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Analysis of the Impact of Electromagnetic Radiations from Cell Phones on Male Sperm Infertility

Lusekelo Kibona* Godbless Swagarya** Michael Kisangiri**

*Information and Communication Technologies Department, Ruaha University College (RuCo) – Iringa, Tanzania
** Electronics and Telecommunication Engineering Department, Nelson Mandela Institution of Science and Technology - Arusha , Tanzania

Abstract- Tanzania telecommunication sector has witnessed fast growth in the number of mobile telephone users now served by seven cellular operators. Until February 2012, there were about 26 million mobile phone subscribers served by more than 4,000 base stations spread all over the country. Despite the many advantages brought by these systems, there is increased public concern over possible adverse health effects due to electromagnetic fields (EMF) radiated by these equipments. This paper aimed to analyze the impact of the electromagnetic radiations from cellular phones to male sperm infertility. The cellular phones with operating frequency of 900MHz and operating frequency 1800MHz were placed at a certain distance near the male reproductive organ (testis) and then electromagnetic wave radiated by the phone were analyzed by measuring the SAR of the testis. It was concluded that there is significant impact on the male sperm fertility on the exposure of the male reproductive organ to the radiations from the cellular phones at the specified operating frequencies near the testis. Several recommendations has been provided, that radiating devices should not be placed on the male pocket trouser for storage and also making calls while the cell phone is in pocket trouser (ie using headphones to receive or make a call) should be completely avoided.

Index Terms- Specific Absorption Rate (SAR), Electromagnetic radiation (EMR), cell phones, male sperm fertility, sperm count.

I. INTRODUCTION

Infertility is defined as inability to conceive after a year of sexual intercourses without the use of contraceptives. In half of the cases the causative factor is the male. Males are exposed to the effect of various environmental factors, which may decrease their reproductive capabilities. A decrease in male fertility is a phenomenon which occurs within years, which may suggest that one of the reasons for the decrease in semen parameters is the effect of the development of techniques in the surrounding environment. A hazardous effect on male fertility may be manifested by a decrease in the amount of sperm cells, disorders in their mobility, as well as structure. The causative agents may be chemical substances, ionizing radiation, stress, as well as electromagnetic waves.[1]

Despite the relative importance of infertility due to the male, infertility evaluations have traditionally focused on women, because women tend to seek gynecological care and because men often are reluctant to seek advice. A variety of disorders ranging from hormonal disturbances to physical problems, to psychological problems can cause male infertility. Although many treatment options are now available, in many cases treatment will not work. In many instances, male infertility is caused by testicular damage resulting in an inability of the testicle to produce sperm. Once damaged, the testicle will not usually regain its sperm-making capabilities; this aspect of male infertility is analogous to menopause (though not natural like menopause) for women and cannot usually be treated. Despite medicine's limited ability to treat male infertility, many successful treatment options are available for its many causes. Besides testicular damage, the main causes of male infertility are low sperm production and poor sperm quality.

Radiofrequency (RF) energy is a type of nonionizing radiation, including EMR produced by cellular phone, and is not strong enough to cause ionization of atoms and molecules.[2]
Cellular phones emit low levels of RF in the microwave range while being used. Although high levels of RF can produce health effects (by heating tissue), exposure to low-level RF may not produce heating effects and causes no known adverse health effects. Several experimental studies demonstrated that exposure to electromagnetic or static magnetic fields had adverse effects on the reproductive system. [3]
Cell phones transmit and receive microwave radiation at frequencies which excite rotation of water molecules and some organic molecules, associated with thermal effects and non-thermal effects. The thermal effects includes headache, sensation of warmth or burning around the ear, burning sensation on the facial skin and alteration of the blood-brain barrier. [4]
In recent times there has been some controversy over the impact of electromagnetic radiation on human health. The significance of mobile phone radiation on male reproduction is a key element of this debate since several studies have suggested a relationship between mobile phone use and sperm quality.
The evaluation of the effect of mobile telecommunications on the state of human health is a difficult issue, which results from the fact that there is a problem with isolating from various environmental factors the particular one that may be caused by electromagnetic waves emitted by mobile phones. In addition, waves of the same frequency waves emitted by phones in association with other factors should also be considered. It may be presumed that people who intensively use phones more often perform sedentary work. This is conducive for the elevation of temperature in the region of the scrotum, and infertility. People who talk on the phone, to a greater degree may be exposed to

stress, which by affecting the level of cortisol, prolactin and testosterone may contribute to the decrease in the concentration of the semen. [5]

II. CELL PHONES ELECTROMAGNETIC RADIATION IN RELATION TO MALE BIOLOGICAL EFFECTS.

The Tanzania telecommunication sector has witnessed fast growth in the number of mobile telephone users now served by seven cellular operators. Until February 2012, there were about 26 million mobile phone subscribers served by more than 4,000 base stations spread all over the country. A considerable increase in the number of FM radio (82 stations) and TV (26) stations has also been observed. These are served by about 55 transmitting towers. Increase in other sources such as Radar was also noticed. Despite the many advantages brought by these systems, there is increased public concern over possible adverse health effects due to electromagnetic fields (EMF) radiated by these equipments.[6]

During recent years there has been increasing public concern on potential health risks from power-frequency fields (extremely low frequency electromagnetic fields; ELF) and from radiofrequency/microwave radiation emissions (RF) from wireless communications. Non-thermal (low-intensity) biological effects have not been considered for regulation of microwave exposure, although numerous scientific reports indicate such effects. Health endpoints reported to be associated with ELF and/or RF include childhood leukemia, brain tumors, genotoxic effects, neurological effects and neurodegenerative diseases, immune system deregulation, allergic and inflammatory responses, breast cancer, miscarriage and some cardiovascular effects. Regarding ELF a new lower public safety limit for habitable space adjacent to all new or upgraded power lines and for all other new constructions should be applied. A new lower limit should also be used for existing habitable space for children and/or women who are pregnant. A precautionary limit should be adopted for outdoor, cumulative RF exposure and for cumulative indoor RF fields with considerably lower limits than existing guidelines. The current guidelines for the US and European microwave exposure from mobile phones, for the brain are 1.6 W/Kg and 2 W/Kg, respectively. Since use of mobile phones is associated with an increased risk for brain tumor after 10 years, a new biologically based guideline is warranted.[7]

Figure 1: Different pictures showing the biological effects caused by electromagnetic radiation from cellular phones
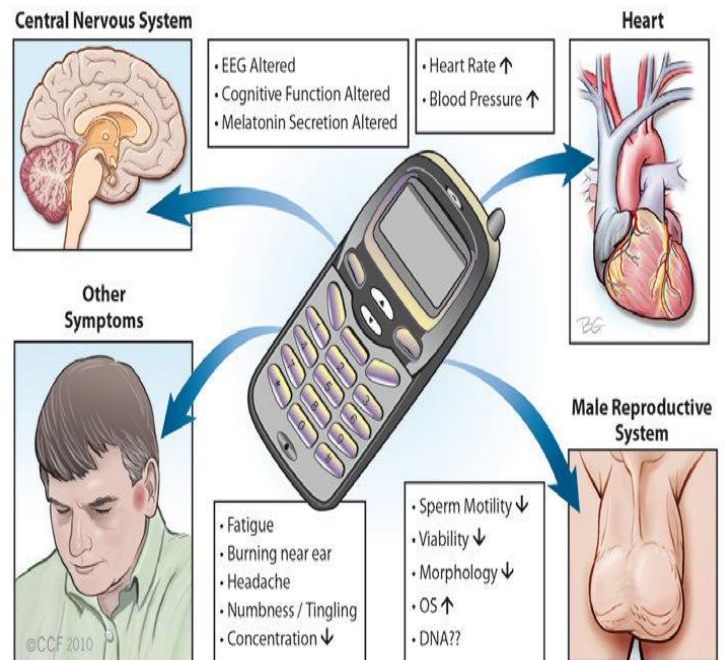
Figure 2: Effects of Cellular Phone Usage on the Human Body. Usage of cellular phones is associated with alterations in various body systems including the central nervous system, cardiovascular system, and male reproductive system. Taken from Makker 2009[8]
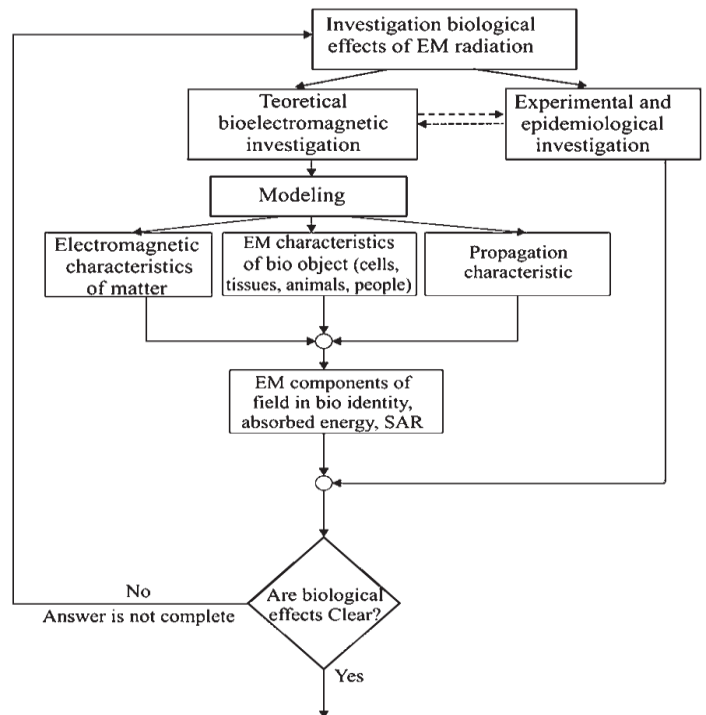
Figure 3: The function algorithm for the research of biological effects of EM radiation according to[9]
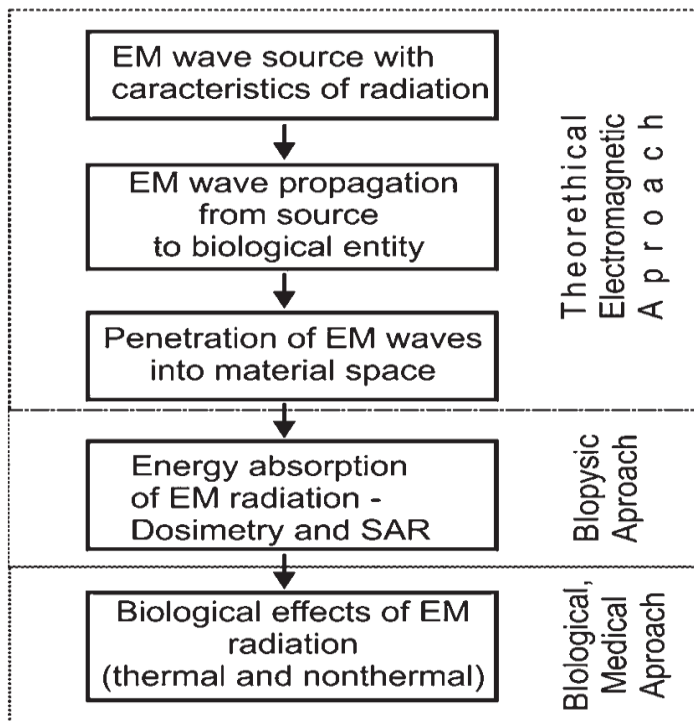
Figure 4: The procedure of examining biological effects of EM radiation emitted from the source of known characteristics according to[9]

Radio frequency electromagnetic radiation (RF-EMF) as produced my mobile phones, like all other forms of electromagnetic radiation cause enough of disruption to our body's cells and physiological functions to warrant real caution in the use and protection against its negative health and fertility outcomes in both men and women.

There are 2 major ways in which mobile phone radiation my impact *infertility*:

1. It disrupts the hypothalamic, pituitary, thyroid, ovarian/testicular axis, which ensures optimum reproductive function – thus affecting male and female reproductive function, with sperm being most heavily affected but women also need to be very cautious because a hypothalamic/ovarian axis disruption can cause ovulatory and fertility challenges of their own kind;
2. The electromagnetic waves emitted by these devices has a direct, physical, oxidative impact on the cells in close proximity to the radiating device.[10]

The effects of electromagnetic radiation can easily be analyzed by considering the threshold values of the specific absorption rates(SAR) in which the factors like Electric field intensity(E) though relative dielectric constant(ε), electric conductivity(σ) and the mass density(ρ).

The radiation source of the cellular phone can be modelled by an equivalent dipole antenna. After obtaining the induced electric field by the FDTD method, the local SAR in W/Kg for:

$$SAR(i,j,k) = (\sigma(i,j,k)|E(i,j,k)|^2)/\rho(i,j,k)$$

E is the electric field magnitude in V/m, σ is the material conductivity in S/m and ρ is the mass density in kg/cubic meters. Also the SAR can be determined by the following relationship

$$SAR = c_p dT/dt$$

Where c is specific heat, dT is rise in temperature, and dt is a short time period, So the rise in temperature in a specified duration may cause to the raise of SAR.

The SAR values always decreases when the exposed skin get or move away from the radiating radiotelephone antenna. So the tissues around the nearby cellphone devices are more exposed compared to the tissues which are far away from the radiating cellphone antenna.

REPRODUCTIVE SYSTEMS AND MALE SPERM FERTILITY

In simple terms, reproduction is the process by which organisms create descendants. This miracle is a characteristic that all living things have in common and sets them apart from nonliving things. But even though the reproductive system is essential to keeping a species alive, it is not essential to keeping an individual alive.

In human reproduction, two kinds of sex cells or gametes are involved. Sperm, the male gamete, and a secondary oocyte (along with first polar body and corona radiata), the female gamete must meet in the female reproductive system to create a new individual. For reproduction to occur, both the female and male reproductive systems are essential. It is a common misnomer to refer to a woman's gametic cell as an egg or ovum, but this is impossible. A secondary oocyte must be fertilized by the male gamete before it becomes an "ovum" or "egg".

While both the female and male reproductive systems are involved with producing, nourishing and transporting either the oocyte or sperm, they are different in shape and structure. The male has reproductive organs, or genitals, that are both inside and outside the pelvis, while the female has reproductive organs entirely within the pelvis.

The male reproductive system consists of the testes and a series of ducts and glands. Sperm are produced in the testes and are transported through the reproductive ducts. These ducts include the epididymis, ductus deferens, ejaculatory duct and urethra. The reproductive glands produce secretions that become part of semen, the fluid that is ejaculated from the urethra. These glands include the seminal vesicles, prostate gland, and bulbourethral glands.

Because the testis is a superficial organ, it may absorb more EMW energy than other organs. Human testes need physiological temperature 2°C lower than body temperature for optimal spermatogenesis and an elevation of testicular temperature may be reversible detrimental factor to sperm production[11]
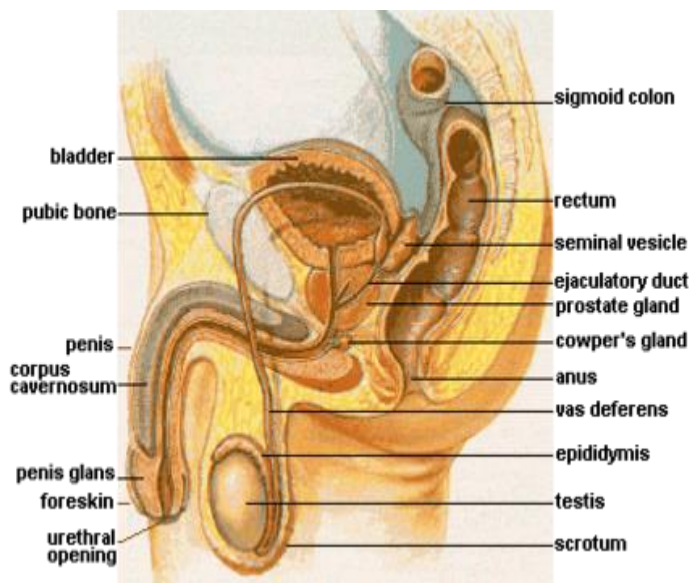
Figure 5: The human male reproductive system[12]

The sperm is the main reproductive cell in males. The sperms differ in that each carry a set of chromosomes dividing each into either a male, or female sperm. The females differ in that they carry a X gene, while the male sperm carry a Y gene. The female sperm also differ phenotypically in that they have a larger head in comparison to the male sperms. This contributes to the male sperm being lighter, and therefore faster and stronger swimmers than their female counterparts (although statistically there is still a 50% chance of an either XY or XX embryo forming.

Spermatozoa stream lines are straight and parallel. The tail flagellates, which we now know propels the sperm cell (at about 1-3 mm/minute in humans) by rotating like a propeller, in a circular motion, not side to side like a whip. The cell is characterized by a minimum of cytoplasm. During fertilization, the sperm's mitochondria gets destroyed by the egg cell, and this means only the mother is able to provide the baby's mitochondria and mitochondrial DNA, which has an important application in tracing maternal ancestry. However it has been recently discovered that mitochondrial DNA can be recombinant.

Spermatozoa are produced in the seminiferous tubules of the testes in a process called spermatogenesis. Round cells called spermatogonia divide and differentiate eventually to become spermatozoa. During copulation the vagina is inseminated, the spermatozoa move through *chemotaxis* to the ovum inside a Fallopian tube or the uterus.

Fertilization is the process by which a sperm combines with an oocyte, or egg cell, to produce a fertilized zygote. The sperm released during ejaculation must first swim through the vagina and uterus and into the fallopian tubes where they may find an oocyte. After encountering the oocyte, sperm next have to penetrate the outer corona radiata and zona pellucida layers of the oocyte. Sperm contain enzymes in the acrosome region of the head that allow them to penetrate these layers. After penetrating the interior of the oocyte, the nuclei of these haploid cells fuse to form a diploid cell known as a zygote. The zygote cell begins cell division to form an embryo.

Male infertility is the inability to cause a pregnancy and often is due to low sperm count.

The most common causes of male infertility are related to sperm usually problems with sperm count and the quality of that sperm. Sperm-related problems includes low sperm count, sperm that don't move quickly enough they die before they reach the egg, sperm that are not formed correctly, seminal fluid that is too thick sperm can't move around in it very easily and no sperm. Heat can have a detrimental effect on normal sperm production. Too much time spent soaking in a hot tub can raise the temperature of the testicles and interrupt sperm production.[13]

Sperm-related problems may result from too much or too little of some of the hormones that guide sperm making. Another cause of male infertility is a problem with ejaculation. In some cases, tubes inside the male reproductive organs are blocked. If so, you may have a hard time ejaculating, or nothing comes out when you have an orgasm. Sometimes, the ejaculation goes backward from the prostate into the bladder instead of out of the body.

III. METHODOLOGIES

The biological effects of electromagnetic radiation are studied through investigations and research such as numerical bioelectromagnetic modelling, experimental (*in vivo* and *in vitro*) investigations and epidemiological studies.

A multidisciplinary approach is crucial to obtain relevant information on the biological effects. The technical sources of radiation and their key features are best known to the engineers engaged in their design, while the process of propagation and absorption is analyzed by applying the physical laws of propagation, technical methods of analysis and simulation[9].

In order to determine the biological effects of electromagnetic waves electromagnetic radiation it is extremely significant to define the amount of absorbed energy of the incidental wave and its distribution in the volume of the object.

Also various frequencies for GSM (from 900MHz and 1800MHz) have been used in simulating the results to find the SAR, Electric field and Magnetic field variation with the mentioned frequencies and fixed transmit power using FEKO simulation software or tool.

It is rather difficult to recreate the real internal structure of tissues and organs. That is why we apply simplified organ and tissue modelling. This makes it possible to model tissues from homogeneous layers that constitute the skin, subcutaneous tissue, bones, skulls, etc., whereas organs are modelled as ellipsoidal structures resembling for instance the brain, eyes, kidneys, or stomach. Such models are suitable for use in numerical simulation programs alongside source models (mobile phones, antennas, etc.). [9]

The obtained results of the field components, absorbed energy and SAR values in such models, although numerically correct, are not very useful for medical professionals since these results cannot be easily associated with biological effects.[14] This is due to the fact that they do not entirely reflect the true structure, thus making it difficult to localize anatomical structures. For example, in a descriptive model of the head, it is not possible to locate the pineal gland and calculate the amount of energy absorbed in it, although some studies have indicated that the

pineal gland is particularly sensitive to the effects of electromagnetic radiation

We do assume that it is possible to link the results of modelling absorbed energy in tissues with the real structure of the tissue, and thus locate the parts of tissue where the biological effects of radiation can be seen. For example in our case we assumed that the tissue present in testes are the investigative parts which can give us the required simulated results.

IV. RESULTS AND DISCUSSIONS

After going through the methodologies above, analysis has been done on the experimental values obtained through the use of FEKO software at GSM frequencies of 900MHz and 1800MHz at a distance of 10cm from where the cell phones was situated in relation to the position of the testes.

The cell phone antenna

Sphere assumed as testis
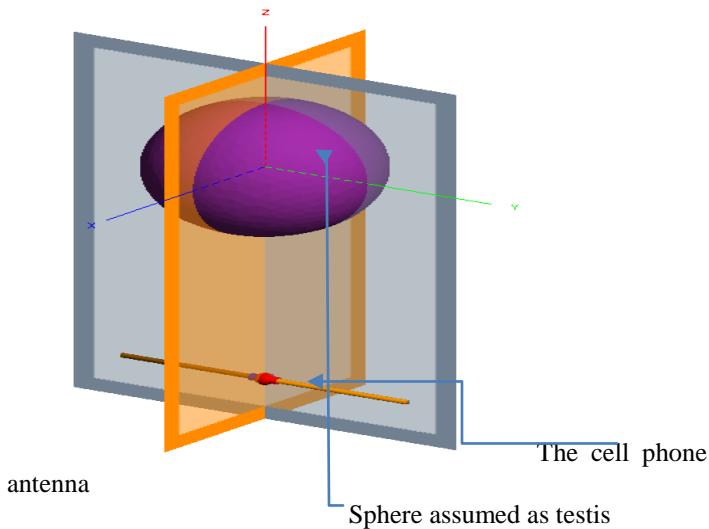
Figure 6: Showing the setup of the experiment analysis of the radiation effects on testis
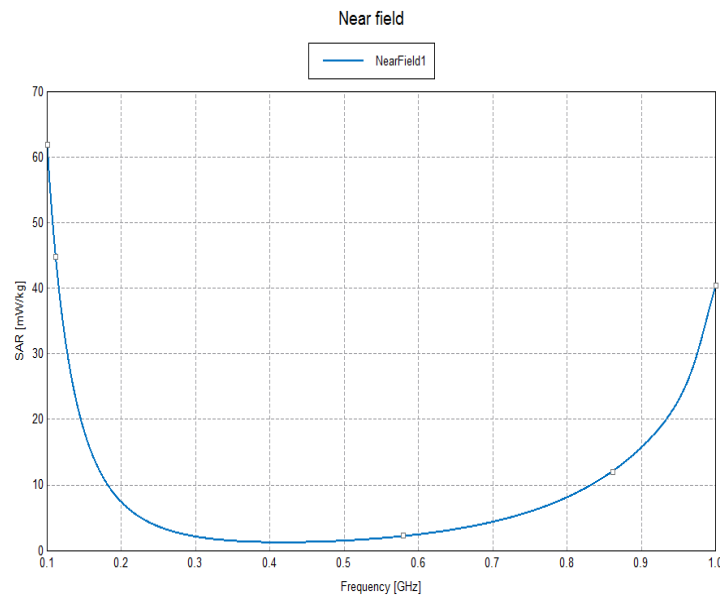
Figure 7: Showing the simulated results of SAR against operational frequency of 900MHz.
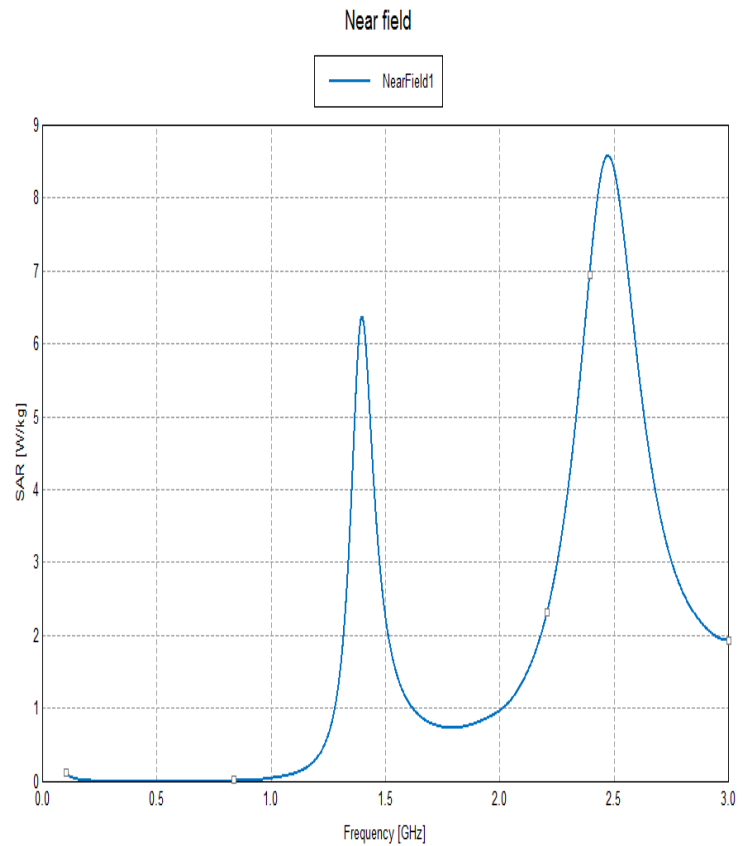
Figure 8: Showing the simulated results of SAR against operational frequency of 1800MHz.

From the simulation results above we can discuss on the values of SAR at different frequencies used by GSM cellular phones where for 900MHz the SAR values was approximately 17mW/kg as it can be seen from the graph when the maximum transmit power from the cellular phone antenna was limited to 2Watts while for 1800MHz, the SAR value was approximately 0.8W/kg as seen from its graph when the maximum transmit power from the cellular phone was limited to 1Watt.

V. CONCLUSION

Since there is energy absorbed by testis tissues during radiation, this electromagnetic energy is easily converted to thermal energy and thus can disturb sperm production which will eventually lead to low sperm count and hence cause infertility problem, also this thermal energy can lead to the reduced sperm motility which also contributes to infertility as the sperm speed is being reduced to the extent that it can struggle to reach the female egg for ovulation.

The SAR values always decreases when the exposed skin get or move away from the radiating radiotelephone antenna. So the tissues around the nearby cellphone devices are more exposed compared to the tissues which are far away from the radiating cellphone antenna.

So keeping cell phone in trouser pocket can lead to male sperm infertility because it will be nearby the reproductive organs specifically testes where sperms are produced and stored there.

RECOMMENDATIONS
From this study, we recommend that storage of mobile phone in a trouser when it is on should be abandoned, also the use headphones while talking and at the same time the phone is situated nearby male reproductive organs should be strictly avoided, and if it is impossible for the two cases above then try to make the call as short as possible (avoiding to make a long call which for example can last for let say 30minutes).

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AUTHORS

First Author – Lusekelo Kibona, Tutor, Ruaha University College, Iringa Tanzania and kibonal@nm-aist.ac.tz.
Second Author – Godbless Swagarya, Msc student, Nelson Mandela African Institution of Science and Technology, Arusha Tanzania and swagaryag@nm-aist.ac.tz.
Third Author – Dr. Michael Kisangiri, Lecturer, Nelson Mandela African Institution of Science and Technology, Arusha Tanzania and kisangiri.michael@nm-aist.ac.tz.

Correspondence Author – Lusekelo Kibona, Tutor, Ruaha University College(RuCo), Iringa-Tanzania and kibonal@nm-aist.ac.tz. +255 754 406025

Mitigation of the Transient Recovery Voltage on Generator Circuit Breaker during Generator Fed Faults

Tamer Elyan, Ebrahim .A. Badran, M. A. Abd-Allah, Abdelsalam H. Hamza

*Department of Electrical Engineering, Faculty of Engineering Shoubra, Benha University, Cairo, Egypt
**Department of Electrical Engineering, Faculty of Engineering, Mansoura University, Cairo, Egypt

Abstract- This paper simulated a generator circuit breaker model using ATP-EMTP simulation package. The frequency of oscillations produced at current zero is reduced as the short circuit current increased. At 80 kA short circuit a resignation is happened at first current zero, while the success interruption is happened at the second current zero, at a capacitance of 8.3nF. As the short circuit current increases, more than 80 kA, the circuit breaker fails to interrupt with the small terminal capacitor, i.e. 8.3nF, 10nF and 20nF. The TRV is decreased as the value of the terminal capacitor increased. At a certain value of the terminal capacitor, the TRV is increased with increasing the short circuit current. The RRRV decreases as the value of the terminal capacitor increased. Also, at a certain value of the terminal capacitance, the RRRV decreases with decreasing the short circuit current.

Index Terms- Modeling, Mitigation, Transient recovery voltage TRV, Rate of rise of restricking voltage RRRV, Time to crest.

I. INTRODUCTION

I. INTRODUCTION

Generator circuit breakers, GenCB, are located between generators and step-up transformers in power networks and their ratings usually range from 100MVA to 1300MVA. GenCBs face much higher current and voltage stress than distribution circuit breakers and the current interruption requirements of GenCBs are significantly higher than the distribution networks at similar voltages [1, 2, 3]. Modern GenCBs implement self-blast interrupting principles in order to reduce the operating energy of the circuit breaker. With this special design, GenCBs are capable of interrupting short circuit currents with high asymmetries. During a breaking operation by an SF6 GenCB, the arc voltage modifies the behaviors of the short circuit current. Therefore, GenCBs usually exhibit significant arc voltages with short arcing times. A few different mathematical circuit breaker models exist and are mostly characterized by experimentally measured parameters to describe the dielectric properties of different phenomena taking place in the breaker opening process. At the moment there is no existing precise universal arc model because of the complexity of the arc physics. On the other hand, most of the models mainly focus on describing the breaker behaviors during the current zero periods and ignore the importance of arc voltage. This paper focuses on the modeling, simulation taking the arc voltage into consideration. A mitigating technique to suppress TRV produced across the

GenCB as a result of switching generator using GenCB is studied at different short circuit current.

II. MODELING OF GENCB

The proposed contact model is a black-box model with variable conductance. The value of conductance is determined by a mathematical model, which comprises four sub-stages: a closed breaker stage, an arcing stage, an arc extinguishing stage and an open stage [4, 5].

A constant resistance with a value of $1\mu\Omega$ is used for modelling the closed circuit breaker stage and a constant resistance of $10M\Omega$ is used to model the open circuit breaker stage after successful arc extinguishing. The arc extinguishing stage is modelled by using a series connection of a Cassie and Mayer arc model.

$$\frac{dg_c}{dt} = \frac{1}{\tau_c}\left(\frac{i^2}{U_C^2 g_c} - g_c\right) \qquad (1)$$

$$\frac{dg_m}{dt} = \frac{1}{\tau_m}\left(\frac{i^2}{p_0} - g_m\right) \qquad (2)$$

The total conductance of the arc model during this stage is calculated using equation (3) and applied in the simulation for the arc extinguishing stage.

Where; i is the current through the breaker, gm is the conductivity of mayer's model part, g_c is the conductivity of cassie's model part, τ_m is the Mayer time constant, τ_c, is the Cassie time constant, U_c the constant voltage for Cassie arc model, and p_o is the constant power of Mayer arc model.

The four sub-models form a combined contact model. Once the contact receives open signal, each sub-model is activated at the corresponding time.

III. GENERATOR FED FAULTS

Figure 1 show a generator circuit breaker located between the generator and the step up transformers. The two key unique fault current conditions encountered by generator circuit breakers are shown in Figure 1.

ATP-EMTP simulation package is used to simulate the generator fed fault, fault at B, of Figure 1.The simulation network of a generator fed fault by using the Habedank arc

model for modelling the circuit breaker is shown in Figure 2 [6]. There is usually a cable connected between the GenCB and the step up transformer, hence the demonstration circuit comprises a voltage source, a GenCB, a cable and a fault initiated at the end of the cable.
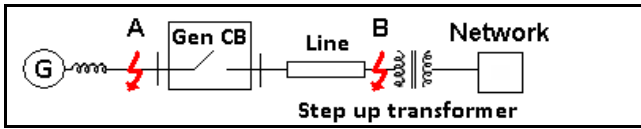
Fig.1.System fed fault of generator circuit breaker [6]
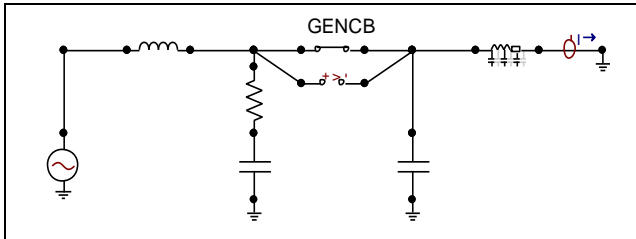
Fig.2.Demonstration circuit for generator fed fault

The voltage across the circuit breaker at current interruption of 20kA short circuit current is shown in Fig. 3. It is noticed that at current zero, the voltage oscillates with a high frequency. After the period of high oscillation the voltage oscillates at 60 HZ, with a value of 20.4kV.

Figure 4 shows the voltage across the circuit breaker at current interruption of 20kA short circuit current. It is noticed that at current zero the voltage oscillates with a high frequency and reached from zero to crest value of TRV of 41.801kV in time of 10.9 µs, i.e. the RRRV is 4.511 Kv/ µs. Following the decay of transient, the voltage oscillates at 60HZ with 20.4kV.
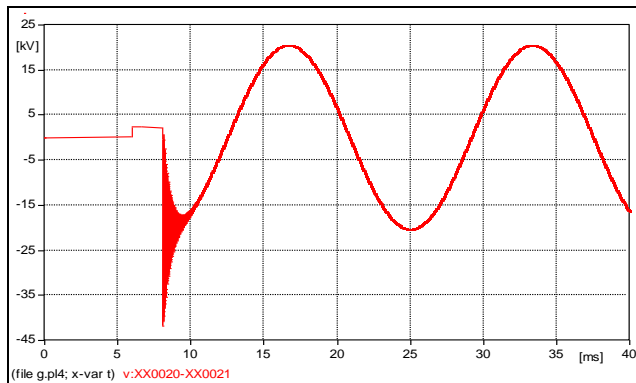
Fig.3.Transient recovery voltage of 20kA short circuit.
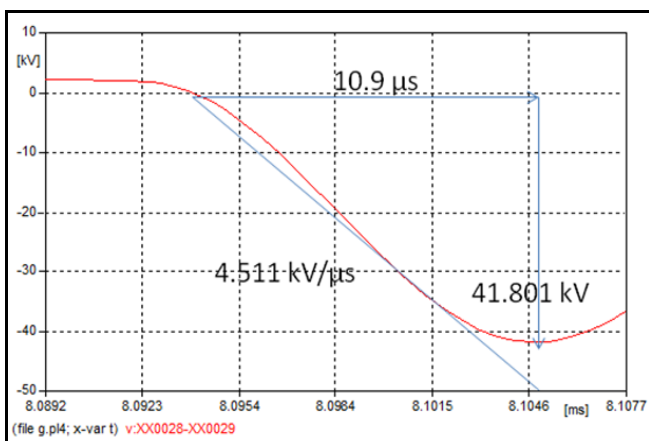
Fig.4.Crest value and RRRV of transient recovery voltage of 20KA short circuit current

Figure 5 and Figure 6 show the voltage across the circuit breaker at current interruption of 60kA short circuit. It is noticed that the TRV oscillates with lower oscillation than the previous case of 20kA short circuit. At current zero the voltage oscillate with high frequency and first TRV peak of oscillation reaches a value of about 40.654kV in a time of 6.6 µs. The RRRV is about 7.2467 kV/ µs which is larger than that of the 40kA case. Following the decay of transient, the voltage oscillates at 60HZ with 20.4kV.
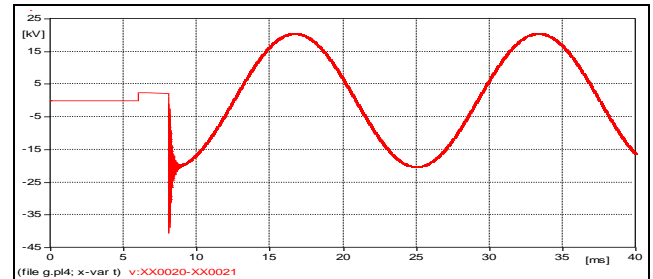
Fig.5.Transient recovery voltage of 60kA short circuit
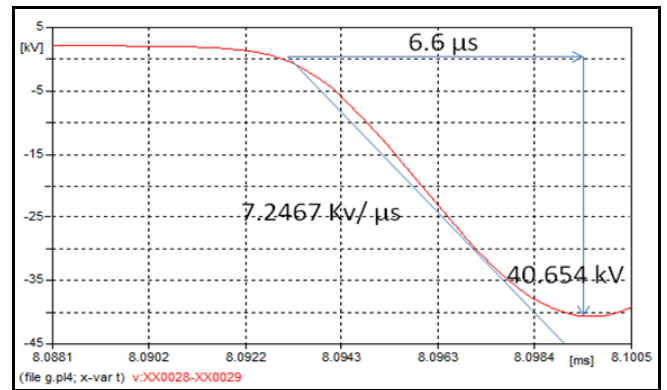
Fig.6.Crest value and RRRV of transient recovery voltage of 60KA short circuit

The voltage across the circuit breaker at current interruption of 80kA short circuit is shown in Figurers 7 and 8. It is noticed that the reignition is happened at first current zero and the interruption of short circuit current is happened at the second current zero. After that the TRV oscillates with high oscillation and the first TRV peak of oscillation reaches the value of about 40.308kV in a time of 6.4 µs. The RRRV is about 7.4 kV/ µs. Following the decay of transient, the voltage oscillates at 60HZ with 20.4kV.
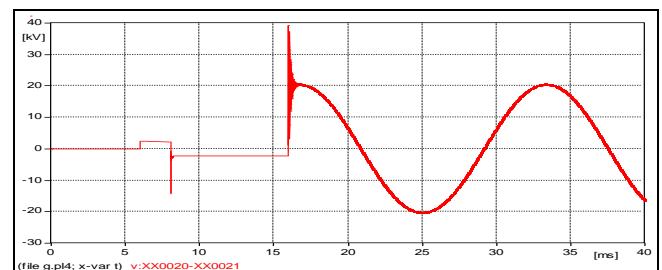
Fig.7. transient recovery voltage of 80kA short circuit

The voltage across the circuit breaker in case of 100 KA and 130 KA short circuit currents is shown in Figure 9. It is seen that the circuit breaker fail to interrupt the two short circuit levels.

IV. MITIGATION OF THE TRV

A capacitor can be used at the terminal of the generator to suppress the TRV effectively. Figures.10 and Figure 11 show the voltage across circuit breaker at two different values of capacitances, 8.3nF and 30µF, respectively. It is noticed that the first waveform has a high voltage oscillation with using a capacitance of 8.3 nF. The TRV and the RRRV are about 41.801kV and 3.834 kV/µs, respectively. While with using a capacitance of 30µF, the TRV and the RRRV are about 27.088kV and 0.092 kV/µs, respectively. It is also shown that the high frequency oscillation is removed with using a capacitor of 30µF.
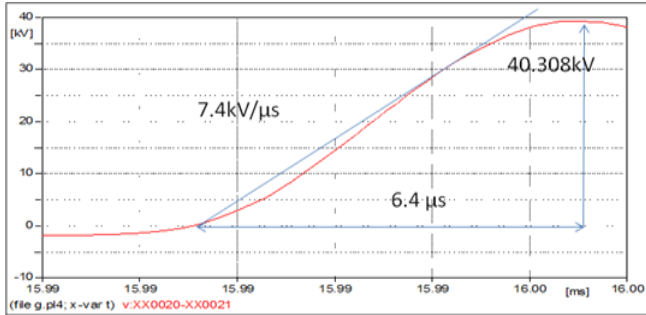
Fig.8. the crest value and RRRV of transient recovery voltage of 80KA short circuit
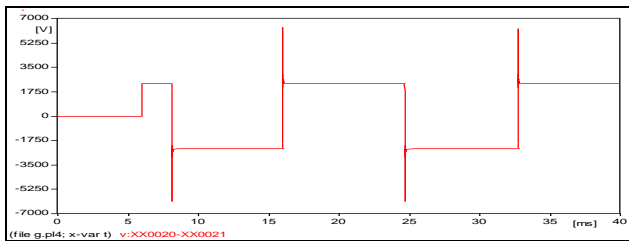
Fig.9 the voltage across the circuit breaker
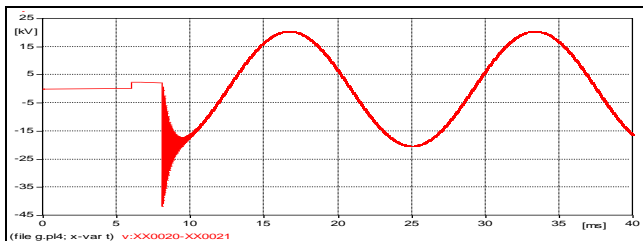
Fig.10.The voltage across the circuit breaker in case of 20kA short circuit and 8.3 nF capacitor
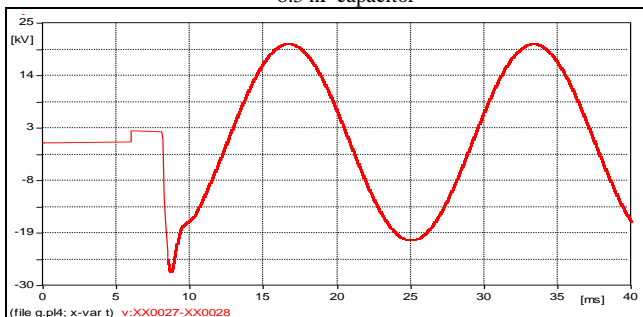
Fig.11.The voltage across the circuit breaker in case of 20kA short circuit and 30 µf capacitor

Figure 12 shows the TRV versus the capacitance value of capacitor at generator terminal. It is noticed that as the value of the capacitance increased the TRV is decreased. Also, the TRV is increased as the short circuit current increased, at a certain values of terminal capacitor. It must note that the capacitance should not exceed a certain limit to prevent resonance in the network. The TRV will be decreased by about 13.34 kV as the

capacitance increased from 8.3 nF to 20 µF, at 20 kA short circuit current. The TRV will be decreased by about 5.65 kV as the short circuit current increases from 20 kA to 130 kA, at a capacitance of 1.0 µF. At 100 kA short circuit the circuit breaker is failed to interrupt with a terminal capacitor of 8.3nF and 10nF, while at 130 kA the circuit breaker is failed to interrupt with a terminal capacitor of 8.3nF, 10nF and 20nF.
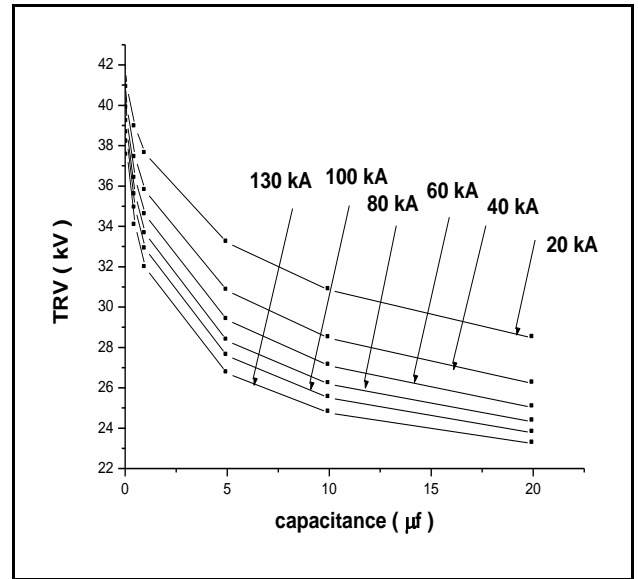
Fig.12 TRV versus capacitance values at different short circuit current

The RRRV versus the capacitance values, at different short circuit currents is shown in Figure 13. It is illustrated that as the value of the capacitance increases, the RRRV is decreased. Also, the figure shows that, at a certain value of the capacitance, the RRRV decreased as the short circuit current decreases. The RRRV will be decreased from about 4.51 kV/µs to about 0.07 kV/µs as the capacitance increased from 8.3 nF to 20 µF, at 20 kA short circuit current. The RRRV will be increased from about 0.27 kV/µs to about 0.87 kV/µs as the short circuit current increases from 20 kA to 130 kA, at a terminal capacitance of 1µF.
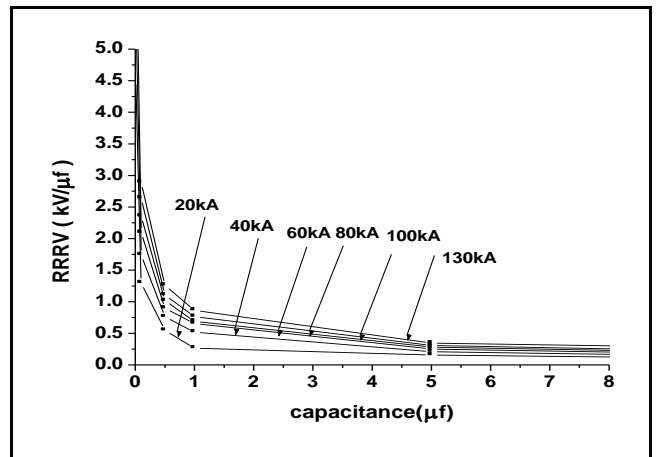
Fig.13.RRRV versus capacitance at different short circuit current

The change of time to crest, T2, with the capacitance values at different short circuit currents is shown in Fig.14. It is noticed that as the value of the capacitance increase the time to crest is increased. Also, at a certain value of the capacitance, the time to crest is increased as the short circuit current decreases. The time to crest is increased by about 453.6 µs as the capacitance increased from 8.3 nF to 20 µF, at 20 kA short circuit current. The time to crest decreased from about 116.3 µs

to about 43.4 µs, as the short circuit current increases from 20 kA to 130 kA, at a terminal capacitance of 1µF.
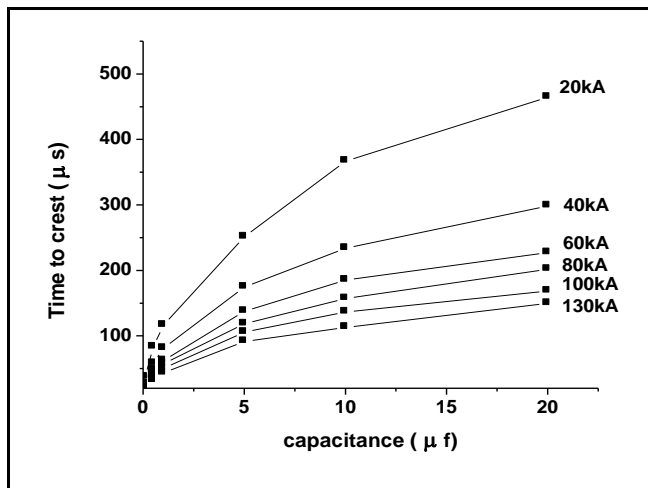
Fig. 14 the time to crest versus capacitance values at different short circuit current

V. CONCLUSIONS

1. The frequency of oscillations produced at current zero is reduced as the short circuit current increased.
2. At 80 kA short circuit current a reignation is happened at first current zero, while the success interruption is happened at the second current zero, with a terminal capacitance of 8.3nF.
3. At 100 kA short circuit current the circuit breaker is failed to interrupt with a terminal capacitor of 8.3nF and 10nF, while at 130kA short circuit current the circuit breaker is failed to interrupt with a terminal capacitor of 8.3nF, 10nF and 20nF.
4. The TRV decreases with increasing the value of the terminal capacitor.
5. At a certain value of terminal capacitor, the TRV is increased with increasing the short circuit current.
6. The RRRV decreases with increasing the value of the terminal capacitor.
7. At a certain value of the terminal capacitor, the RRRV decreases with decreasing the short circuit current.

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Green Growth & Organic Agriculture as Livelihood Strategy in Sustainable Rural Development

Rajesh Kumar Dubey

* Department of Bio-technology, Faculty of Science & Technology, Shri Venkateshwara University, Amroha, Uttar Pradesh

Abstract- This paper presents the findings of a case study of a Tribal community pursuing a green growth & livelihood strategy based on organic agriculture. Using the sustainable rural livelihoods framework, the paper identifies three different organic livelihood strategies involving varying degrees of capitals. The paper concludes that understanding the implications of these different organic strategies and their rationales is a prerequisite for policy-makers to tailor policies and programmes aiming to assist rural communities benefit from organic agriculture as a vehicle for advancing green growth & sustainable rural development.

Index Terms- Chhattisgarh, Organic Agriculture, Agro-ecological Income, Livelihood Strategy, Market and Non-Market Values, Community.

I. Introduction

With increasing concern about the environmental, economical and social impact of chemical–dependent conventional agriculture, have led many farmers and consumers to seek alternative practices that will make agriculture eco-friendly, profitable and livelihood sustainable. The alternative organic farming is potentially a profitable enterprise, with a growing global market, already being supplied by more than 90 developing countries. Entrepreneurs see a market for selling food that has been grown chemical free. Local consumers in India have a fairly well-developed perception about organic produce, are interested in buying certified organic foods, and even willing to pay more for them. To gain access to this market, however, certification is a prerequisite. As well as achieving this, the following issues are also important for developing countries: increasing technical know-how amongst the farmers about organic farming and organic inputs; good post- harvest handling (e.g. cold storage, quality grading, and packaging support); effective and efficient infrastructure and export logistics (to enable the fresh produces to arrive in good condition in the country of destination); and good and trustworthy relations with importers, traders and wholesalers in the target markets. This sector enables to meet the necessary requirements of producing and marketing organic foods, both the domestic and export markets; and can secure an extra premium for the poor farmers. Through research & development, extension and small- scale trials, enable the rapid expansion of organic farming and so significantly develop livelihood among the farmers, BPL families for both farm & non-farm activities. Organic farming used to be the principal farming method before "modern agriculture" was introduced. Organic foods and textiles are gaining market shares throughout the world. This is true not only

from a global market perspective seeing organic volumes and market values exchanged internationally and in domestic and local markets. It is also true from a perspective seeing organics as a livelihood strategy involving non-market values and perhaps symbolizing a globalization option: a chance to cope with globalization based on opportunities arising from a mix of global and local (Egelyng 2006). Organics are becoming an attractive option for rural residents to generate income and improve their livelihoods (Oltramari et.al 2002). This paper analyses organic agriculture as such a (community level) livelihood strategy. Inspired by the livelihood approach, particularly its ecological economics (natural capitals, environmental services and incomes) and social capital (networks) dimensions, the paper provides an analysis of market and non-market rationales for individual farmers as well as their communities to "go organic" and pursue organic agriculture as a rural developmental pathway.

II. Materials and methods

This paper draws upon yearlong field research in tribal areas of Bastar, Sarguja & Korea a community of small family farmers in the state of in Chhattisgarh. More specifically, it focuses on socio-ecological implications of organic agriculture for local livelihood strategies. Data were collected using a variety of methods. These included participant observation, open-ended interviews, archival research and surveys (both quantitative and qualitative). The sustainable rural livelihoods framework (Scoones, 1998) is the approach used in our analysis.

III. Results

Today an organic food is the outcome of professionals and entrepreneurs born in Bastar who, with relatives and friends still farming in the community, established a local association in 2011, to promote "the quality of life of small family farmers through organic agriculture". A project for small-scale agro-industrialization and a local association for agri-tourism supporting farmers and local residents developing tourism linked to organics part of the story as well as international development agencies, non-profit organizations, and prestigious academic institutions, supporting sustainable agriculture programs in Bastar. Today, Organic Farmers Interest Groups (OFIG) operates in the Bastar different areas commercializing a variety of foods (milk, honey, sugar, vegetables, rice, etc). After organic adoption their organic production will be "properly" certified organic - and Bastar's agri-tourism program keeps expanding.

Out of the 44 certified productive units analyzed have different agro-ecological patterns and farms sizes. Farm size

ranges from less than a hectare (farmers producing honey 'renting' the use of a forest area for their hives) to farms over 40 hectares (up to 90). Most of these are connected to a local agro industry (sugar, jellies, canned foods, cheese). In addition to size, land use patterns also vary significantly among farmers. While some producers devote significant portions of the farm to timber (eucalyptus and/or pine trees), others do not manage this resource. Despite this variability, farmers across municipalities do share two common land use trends: agro-ecological diversification and preservation of areas with native forest.

Besides differences in size and land use, local organic producers are diverse in terms of their livelihood strategies. Table 1 (below) shows three basic typologies of organic producers found in the region. The main differences across these different types of organic 'practices' are the relevance of agro-ecological income in the household, and their position in the socio-economic network of organic activists, business communities, consumers and farmers. (Agro-ecological income can be defined as benefits flowing from practicing organic methods, for instance in terms of extra wildlife to harvest or extra output resulting from conservation biological control where a bio-diverse non-sprayed farm eventually provide habitat and food sources to beneficial, which help control pests). Family farmers (type 1) rely extensively on the agro-ecological resources of the farm for productive and reproductive functions, and they have lower levels of economic and social capital – less income and less education, less influential connections and less access to information. Family farms are located outside the 'downtown' of the village, often in places of difficult access, i.e hilly terrain, dirt roads and limited communications. In contrast, most mixed households (type 2) work with tourism and hire labor to plant, weed, harvest, and process). In mixed households, at least one adult work off-farm in local jobs as teachers or municipal employees. Joining organic production does not prevent such households from establishing residency, which in practical terms means direct access to local services (phone, bus, stores, school, bank, pharmacy, etc) and networks (associations, gatherings, etc). A third category of organic households, which we refer to as "instrumental retreats", corresponds to households which do not obtain significant agro-ecological income from organic production, but rather they use the 'farm' for personal, recreational, community service, and/or political articulation in the community. This category comprises professionals residing outside, including absentee owners, who sympathize with the local association for organic farming. These 'instrumental retreats', which are also certified organic and part of the local association for organic farming, are partially productive. Some have fruit trees, or chicken, or hives. However, this category of organic agriculture may be better understood as spaces of social exchange. Meetings, assemblies, workshops, and symposia are articulated by these organic 'producers', who contribute with their knowledge and connections to the advancement of organic farming in the region.

Table- 1: Household typologies among certified **(under conversion) organic producers.**

Particulars/ Criteria	Household typologies		
	Family farm	Mixed household	Instrumental retreat
Education	Primary	Primary/Secondary	College/Graduate
Labor	Family	Family/Hired	Hired
Self-consumption	High	Low	Not Relevent
Services	Poor	Standard	Depending on use
Off-farm work	Agriculture(if any)	Local Services	Professionals/entrepreneurs
Residency	Farm	Town	Town/City
Participation	Low	Medium	High
Off-farm income	Sporadic	regular	Always
Organization	Nuclear	Nuclear/individuals	individuals
Tourism	Not Common	Most of them	Private/informal

IV. DISCUSSIONS

A decade after a local association for organic farming was established in the region, three different typologies of certified organic producers can be identified in the community of Bastar: family farms, mixed households, and instrumental retreats. These three types of 'producers' do not differ so much in terms of their agro-ecological practices (diversification), but in relation to the role that the income resulting from organic production plays in the households. This in turn is deeply correlated to the capacity of the household to access social and economic capitals. Households depending almost exclusively on agricultural incomes do not fully participate in the decision-making process of the association(s) they belong to and have less educational resources – a characteristic shared with non-organic small family farmers in the region such as tobacco producers. In contrast, organics have also fostered new typologies; the mixed household and the instrumental retreat. In mixed households, "organics" are an alternative extra source of income, and the tendency is to rely on services (tourism) rather than small-scale agro-industrialization. In instrumental retreats, unlike in the two previous types, organics are not that much of a productive, but a political tool. These institutional spaces serve to connect urban residents involved in the local reality of the producers. At the same time, retreats open the rich socio-economic networks of the urban/global society to the rural community.

V. CONCLUSIONS

The diversity of organic 'productions' found in the community of Bastar can be interpreted as a response to adopt and adapt organics as a livelihood strategy in a rural community of small family farmers (Moreno-Penaranda, 2006). The three different ways in which organics occur in the community are deeply interrelated. While small organic family farmers manage the agro-ecological resources and their processing into foods, mixed households 'use' organics to develop alternative sources of rural income, such as agri-tourism. Both types of households are connected to the broader institutional, social, and financial dimension of organics through the networks of academics, entrepreneurs and other professionals involved in the experience. Given the complexity of these interactions, we argue that the role of organics as a livelihood strategy can be interpreted as a strategy to adapt organics to the local community. A policy to transform certified organics into an instrument of social change in rural communities ultimately depends on understanding the functioning of these networks.

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AUTHORS

First Author – Rajesh Kumar Dubey, Department of Bio-technology, Faculty of Science & Technology, Shri Venkateshwara University, Amroha, Uttar Pradesh

Cross-Language Instant Messaging

Tippu Junaidi*, Umesh Kamble*, Viraj Kalkur*, Haridas Kavindra*,Y.C.Kiran **

* Dayananada Sagar College of Engineering, Bangalore
** Associate Professor, Department of Information Science and Engineering, Dayananada Sagar College of Engineering, Bangalore

Abstract- Along with the rapid development of Internet technologies, the instant messaging has become nowadays an important medium for a huge number of people to communicate with friends, family, and even colleagues while working. People who come from different corner of the world speak different native- languages. Even if the instant messaging technology is now so developed, there is a barrier to communication for people having different native-languages.

This application tries to let people easily chat without having to be familiar with the others' native language by integrating "instant messaging" and "machine translation" technologies. This shall overcome the language barrier to communication. Furthermore, with proper design, this mechanism can also facilitate conversation practice.

I. INTRODUCTION

In recent years, along with the development of Internet communication technologies, various network-related applications are springing up. Social network and its related applications are the hottest topics. Among them, the instant messaging (IM) has become nowadays an important medium for people to communicate for its convenience and free of use. Through the Internet we are able to make friends with people around the world and chat with them using a computer. The instant messaging has shortened the geographical distance between people all over the world - the conversation is as easy as sitting in front of the computer and popping fingers to type – the text communication has become easy and efficient. However, the invisible distance – the barrier results from the different native-languages people speak has not been eliminated yet. Problems are with inputting foreign languages and to even understand other languages. It is still a tough work for people to communicate with each other's while they are speaking different native languages.

This language barrier needs to be overcome by the technology of natural language processing (NLP). Natural language processing Technology, such as information retrieval, speech recognition, machine translation, automatic summary and so on, has developed rapidly in recent years. The machine translation technology can be used to do the language translation task instead of human translators or language experts. If "instant messaging" and "machine translation" technologies cooperate so that instant messaging is no longer just a messenger's role: it also properly does real-time translation to the context of messages. This shall eliminate the barrier to communication easily for those whom are speaking various different languages. Furthermore, with some proper design, this mechanism can also provide some facilitation for conversation practice during language learning.

II. RELATED WORKS

2.1 Instant messaging

Instant messaging is a kind of network service that allows two or more people to make text chat to each other's. It is developing rapidly in recent years, and is integrated with more and more functions such as offline message delivery, voice chat, video chat, file-transfer etc. Instant messaging is now no doubt one of the most popular network services in the Internet.

In April 2009, "comScore, Inc." released a result [1] of an application Internet users in France revealed that people in France spent the highest share of total time spent at 14.3 per cent on instant messaging, followed by social networking at 5.7 per cent. In October 2009, another report of "comScore" [2] indicated that online communications, entertainment and social networking occupied the highest share of Hong Kong Internet users' attention. Instant Messengers accounted for the highest share of minutes spent online at 16 per cent. Yet another survey [3] indicated that MSN Messenger [4] has the strongest penetration worldwide, with 61 per cent of worldwide IM users utilizing the application. MSN Messenger is also dominant in Latin America, reaching more than 90 per cent of IM users, and in Europe and Asia Pacific, reaching more than 70 per cent of IM users in each region.

North America is the most competitive IM market, with MSN Messenger, AOL/Aim [5] and Yahoo! Messenger [6] each garnering between 27 per cent and 37 per cent of IM users.

According to a survey in Taiwan by InsightXplorer Limited [7], the current usage rate of instant messaging in Taiwan is 92.7%, among which 50.1% of netizens have installed two or more instant messaging software. From the view of user-age, the younger the netizens are, the more often they communicate with friends via instant messaging. In the ages of 15 to 19 year-old, 99% Web surfers use instant messaging; despite from the teenagers, in the age of 35 to 39 year-old, the usage rate is as high as 81.3%. As for the user population, MSN Messenger owns a number of more than 700 million users, while the Yahoo! Messenger about 470 million users.

2.2 Electronic dictionary

The software electronic dictionary is usually available   in the form of either   package software or network service accessed through a Web browser (online service). For the latter, because of its no installation of software needed and free to use, is currently most popular way to provide the dictionary service, commons are Yahoo! dictionary [8], Google translate [9], Microsoft Bing translations [10]. These online dictionary services normally provide the functions of vocabulary queries, paragraph translation, webpage translation, text file translation and some others. Google translate   and   Microsoft

Bing translations provide not only a number of intimate small tools and resources to end-user, but also application programming interface (API) to the computer software developer [11, 12]. One example of benefit from automated translation technology is that many Internet Content Providers make copies of the original web content available in various language versions generated by machine translation, thereby expanding the scope of audience to global.

2.3 Instant Messaging with Language Translation

With today's technology, the cross-language dialogue is not out of reach. The key is to cooperate "instant messaging" and "electronic dictionary" technologies. For Internet instant messaging, not only passing messages for the two sides in dialogue, but also makes proper language translation to the context of the messages. The electronic dictionary can be used to facilitate the translation task.

Instant messaging is a kind of network service that two or more users can talk to each other's by real-time text chat. Among many, MSN Messenger [4] is developing quickly and is one of the most popular globally. As for the electronic dictionary, now often provides service through web pages (also referred to as Internet dictionary, online dictionary). In addition to look up words, it also provides advanced sentence translation function. Among many, Google Translate [9] is one of the most developed online dictionaries and it comes with application programming interface (API) that can be used by computer program rather than human [11,12].

This developed application uses an instant Messenger for communication technology and Google Translate for language translation technology, to design a system that supports "bi-directional multi-language translation" instant messaging, as shown in Fig. 1.

message context according to the native language settings of two ends.
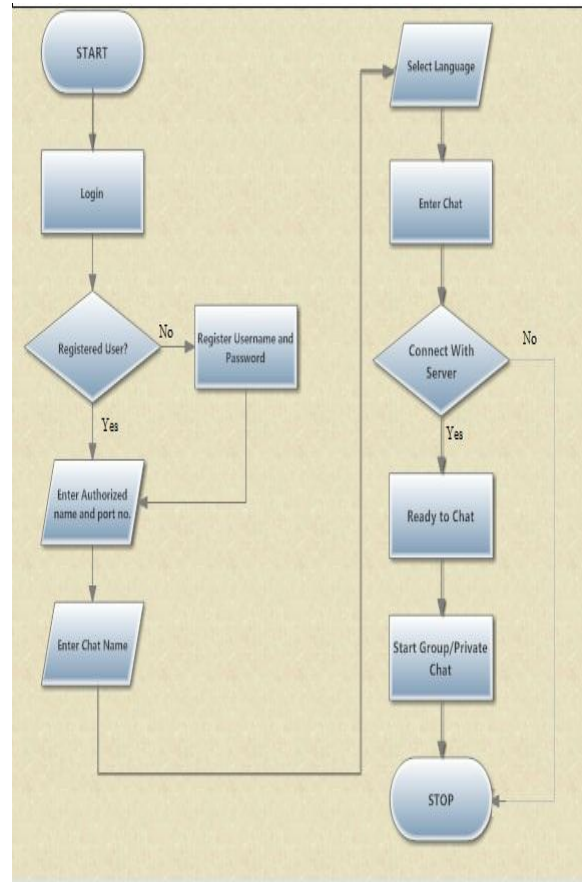
Fig: Flowchart for Client Module
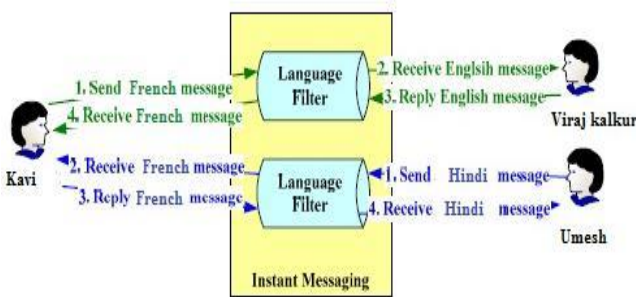
Fig1: Bi-directional multi-language automatic translation instant messaging.

III. SYSTEM PROCESS AND ARCHITECTURE

3.1 System Process

The system provides a set of management interfaces to allow users to maintain their MSN Messenger contact list, each contact in the list can be configured to be associated with a value of "native-language". This setting will be stored in a database for future reference. The system is responsible for passing text messages between two dialogue ends, and more importantly, making appropriate language translation to the
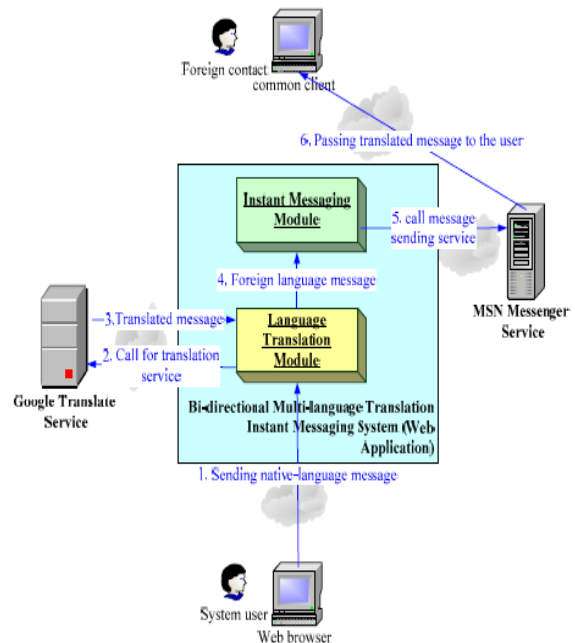
Fig2: Sending Process by the instant messaging system.
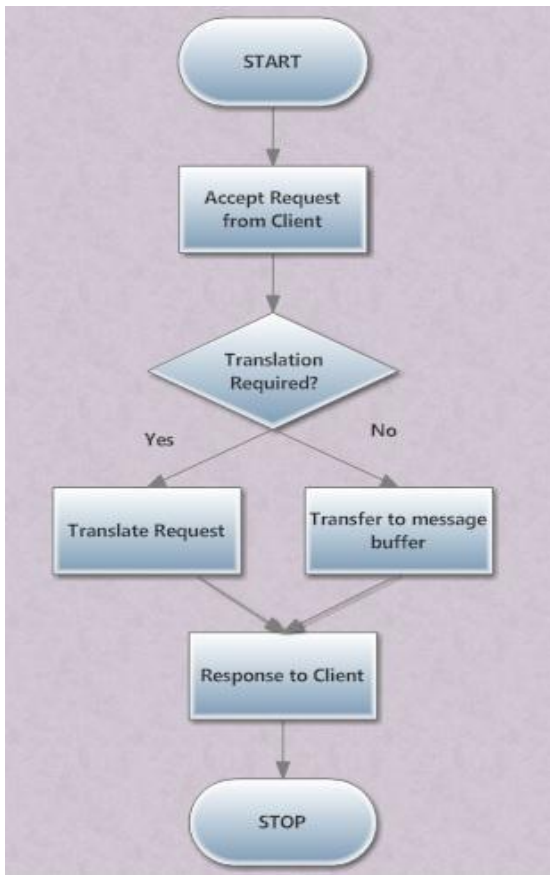
Fig: Flowchart for Server Module.

Fig.3: Receiving process of the instant messaging by system.

Fig. 2 and fig. 3 show that in order to achieve bilingual conversion instant messaging ability, only one of the two ends of user needs to chat through the system (which end is denoted as "user" in fig. 2 and fig. 3), the other end of user can use common

messenger client (which end is denoted as "common client" in fig. 2 and fig. 3). Because of the nature of the system design, the end using common client even does not need to know the existence of this system which helps with the translation. This makes it more practical and feasible of the system.

3.2 System Architecture

The system aims at integrating the online instant messaging service - Messenger with bi- directional multi-language translation capabilities, allowing users to easily chat with friends around the world using their own native language, and can from which to achieve language learning.

The tools and development environment used for building the Cross language messenger are as follows:

i. Programming language - Java SE
ii. Integrated Development Environment (IDE) - NetBeans IDE
iii. Database- MySQL Workbench [14]
iv. Web Server - Apache Tomcat [15]
v. Instant messaging API - Java MSN Messenger Library (JML) [16]
vi. Language translation API - Google Translate API for Java [12]

System Architecture
System architecture is as follows:

Instant Messaging Module: mainly responsible for account login and authentication, access to contact lists, message transmission and reception. The functions of this module will be realized with the JML APIs.

Language Translation Module: responsible for natural language translation capable of bi- directional multi-language translation ability. For example, to use French-English translation, entering an English sentence to the module then the module will translate the context into English and output to the caller. This module will cooperate with the Google Translate API for Java to realize the functions.

Management Module: The management module is responsible to record/retrieve the dialogue history and setup native-language configuration.

<u>User Interface</u>: responsible for integrating and coordinating the two modules: instant messaging and language translation, and provides user interface.

IV. SYSTEM IMPLEMENTATION

An enhanced version of the Internet instant messaging system has been designed with the following capabilities: Every contact in the messaging contact list can be set to associate with a language option which denotes the native language of the contact.

User chats with contacts who speak different native language from the user without having to be familiar with each other's native- languages. The system translates the message context into the proper languages according to the language options associated to the contacts, and then convey the messages to them.

V. CONCLUSION

The advance of the Internet technology has eliminated the barriers of the geographic distance. However, with the perspective of the global village, the barrier to communication results from various different native languages people speak is still a problem to be solved at present.

Through the design of this work that cooperates instant messaging and machine translation technologies, having simultaneous interpreter is no longer of the privilege of a country leader, it is now possible for everyone to take to enjoy the convenience of cross- language communication online.

Wide range of situations can benefit from this, from making foreign friends to the cross- language global customer service. The additional foreign language conversation learning function is also a good helper.

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AUTHORS

First Author – Tippu Junaidi -Bachelor of Engineering (B.E), Dayananada Sagar College of Engineering, Bangalore. tippujunaidi@gmail.com (+91 9535042422)

Second Author – Umesh Kamble Bachelor of Engineering (B.E), Dayananada Sagar College of Engineering, Bangalore. Umi.kamble@gmail.com (+91 9035025805)

Third Author – Viraj Kalkur- Bachelor of Engineering (B.E), Dayananada Sagar College of Engineering, Bangalore. virajkalkur@gmail.com

Third Author – Haridas Kavindra- Bachelor of Engineering (B.E), Dayananada Sagar College of Engineering, Bangalore. Kvi91@yahoo.fr

Use of Data Mining Methodologies in Evaluating Educational Data

Thilina Ranbaduge

Department of Information Technology, University of Moratuwa, Srilanka

   Abstract- Currently, online learning has gained a huge recognition within the higher education context and it has become a vital need in the current society to find such improvements, to increase the level of knowledge in people. In the modern society e-learning is recognized highly where it connects the students with the learning resources limitlessly. People have introduced various Learning Management Systems (LMS) in order to overcome the problem of managing large information sources and they are currently playing a remarkable role in e-learning environments. The lack of knowledge for employing learning methodologies in an accurate manner, has currently made these e-learning systems to face many problems. Even though LMSs enable the teachers to manage diverse educational materials in a much easier manner because of the differences in accessibility levels to the learning resources and study materials; it has become an unsolved problem to view the overall performance of each student in accordance with the behaviour of the student which is indicates the actual image of student learning capacity, on the course module. So it has become a massive challenge to cover the actual needs of the learners through the e-learning systems. Due to different learning patterns of students, it is becoming a vital need to understand the student performance, in a much more detailed manner.

Getting a proper understanding on a student overall performance which is based on the amount of information that he or she has gathered through the online resources, will help the teachers and the tutors to identify the different learning capacities of the students and will be able to provide the necessary guidance to improve their capabilities. To improve the learning capabilities of the students, the teachers and tutors should be capable of monitoring the overall performance of each student, separately and dynamically adjust their teaching methodologies on students and to take immediate decisions to improve learning of students. In this context, methodologies available in educational data mining can be used to extract knowledge from educational data sources to better understand students and the way they learn. This paper mainly focuses on the use of different data mining techniques upon the educational data to identify or discover the important knowledge on student learning which can be used to evaluate the students overall performances in the e-learning systems and identify and how these are been used to recognize different learning patterns of the students. Currently most of the techniques which are been used in each step in the data mining process contain its own advantages and disadvantages depending on the usage with the educational data which indicate the patterns of learning of students in many different forms and with various accuracy levels. However, based on these techniques, different models can be implemented to evaluate the performance of each student and it will be used to predict the overall performance that each student will be taking at the end of the course modules. Based on these results the teachers can provide the necessary guidance to the students who need more attention and also as an assistance to improve their capabilities on teaching and this will enable the knowledge producers to dynamically change the knowledge flows within the e-learning environments in a more effective and efficient manner.

   Index Terms- Educational data mining, Evaluation models, Student data, Learning Management Systems

I. INTRODUCTION

In the current business environment, online learning has gained a major recognition within the higher education context and it is a vital need in the current society to find such improvements to increase the level of knowledge in people. The growth of Internet computing has enabled people to change the way of gathering knowledge and it has introduced a new drive way for distance education. In the modern society e-learning is recognized massively where it connects the students with learning resources limitlessly. During the past ten years educational institutions have integrated Information Technology with advancements in the communication fields for their educational programs to improve the level of teaching and the learning capacities of the students. Advancements in the Internet technologies have introduced various learning mechanisms for the students to gather more knowledge collaboratively and collectively, which has changed the way of gaining knowledge and teaching [2, 3].

II. E-LEARNING ENVIRONMENTS & LEARNING MANAGEMENT SYSTEMS

   The growth of Internet computing has enabled the people to change the way of gathering knowledge and it has introduced a new driveway for distance education. In the modern society e-Learning has a massive recognition where it connects the students with the

learning sources limitlessly. Advancements in the Internet technologies introduce virtual learning environments to the students by enabling them to gather knowledge collaboratively and collectively. Moving away from traditional class room environments to the virtual Learning Management Systems (LMS) enable the teachers and the tutors to manage the diverse educational materials in a much easier manner [24].

Either commercial or open source, LMS are having a common purpose of providing the course materials for the students and open source implementations like moodle LMS are the most widely used virtual learning environments around the world. As shown in figure. 1, once a user logs in to the LMS he will be able to access all the courses for a particular semester he has registered and the LMS provides different e-learning activity modules (Calendar, emailing facility, news system, etc.) for the students to increase their interactions with the system.

Figure.1: LMS environments

The most important capability which is provided through the learning environments is monitoring and gathering information on each user's activities and behaviour within the system [7]. Each of the activities in which a particular student is actively participating indicates significant information about the student learning capacity. User behavioural information can be used for analysing purposes, where it can be used to identify different facts about the system and the current user's capabilities such that it will assist the knowledge producers to change the knowledge flow and the knowledge consumers to change the way of learning to improve their learning capacity [2].

III.   WHY WE NEED EDUCATIONAL DATA MINING

Different advancements in the Internet and the telecommunication fields brought effective utilization of a large amount of knowledge which is diverse and distributed around the world. Sharing and manipulation of knowledge with distance interactivity in real time, where the teachers and the students are not seeing each other face to face is an enormous achievement that the society has gained by the use of IT technologies and the LMSs are used remarkably in order to overcome this problem of managing large information sources. Due to the lack of knowledge for employing learning methodologies in an accurate manner, currently e-learning systems are facing many problems [25, 28].

Virtual LMSs enable the teachers and tutors to manage diverse educational materials in a much easier manner. The LMSs provide many different grading mechanisms on the course learning resources that can be used by teachers to view the outline performance of each student and see the final marks that the student has gained in the given activity on the course [5, 10]. Due to the differences in accessibility levels for the learning resources and study materials; it has become an unsolved problem to view the overall performance of each student in accordance with the behaviour of the student which is indicated by the actual image of student learning capacity on the course module [25].

Learning and teaching in a virtual classroom environment depends on the way in which the information is flowing through the communication channels and the actual expectations of the users of the system. In modern e-learning environments, teachers and tutors are mostly dependent on the course module outline and these activities are arranged using the functionalities available in LMS according to the course module schedules. Due to the different levels of learning capabilities of the students these course activities are performed in dissimilar fashion by these students, which highlights that the knowledge level which they have gathered in each activity is different. Therefore applying the teaching principles or the teaching methodologies on all the students in the same manner will not fulfill the actual requirements of the students.

It has become a major challenge to cover the actual needs of the learners through the e-learning systems. Due to different learning patterns of students it has become vital to understand the student performance in a much more detailed manner without being concerned about the performance of each individual activity in the course module. A proper understanding of the students overall performance which is based on the amount of information that he or she has gathered through the online resources will help teachers and tutors to identify the different learning capacities of the students and will be able to provide the necessary guidance to the students to improve their capabilities since the main objective of an e-learning system is not to help the student to pass course module examinations but to help students to learn [13].

Learning is not only applied in the educational context, but it also can be applied for different organizations, where to use the information and learning processes effectively and efficiently to drive learning and development. Learning performance analysis reflects an organization's ability to execute performance driven learning effectively and efficiently to meet current strategic business needs as well as creating capability for the future. Performance driven learning ensures that investment in learning activities is always focused on vital performance elements and these elements are focused on performance factors that are critical to a learning scenario [27]. Based on the indications through performance analysis any organization can identify the level of the learning capacity that their stakeholders are currently in, and manage it appropriately as needed. This will ensure that the learning processes within the organizations always focuses on the predictive performance level and to achieve it by dynamically changing its driveways accordingly.

IV.   USE OF DATA MINING METHODOLOGIES IN EDUCATIONAL DATA

Using analytics in the educational context to understand the student behaviour is an up-coming researching concept in the modern data mining arena. Becoming a new relative area of practice and research, different types of approaches and wide varieties of terms have been introduced. In the field of analytics, in the academy context many people have tried to come up with new computer supported interactive learning methodologies to identify the learning patterns of the students. Many people have researched on various computer aided software tools on collecting and analysing student data to build tools supporting in intelligent tutoring systems, games and learning simulation programs, to discover patterns and trends in a large content of student data to make new findings on hypotheses they made on student's learning [6, 22].

On most of the occasions, the available methodologies have come under similar conceptual and functional definitions, where most of the approaches were concerned on student learning data over the algorithms. But currently with such definitions, analytics are playing a major role in the higher education sector for the purpose of taking administrative decisions [27]. Currently most of the institutions are working with the administrative staff to manage the student enrolments in the study programs, to better utilize the resources, such as the budget, time and the staff among the study courses effectively and efficiently.

Researchers believe that the use of learning analytics in higher education will grow further with such importance, of identifying the student behaviour in the educational domain. Currently any types of institution, from a college to a university, academic analytics are being used to increase the financial and operational efficiency of the students. In order to cope with the high demands in the student's learning Luan indicated that many of the business critical questions are appearing parallel to higher education as well [27]. To address these issues in higher education many researches are currently implementing practices, focused on student retention, admission and operational efficiency.

According to the study conducted by the U.S. Department of Education [11] the most common reasons for student's to be dropping out of school are

- Lack of educational support - many students decided to drop out of high school due to lack of sufficient parental support and educational encouragement.
- Outside influences
- Special needs - students often drop out of high school because they require specific attention to a certain need, such as dyslexia or other learning disabilities
- Financial problems.

Out of the four mentioned above, the lack of educational support and the special needs reasons can be easily managed using the predictive analysis approach since student who are at risk of failing can be identified at an early stage by analysing their historical data of learning behaviour.

According to Natsu's report [23], it is mentioned that analytics can be used as a navigator for the education leaders to cut costs and improve teaching and learning in the institutions. She mentioned that the use of predictive analytics can be used for improving

efficiencies to save money to enhance student achievement and the report included examples such as planning courses, recruiting and retaining college students, optimizing the scheduling of classrooms, and maximizing alumni donations.

According to the Cash, Dawicki, Sevick [8] the use of analytics, as an early warning system is a useful and effective tool and it should allow districts to achieve the following goals and objectives in their dropout prevention efforts:

> Goal 1: Accurately define and uncover students' problems and needs
> Goal 2: Successfully identify interventions and improvement strategies
> Goal 3: Effectively target and initiate programs and reforms
> Goal 4: Truthfully monitor ongoing efforts and progress with 'at-risk' students

According to them, in order to achieve these goals either Business Intelligence or Predictive Analytics can be used. Business intelligence model and tools are more focused on analysing historical and current data in order to provide a look at operations or conditions at a given period of time while predictive analytics approach attempts to incorporate historical data into statistical models in order to make predictions about future events or outcomes.

A. The Knowledge Discovery Process

Application of data mining with educational data sources is a recent research domain which has gained a larger recognition among the society. Proper understanding on the learning behaviour of the students helps the educational sources to manage their educational programs, to a much more improved level, which can increase the learning capabilities of the student, who followed their educational programs.

Academic analytics or Learning analytics is a wide term used recently to describe the use of data mining in educational data sources [27]. Researchers have used various data mining methodologies in different ways to understand or identify the learning models and learning patterns of the students. Various learning management systems can be used for providing the study programs for the students who can be connected in open distance mode or in a much more hybrid manner. But applying the same teaching principle on all the students in the same way will not cope with the ultimate goal of any learning management systems available, which is to help the students to learn rather helping them to pass.

But understanding the nature of the learning in each of the students requires a huge effort such that the researching of educational information need to be followed by a stepwise process to reach the final discoveries. Like in any data mining research, some steps can be given as the basic steps that need to be followed in the knowledge discovery process which is shown in figure 2. The same principles can also be applied in the learning analytics processes where the data collecting step will be applied to different educational data sources to aggregate necessary data for the analysis and data pre-processing steps will be applied to arrange the data into a proper arrangement which can be applied on the mining algorithms to discover the hidden information and patterns [3, 5].
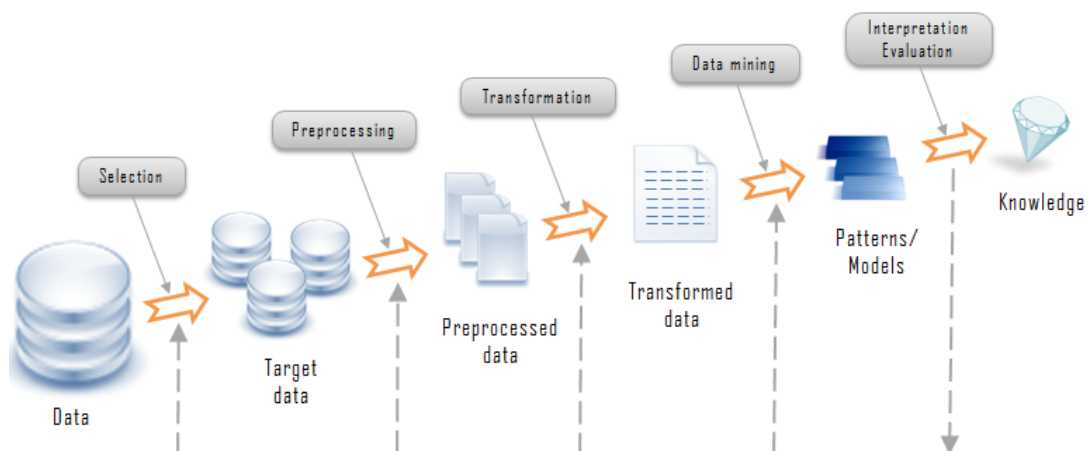
Figure. 2. Knowledge Discovery Process (Reference: http://www.rithme.eu/img/KDprocess.png)

B. Institutional Implementations on Educational Data Mining

The importance of using analytics in an academic context has been widely recognized among the institutions. Most of the institutions or universities are using the learning analytics approaches to improve their student enrolments in the course modules which are offered. Some researchers have tried to come up with complex models which are based on examination scores, course works and other related information, to discover the patterns in student's enrolments in educational programs [24, 25].

The main advantage which they have achieved through such analytics approaches is to implement an improved management process on the efficient use of limited admission budgets, time and the available staff which can be viewed as a statistical analysis approach on diverse institutional data sources. To create the required level of intelligence in an educational context many approaches have been implemented over the course management systems to improve teaching, learning and success of the students which gives an early prediction on which students are in academic difficulty and by allowing the faculty and advisors to customize learning paths or provide personalized instruction to specific learning needs.

Baylon University, which is a pioneer in higher educational analytics, created an Enrolment Predictive Model as a supportive tool for the prospective student admissions [22]. Moving from traditional admission strategy to the predictive model they analysed factors which provides various aspects in the student. Most of these variables they were concerned are based on the student's motivation on attendance, extracurricular activities and score values attained at different levels of examinations. Scores generated by the predictive model are considered by the admissions staff to identify those students most likely to be admitted to the university and they achieved the advantage of allocation necessary for human and budgetary resources appropriately.

Purdue University has developed a prediction model which extracts data from the Course Management System (CMS) and predicts which students may be at a risk in academic work [22]. The main purpose of this system is to provide proactive involvement in students learning which is mainly focused on student academic success which is the result of the student's capacity on standardized test scores and other similar information and the student's effort and motivation which is measured by the participation within the CMS. The prediction model is been prepared for two user groups of freshman and overall student population. Using factor analysis and logistic regression mechanisms these models were tried to predict the student success in a given course module.

In year 2010 Purdue University implemented a new analytic tool known as Course signal [24] to increase the student success in the classrooms. This system is capable of providing early warning about the students who are not academically performing well in the classroom. Both the student and the teachers can benefit from the system so that the real time feedbacks and necessary communications will be arranged for the students to find the required resources to improve their knowledge levels in academic subjects.

A research which has been taken in Northern Arizona University (NAU) tried to model connectivity between the resource utilization, level of risk for the student and their outcomes to create a proactive involvement in their academic achievements [22]. The researchers found that the advising and using of resources can be efficiently done on the student's who are at high risk level in academic works through academic recommendation and career sessions. They also indicated that having an intrusive advising mechanism on students will help them to understand the effective use of timing, content communication and the careful planning on the subject matters.

The University of Alabama introduced a new predictive model which can be implemented to predict and improve the student retention at the university with analytics approaches [22]. The researchers have developed a sophisticated model with attributes on student data by using statistical techniques such as logistic regression, decision trees and neural network mechanisms. Based on the information which has been discovered by the model, the faculty and the academic advisors have given instructions for the students to select the necessary course modules.

C. Use of Learning Analytics in E-Learning Environments

LMSs have started its process as assistant to a much more crucial role in higher education. Most of the organizations, Institutions and Universities currently use many different types of Learning Management Systems to provide their study programs for the students. The growth of the Learning Management Systems have been a challenge between two categories of commercial or the open source where these two are competing with each other for providing a better service to the users [29, 30].

The major open source learning management systems those currently dominating the educational space can be specified as Moodle and Sakai [5]. The major factor behind the demand for this open source LMSs is because of their cost saving and more control. With the available budgetary constraints people tend to move to open source LMSs due to the fact that any function found in the commercial tools is available with the open source LMS as well. As mentioned in the Sakai Project web Site the main objective of the Sakai is to design, build and deploy a new Collaboration and Learning Environment for better higher education. Sakai was initially started by the University of Michigan and Indiana University where both put their efforts to enhance the functionalities. After the grants given by the Mellon Foundation, MIT and Stanford joined in and formed the Sakai Project.

It is found that from an administrator's perspective, the Sakai system is relatively easy to install and set up compared with the many other open source projects in their early stages of development which does not seem to be easy in its installation process. Even some commercial tool users commented that the Sakai user interface experience is very much familiar and easy to manage. Moodle is a course management system which is a free and Open Source software package designed using sound principles to help educators create effective online learning among the students.

Lauria and Joshua [5] have tried to implement a predictive model within the Sakai for predicting the performance of the students and to take the decisions for making corrective actions. In their research they came up with a methodology which contains six phases on the knowledge discovery process which are data collection, data reduction, rescale and transformation, partitioning the data, build the models and finally to evaluate the models and choose an appropriate model for the predictions.

In any educational institution the learning capacities and the learning capabilities of the students vary on different levels due to the way they arrange their learning behaviour. Due to this learning nature applying the same teaching principle on each and every student in the same manner does not provide the required level of knowledge in students. This gives an indication to the teachers why many students are dropping out from schools or educational institutions.

In the year 2009, Massachusetts Department of Elementary and Secondary Education started a project known as the Dropout Prevention Planning Project to implement an approach to understand the different factors on student's dropout incidents [8]. They implemented a Student Information Management System which contains information about the student within the State and they initiate an index known as the Early Warning Indicator Index for measure the risk of dropping out in each student.

According to the Massachusetts Department of Elementary and Secondary Education, currently there are several early warning systems available, which are using predictive analysis approaches to analyze the students. Microsoft SIGMA is an early warning system which capitalizes on its Education Analytics Platform (EAP) to provide a new data-based approach to managing students who are at-risk and it is known as the Student Individualized Growth Model and Assessment [8, 11]. Mizuni's Data Warehouse and Dashboard Suite [8] is a transactional and aggregation data store, for managing and analyzing data and offers education stakeholders insight, into student performance, by monitoring key indicators to increase student achievement. VERSI-FIT also based on Microsoft has also developed its own early warning system based upon the Education Analytics Platform which is known as the Edvantage At-Risk Early Warning System and Credit Recovery System [8].

D. Collecting Educational Data for Analysing

Understanding the way these students are learning will help the teachers and the academics to change the teaching methodologies they used, to cope with the requirements of the students. As the academic analytics suggest, the knowledge can be created about the students, by applying the statistical analysis and predictive modeling on educational data sources. For building these analysis processes what is mainly used is the continued streams of data which are created within the learning management systems with the data mining techniques and which can be used as a decision making tool for teachers. Before applying the analytical modeling it is a must to acquire proper information out from the student data since not all information available in the data sources is important for the analysing [7].

The main advantage which in the given context is that most of the data which are available in the data sources are labeled and they contain information about the student characteristics as well as the course management events where the modeling process can be applied in many ways. The use of LMS systems in researches assist the researchers in gathering of necessary data which are collected for different course modules. Most of the LMS systems maintain such student data using log files where each log contains information about the activities each student has performed during the course schedule [6, 25, 29]. Using the activity information with the demographic characteristics of students such as age, sex, residence etc. can be used with the mining algorithms to understand how students are motivated on learning and how the performance of each student varies with their learning patterns.

Lauria and Joshua [5] indicated the importance of gathering the student log data for the analysis process and discovering patterns in the student data. In their research they collected the student data from diverse sources and followed several pre-processing steps to handle the missing value, outliers and incomplete records. All the student academic performance data which were logged in a Sakai implementation named iLearn were aggregated with the student demographic data such as age, gender, race, SAT scores, GPA and with the course enrolment data such as course name, course subject, number of students in the course to produce consolidated records per course and student. In order to remove the variations in different course contents all the data were collected as ratio values rather than as an absolute value.

One of the main reasons that applying learning analytics in educational data sources is challengeable is because the dataset becomes very small compared with the other applications around in the given context. Even though the number of student information which is contained in a database is huge, most of these are dynamic and contain many variations among them. Diego Garcia Saiz and Marta Zorrilla [10] found it difficult to collect the required data which made them to use the data for the past three academic years with an average student enrolment of 70 per year, for a specific course module, to build the necessary dataset for the analysis.

For all of these student instances they considered attributes with mean values such as total time spent, number of sessions carried out, number of sessions per week, average time spent per week and average time per session. In S. Anupama Kumar and M Vijayalakshmi [12] research they have tried to predict the student overall

performance based on their internal assessments in the learning environment and they considered five course modules which were offered in a semester and overall student count for the selected analysis were about 117.

Even though the datasets are small compared to the other data mining domains, still it can be proven that sensitive and interesting information can also be generated regardless to the size of the dataset. T. Hadzilacos, Dimitris Kalles, Christos Pierrakeas and Michalis Xenos [14] indicated that even in a complex educational environment, sensitive learning patterns can be identified, applying the machine learning techniques on a small set of student data. In their research they focused on applying various algorithms on demographic data and student course data to discover the relationship of tutors with their students.

Other than the size of the dataset attributes or the collection of independent performance factors it is also highly concerned with the educational data mining researching context. In educational systems like Learning Management Systems, Students' academic performance depends on diverse factors like personal, socio-economic, psychological and other environmental variables [28]. Each of these factors can affect the student overall performance in different weights. Based on the level how each of these factors is appearing in the student education, several learning patterns can be identified on each of these students. Based on these learning patterns analysis models can be implemented such that they include all these variables for the effective prediction of the performance of the students. The prediction of student performance with high accuracy is beneficial to identify the students with low academic achievements which enable the educators to assist those students individually.

S. B. Kotsiantis, C. J. Pierrakeas, and P. E. Pintelas [18] have tried to apply data mining methodologies on educational data to limit student dropout in university-level distance learning where they argued that the dropout can be caused by professional, academic, health, family and personal reasons and varies depending on the education system adopted by the institution providing distance learning, as well as the selected subject of studies.

They based their research on a course module which was offered in Hellenic Open University which based their educational programs, mainly on distance mode. They built a data set of 365 student instances and based on the data the attributes were divided into two groups which were the 'Curriculum-based' group and the 'Students' performance' group. The 'Curriculum-based' group represented attributes of students' sex, age, marital status, number of children and occupation and the group represented attributes concerning students' marks on the first two written assignments and their presence or absence, in the first two face-to-face meetings.

In the M. Ramaswami and R. Bhaskaran [15] research, they argued that the student performance could depend on diversified factors such as demographic, academic, psychological, socio-economic and other environmental factors. Based on each of these factors they constructed their analysis process to identify the different performance factors of the students and they obtained highly influencing predictive variables through feature selection technique to evaluate the academic achievement of students.

The data collection process which is in T. Hadzilacos, Dimitris Kalles, Christos Pierrakeas and Michalis Xenos [14] research, they collected student data under two categories of attributes, which are Demographic attributes and Performance attributes. The Demographic attributes were collected by concerning students' sex, age, marital status, number of children and occupation and Performance attributes represents attributes which were collected from tutors' records concerning students' marks on the written assignments and their presence or absence in face-to-face meetings. Other than the above it was found that there exist some obvious and some less obvious attributes that demonstrate a strong correlation with student performance where some give the higher importance in consideration.

Other than the demographic and performance student factors some data can also be collected through the students activities which they have performed within the learning management system. The data related to the discussions, quizzes and messaging can highlight significant information on student communications between their other peer students, teachers and tutor and provide information about how they have gathered information through communications channels which are provided by the learning environment.

J. Mamcenko, I. Sileikiene, J. Lieponiene, R. Kulvietiene [26] have tried to collect data on questions given to the student and the answers given by the students with the amount of time that each student has spent on each question, to construct the dataset and applied the collected dataset with several data mining methodologies, to discover the different learning patterns of each student which they focused on a programming course examination and the ways that the students have answered.

C. Romero, S. Ventura, P. G. Espejo, and C. Hervás [2] have tried to use different classification approaches on the student activity data, to compare the applicability on data mining techniques for classifying the students into groups and to predict the final marks obtained in the course modules. For constructing the dataset they used the activity information from the database in the moodle environment and they extracted the information on moodle activities and the final marks the students have achieved for 7 course modules.

E. Data Pre-Processing Techniques in Educational Data Mining

In any knowledge discovery process pre-processing steps that apply on the collected data gain, a huge consideration where many mechanisms have been introduced by different researchers. The main objective of applying these pre-processing steps on the aggregated data is to increase the accuracy levels and to improve the quality of the data since the collected data can contain noises or improper data for applying on the data mining algorithms [6].

In an academic context the LMS systems contain much larger data sources which need to be included together to create the dataset [28]. When collecting the required data from diverse sources, extracted information can contain missing value, outliers and incomplete records. Applying the data mining techniques on the dataset without proper preparation will provide unexpected and misleading results as outcomes. Lauría and Joshua Baron [5] highlighted the importance of applying pre-processing steps on educational data. After the data collection process they followed some steps to reduce the dimensions on the available data. In order to maintain a proper level of query accuracy and efficiency the number of variables and parameters required for the estimation were selected properly and unnecessary features were removed.

After the necessary data was selected the transformation and rescaling phase was carried out to make sure that all the attribute data were formatted according to the requirement of the data mining algorithms they used. After the data was converted or transformed the partitioning step was used to divide the data into several groups. They carried out this partitioning process on the data set to make sure that the required amount of data is available for the training of the data model and for the validation with a testing step.

Outliers and noisy data in the data set can affect the accuracy levels and the quality of the outcomes in the algorithms. To achieve more improved and accurate results D. García-Saiz and M. Zorrilla[10] built an algorithm known as 'meta-algorithm' to pre-process the dataset and eliminate these outliers. In this algorithm, the data instances with the highest values for the most significant attribute was removed such that these instances can be considered as the outliers in the statistical sense which can improve the results by 20% and which would make a huge advantage when the data set is larger in size and provide with better quality results for the users.

Other than the noises and outliers in the dataset, selecting the most appropriate set of attributes for the data mining algorithms, improve the accuracy levels furthermore. S. Kotsiantis, C. Pierrakeas, and P. Pintelas [18] indicated that there exists some obvious and some less obvious attributes that demonstrate a strong correlation with student performance where some give the higher importance in consideration. As the author suggested by the research, identifying the correlated attributes in the given data set can be used to improve the results of the algorithms and to reduce of dimensions as needed for the algorithm for efficient processing.

In J. L. Hung and K. Zhang [9] researched on activity patterns and making predictions with data mining techniques in online teaching and the data pre-processing phase of the research the data was cleaned by removing all useless, irregular, and missing data from the original LMS common log files and after the initial pre-processing, a session filter was applied to the reduced log file for feature extractions. The purpose of the filter was to aggregate all user requests within a session into a single set of variables. Feature extractions filtered out the following primary variables: user identifier, session identifier, session start date and time, session end date and time, user's hit count, and session duration in minutes and based on these derived variables (duration and frequency of data of each student) were extracted through calculating or accumulating primary variable data on a daily and weekly basis.

F. Use of Analytic Algorithms in Evaluating of Educational Data

According to the requirements in the problems domain, discovering a model to evaluate the students' performance levels, created a key researching area, where different researchers have attempted to find the accurate and possible models [27]. Due to the nature of educational data sources and student behavioural patterns the same performance model cannot be applied to cover all the problem scenarios. Based on the different approaches available on the educational data mining or learning analytics, different areas which need to be considered, can be identified.

The k-nearest neighbour (KNN) data mining method is a classical prediction method among the machine learning techniques available in data mining [3]. It has been widely used due to its simplicity and adaptability in predicting many different types of data. The main advantage of using KNN in prediction processes is that the KNN is a lazy method which does not require a model to represent the statistics and distribution of the original training data. Rather it can be applied on the actual instances of the training data. Even though the KNN is a simple predictive algorithm which can rely on and it does not make any assumption about the prior probabilities of the training data. Also the KNN is satisfactorily used on the situations when the data set is included with noisy and incomplete data.

Due to the advantages and the simplicity of the algorithm T. Tanner and H. Toivonen [21] have tried to implement a model using the k-nearest neighbour data mining algorithm to identify the students who are at high risk of failing in a specific course. By this research they suggested that good results in predicting final scores indicate that students with learning problems can be found reliably. What they have been using on the student data is to make prediction on the performance of a given student based on the similarity to all instances in the training set and find the k most similar objects in the data set. This similarity is calculated by using a Euclidean distance between the features of the test subject and the corresponding features of each instant in the training set.

In their research they showed that KNN can produce predictions accurately for the final scores even after the first lesson. Another interesting result they found is that, in any skill-based courses early tests on skills can be used as the predictors for the final scores and they suggested that predicting final scores for the courses can be used to identify the students with learning problems and can be used directly to implement as early warning features for the teachers so that the students can be alerted if they are likely to fail the final tests. Based on the information or features they used for the experiment with the KNN algorithm they suggest that the KNN

method could be just as effective in other LMSs such as Moodle where only a single lesson score is available for student assessment and especially other skill-based courses could be a good selection for the KNN method.

In order to make the student modeling process much easier Diego Garcia Saiz and Marta Zorrilla [10] have researched on applying different classification techniques on the student data to predict their performances. In their research they tried to implement a tool known as Elearning Web Miner (EIWM) to discovering how the students are behaving and progressing in the courses which is very helpful for the tutors to identify the students who need more attention among a larger set of students. With the intention of analysing and choosing best classification algorithms for educational datasets they analysed four of the most common machine learning techniques, namely Rule-based algorithms, Decision Trees, Bayesian classifiers and Instance-based learner classifiers which mainly were OneR, J48, Naive Bayes, BayesNet TAN and NNge.

In the evaluation process they found that Bayes algorithms perform better in accuracy and is comparable to J48 algorithm although it is worse at predicting than Naive Bayes which is the best in this aspect. They also observed that NNge improves its performance in this dataset although the great number of rules which it offers as output makes it less interpretative for instructors than the rest of the models. Finally they conclude that Bayes Networks are suitable for small datasets in performing better than the Naive Bayes when the sample is smaller. As a consequence of the fact that BayesNet TAN model is more difficult to interpret for a non-expert user and J48 is similar in accuracy to it.

S. Kotsiantis, C. Pierrakeas, and P. Pintelas [13] have suggested an approach which has used machine learning algorithms with the LMS data to prevent, student dropouts in university distance education. In their research they used five different algorithms to study student data and they found that these algorithms can be used more appropriately to predict the student dropouts in study programs. In this research they used most common machine learning techniques which are Decision Trees, Bayesian Nets, Perceptron-based Learning, Instance-Based Learning and Rule-learning [3]. In the evaluation of the algorithms they found that there was no statistically significant difference between algorithms, but it showed that the Naive Bayes algorithm and the RIPPER had the best accuracy than the others. Among the Naive Bayes algorithm and the RIPPER, Naive Bayes has the advantage short computational time requirement and importantly Naive Bayes classifier can use data with missing values as inputs, whereas RIPPER cannot work with which gives an indication that the Naive Bayes is the most appropriate learning algorithm to be used for the construction of a software support tool in Learning Management Systems.

This research was further enhanced by S. B. Kotsiantis, C. J. Pierrakeas, and P. E. Pintelas [16] by applying six machine learning techniques which are Decision Trees, Neural Networks (NN), Naive Bayes algorithm, Instance-Based Learning Algorithms, Logistic Regression and Support Vector Machines. Based on these six algorithms they found that Naive Bayes algorithm and the NN algorithm had the best accuracy with the given data sets. However they mentioned that the differences were generally small and because they were only based on one course module and it may be possible that the ranking in another data set of the same domain is different. Also they concluded that Naive Bayes has the short training time and an effective communicated way of predicting and a small programming cost than the other algorithms.

A research which was completed by C. Romero, S. Ventura, P. G. Espejo, and C. Hervás[2] have tried to used different classification approaches on the student data to compare the applicability on data mining techniques for classifying the students into groups. In their research they used a framework which is known as Knowledge Extraction based on Evolutionary Learning (KEEL) which is an open source framework for building data mining models. For this research they used 25 classification algorithms which are based on Statistical classification, decision tree, rule Induction, a genetic algorithm using real-valued genes, fuzzy rule induction, neural Networks. According to their research they found that models obtained by using categorical data are

more comprehensible than when using numerical data because categorical values are easier for a teacher to interpret than precise magnitudes and ranges.

Also decision trees are considered as easily understandable models because a reasoning process can be given for each conclusion. But a tree obtained with large nodes and leaves are less comprehensible. Rule induction algorithms are also considered to produce comprehensible models because they discover a set of IF-THEN classification rules that are a high level knowledge representation and can be used directly for decision making. Fuzzy rule algorithms obtain IF-THEN rules that use linguistic terms that make them more interpretable by humans and these rules are very intuitive and easily understood by problem-domain experts like teachers. Finally the statistical methods and neural networks are deemed to be less suitable for data mining purposes due to the lack of comprehensibility even they attain very good accuracy rates but very difficult for people to understand.

S. Anupama Kumar and M Vijayalakshmi [12] have tried to predict the student overall performance based on their internal assessments based on decision tree approaches. The algorithms they used for this research is J48 and ID3 decision tree algorithms. According to their discussion the accuracy level of the J48 was higher than the ID3 algorithm since it has predicted more correct prediction results than the ID3 algorithm. Based on the different accuracy levels on each of the decision trees they created, they concluded that classification techniques can be applied on educational data for predicting the student's outcome and improve their results and the efficiency of various decision tree algorithms can be analysed based on their accuracy and time taken to derive the tree. Finally they argue that the application of data mining brings a lot of advantages in higher learning institutions so that these techniques can be applied in the areas of education to optimize the resource allocations as needed with the student learning capacity.

Decision tree approach was further examined by M. Ramaswami and R. Bhaskaran [15] research where they have argued that the student performance could depend on diversified factors such as demographic, academic, psychological, socio-economic and based on these factors they constructed a CHAID prediction model with highly influencing predictive variables obtained through feature selection techniques to evaluate the academic achievement of students. In their research before constructing the CHAID model they used feature selection techniques in reduction of computation time and enhance the predictive accuracy of the model.

In their analysis, they found that the overall prediction accuracy of CHIAD prediction model was higher compared to the other classification mechanism on categorical attributes and they suggested that even though CHAID model is capable of handling small and unbalanced data set, it could be worked out effectively with more predictive accuracy which can be further improved by applying some principle pre-processing techniques.

In the research of Dimitris Kalles,Christos Pierrakeas [17] they tried to use a genetic algorithm and decision tree based classification on student data to understand the different learning capacities of the students. In their research they based the applicability of these algorithms on different sets of students under different course modules. In this research they mainly used the genetic algorithm based decision tree implementation of Genetic Algorithm Tree (GATREE) which is built using the Genetic Algorithm Library (GALIB) library.

In this research GATREE system and experimented with to 150 generations and up to 150 members per generation. They observed that GATREE induced trees provide good accuracy estimation, even without the cross-validation testing phase. Their initial findings suggested that when compared to conventional decision-tree classifiers this approach produces significantly more accurate trees. However it was noted that GATREE has been generating closer estimations even with the quantized formats which gives an indication that GATREE can produce quality results even in the presence of noise.

In Behrouz Minaei-Bidgoli, Deborah A. Kashy, Gerd Kortemeyer, William F. Punch [20] research, they highlighted the importance of using Genetic Algorithms not as a direct classifier on the data but as an optimization tool for resetting the parameters in other classifiers. In this paper they focused on using a Genetic Algorithm to optimize a combination of classifiers. They used Genetic Algorithm Tool Box (GAToolBox) for MATLAB to implement a Genetic Algorithm to optimize classification performance and to find a population of best weights for every feature vector which minimize the classification error rate.

The same idea was further enhanced by the research of Behrouz Minaei-Bidgoli, Gerd Kortemeyer, William F. Punch [19], where they have used the Genetic Algorithms to find a population of best weights for every feature vector from the attribute set which can minimize the classification error rate and it was found that the genetic algorithm for weighting the features improved the prediction accuracy by 10% for the other classifiers used in the research.

Most of the previous researches which were carried out, considered each classification approaches individually for building the performance models and different algorithms are having varying levels of accuracy levels. But in Behrouz Minaei-Bidgoli, Gerd Kortemeyer, William F. Punch [19] research, they restricted their study to four different classifiers which were Quadratic Bayesian classifier, 1-nearest neighbour (1-NN), k-nearest neighbour (k-NN), Parzen-window and try to model the performance of the students by combining the classification algorithms together. As the conclusions they mentioned that a combination of multiple classifiers leads to a significant accuracy improvement in the given data sets.

Other than the classification approaches, clustering is a data mining technique which can be used to identify the hidden patterns in a given dataset [3]. Jui-Long Hung and Ke Zhang [9] tried to use a clustering technique to classify students based on their shared characteristics. They used K-Means clustering mechanism to identify the student clusters based on the behaviours they showed within the LMS environment and Sequential association rules were applied to discover the daily learning patterns of the students in the LMS. Finally they used decision tree algorithm to build the predictive model on the students. According to the predictive model, the frequency of accessing course materials was the most important variable for performance prediction in this study. Also this study concludes that when students participated more actively that is having a higher value on frequency of accessing course materials, number of messages posted, number of messages read, and frequency of synchronous discussions attended they performed better than the others academically.

Finally in this research paper the authors suggested that instructors would be able to get a quick view of basic learning data, such as login date, frequency, pages visited, etc. However, no functions or features are currently available to help instructors identify learners' individual or group learning patterns, or to identify successful or less successful learning behavioural patterns, or to identify the predictive learning behaviours or to help identify necessary facilitation needs. Therefore, the researchers of this study strongly suggest that LMS developers should integrate data mining tools to facilitate effective online teaching and learning.

The clustering mechanisms were further examined by the research of J. Mamcenko, I. Sileikiene, J. Lieponiene, R. Kulvietiene [26] where they have tried to apply Kohonen algorithm which is based on a self-organizing map (SOM) or self-organizing feature map (SOFM) that is a type of artificial neural network (ANN). According to their research it can be concluded that the clustering mechanism they used can be used to discover the statistical information about the student behaviour and the learning patterns.

According to the Hershkovitz and Rafi Nachmias [4] web usage mining is another information source which can be used to analyse the whole learning process and to examine the activity of a large group of learners, in order to develop a log-based motivation measure on LMS environments. Finally F. Castro, A. Vellido, À. Nebot, and F. Mugica [1] have researched on applying various data mining mechanisms to detect and

understand the irregular learning behaviour of the students and the adaptability on LMS environment on student's requirements and capacity.

Finally B. Minaei-Bidgoli, G. Kortemeyer, and W. F. Punch [19] suggested that use of these algorithms as tools can be used to identify those students who are at risk in very large classes and it will help the instructors to provide appropriate advising in a more effective manner. Also J. L. Hung and K. Zhang [9] indicated the importance of implementing such tools which can be used to identify learners' individual or group learning patterns or to identify successful or less successful learning behavioral patterns, or to identify the predictive learning behavior or to help identify necessary facilitation needs. LMS developers should integrate data mining tools to facilitate effective online teaching and learning.

V.   CONCLUSION

During the past decades advancements in the Internet technologies introduced various learning mechanisms to students to gather more knowledge collaboratively and collectively. These technology improvements allowed most of the institutions to utilize large amount of knowledge effectively which is diverse and distributed around the world. But it has become a massive challenge to understand and cover the actual needs of the learners through the existing learning management systems since most of the systems are providing assistance on scheduling and maintenance of the course modules.

Evaluating performance in the e-learning systems becomes a massive challenge because of the different factors which affect the learning models. Many of the qualitative and quantitative factors, which are available in the e-learning framework, highlight different aspects of the students' learning but have not been considered yet for evaluation purposes of the student performances. Therefore a deeper analysis on the behavioural patterns of the students and the factors which affect the student learning in e-learning systems can be used to implement an effective performance model to evaluate the overall performance of each student and it is a much needed requirement at this stage to upgrade the learning capacity in the e-learning education.

Applying data mining methodologies on the educational data has brought a new research discipline where the existing methodologies have been used to model the learning behaviours of the learners. Many of the institutions and other university systems around the globe have tried to overcome the problems of identifying actual student needs through learning analytics. Most of the available system implementations are focused on providing capabilities to the teachers and other knowledge producers to discover the students with difficulties of learning. By analysing their learning environment and other behavioural factors teachers will be able to provide necessary guidance to improve their capabilities or learning capacities.

Other than these early warning capabilities in e-learning systems, many researchers have focused on implementing models to evaluate the overall performance of the students. In many of the researches they based on learning factors to construct an evaluation model to predict the overall performance of the students. Since different factors in the e-learning environment can affect the performance of students in different weights, data mining methodologies was used to model the learning behaviour with high accuracy. But with different learning contexts the same performance evaluation model cannot be used since the data available will not be coped within the implemented model.

Therefore models for evaluating the student performance with acceptable accuracy levels and quality predications still need to be researched more and existing learning analytics should be implemented in such a manner in which they can be used by the knowledge producers with more user friendliness and more interpretation capabilities in an efficient and effective manner.

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AUTHORS

First Author – Thilina Ranbaduge, Department of Information Technology, Faculty of Information Technology, University of Moratuwa, Srilanka. Email : tranbaduge@uom.lk

Enhanced Security Evaluation and Analysis of Wireless Network based on MAC Protocol

MOHD IZHAR[*], MOHD. SHAHID[**], DR. V.R.SINGH[***]

[*] HMR Inst. of Tech. & Mgt,& Ph.D. Scholar of Mewar University
[**] Ph.D. Scholar of Mewar University,
[***] Recognised Supervisor of Mewar University

Abstract- IEEE 802.11-2007 Standard for wireless network classifies security algorithms into: RSNA and Pre-RSNA. Pre-RSNA algorithms are the algorithms used before RSNA. Pre-RSNA security comprises the algorithms; WEP (Wired Equivalent Privacy) and IEEE 802.11 entity authentication. RSNA security comprises the algorithms like TKIP, CCMP, RSNA establishment and termination procedures, including use of IEEE 802.1X authentication, key management procedures and providing mechanisms for protecting management frames. All Pre-RSNA Methods fail to meet their security goals and are deprecated except for Open System authentication after that RSNA comes in the picture. This Paper evaluates why pre-RSNA methods fail for providing security to wireless Networks. This analysis is necessary to migrate to RSNA and making more highly secure and reliable RSNA methods. Security features and capabilities associated with IEEE 802.11i through its framework for Robust Security Networks (RSN) are explained here and can be used as guidance on the planning and deployment of RSNs.

Index Terms- RSNA (Robust Security Network Association), Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA), Counter mode with Cipher-block chaining Message authentication code Protocol (CCMP), temporal key integrity protocol (TKIP), confidentiality, Wireless Local Area Network (WLAN) local area network, Medium Access Controller (MAC) and Physical (PHY).

I. INTRODUCTION

IEEE 802.11-2007, Revision of IEEE Std 802.11-1999 was approved on 08.03.2007 and published on 12 June 2007 by IEEE. This revision gives the IEEE 802.11 standard for wireless local area networks (WLANS) with all the amendments that have been published to date i.e.08.03.2007. The original standard was published in 1999 and reaffirmed in 2003. IEEE 802.11i, an IEEE standard ratified June 24, 2004, is designed to provide enhanced security in the Medium Access Control (MAC) layer for 802.11 networks[3]. The 802.11i specification defines two classes of security algorithms: Robust Security Network Association(RSNA), and Pre-RSNA. Pre-RSNA security consists of Wired Equivalent Privacy (WEP) and 802.11 entity authentication. RSNA provides two data confidentiality protocols, called the Temporal Key Integrity Protocol (TKIP) and the Counter-mode/CBC-MAC Protocol (CCMP), and the RSNA establishment procedure, including 802.1X authentication and key management protocols. This paper analyzes the Pre-

RSNA and RSNA methods in order to migrate from pre-RSNA to RSNA methods and making more secure RSNA methods.
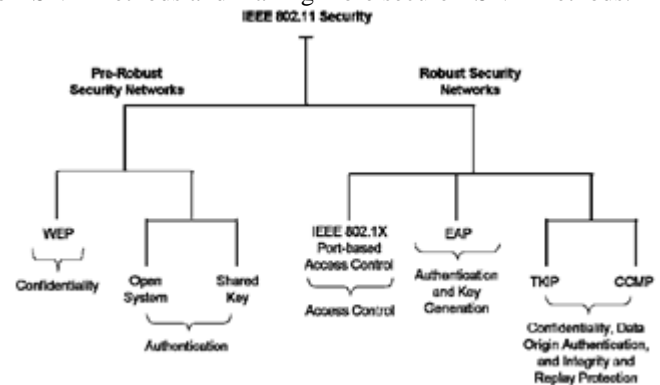
Fig 1 : Broad Classificaiton of Security Protocol

II. BACKGROUND

Wired equivalent Privacy

WEP-40(40-bit key) is defined as a means of protecting the confidentiality of data exchanged among authorized users of a WLAN from casual eavesdropping. The same algorithms have been widely used with a 104-bit key instead of a 40-bit key, this is called WEP-104. WEP security involves two parts, Authentication and Encryption. Authentication in WEP involves authenticating a device when it first joins the LAN. The authentication process in the wireless networks using WEP is to prevent devices/stations joining the network unless they know the WEP key[4].

Many Papers have been published relating to security methods of Pre-RSNA discussing the Wireless LAN 802.11 network security including the comparisons of SSIDs, MAC address filtering and the WEP key encryption. Various simulative platform of software and hardware is designed to crack WEP key based on these authentication methods and analyzing the weaknesses of WEP and RC4, It has been shown that WEP Key can be cracked including SSID enumeration, MAC address spoofing and WEP key cracking by FMS(Fluhrer, Mantin, Shamir) Attack[5].

Entity authentication

An access point must authenticate a station before the station communicates with the network. The IEEE 802.11 standard defines two types of WEP authentication: Open System and Shared Key**.** There are two other mechanisms: the Service Set Identifier (SSID) and authentication by client Media Access Control (MAC) address—are also commonly used. Open System Authentication allows any device to join the network. The 802.11

client **authentication process** consists of the following transactions:

1. Probe request: Client broadcasts a probe request frame on every channel.
2. Probe Response: Access points within range respond with a probe response frame.
Open and shared key Authentication: Once the client determines the optimal access point to connect to, it moves to the authentication phase of 802.11 network access which is of two types Open Authentication and Shared key Authentication.
3. Authentication request: The client decides which access point (AP) is the best for access and sends an authentication request
4. Authentication Response: The access point will send an authentication reply
5. Association request: Upon successful authentication, the client will send an association request frame to the access point
6. Association response: The access point will reply with an association response
7. The client is now able to pass traffic to the access point
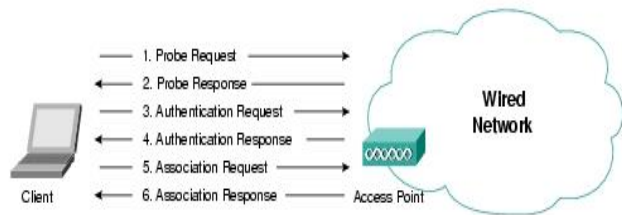
Fig 2 : 802.11 Client Authentication Process

Shared Key Authentication requires that the station and the access point have the same WEP key to authenticate. Turn on the wireless station. The station listens for messages from any access points that are in range. The station finds a message from an access point that has a matching SSID.
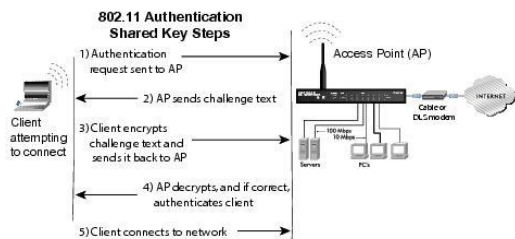
Fig 3 : WEP Shared Authentication

1. The station sends an authentication request to the access point.
2. Wireless access point sends 128 bit random challenge in text to the requesting station.
3. The station sends an association request to the access point. The station uses its configured 64-bit or 128-bit default key to encrypt the challenge text, and it sends the encrypted text to the access point
4. The access point decrypts the encrypted text using its configured WEP key that corresponds to the station's default key. The access point compares the decrypted text with the original challenge text. If the decrypted text matches the original challenge text, then the access point and the station share the same WEP key, and the access point authenticates the station. The access point associates with the station.

5. The station can now communicate with the Ethernet network through the access point.
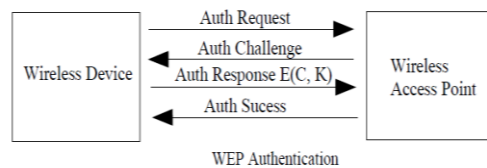
Fig 4 : WEP Authentication

Temporal Key Integrity Protocol

Wired Equivalent Privacy (WEP) was developed in order to secure wireless networks and provide security equivalent to the one that could be expected from a wired network. When WEP failed miserably to deliver the required security, the Temporal Key Integrity Protocol (TKIP) was built around WEP to fix its flaws and provide backwards compatibility with older equipment. Much resources and money were invested into upgrading old WEP networks to TKIP[7]. The TKIP is a cipher suite enhancing the WEP protocol on pre-RSNA hardware. TKIP modifies WEP.

IEEE Std 802.11i-2004, it was an amendment to IEEE Std 802.11™, 1999 Edition (Reaff 2003) as amended by IEEE Stds 802.11a™-1999, 802.11b™-1999,802.11b™-1999/Cor 1-2001, 802.11d™-2001, 802.11g-2003, and 802.11h-2003], amendment 6: Medium Access Control (MAC) Security Enhancements, 23 July 2004. This amendment defines TKIP and CCMP, which provide more robust data protection mechanisms than WEP affords. It introduces the concept of a security association into IEEE 802.11 and defines security association management protocols called the 4-Way Handshake and the Group Key Handshake. Also, it specifies how IEEE 802.1X may be utilized by IEEE 802.11 LANs to effect authentication[8].

Counter Mode with Cipher Block Chaining(CBC) Message Authentication Code(MAC) Protocol (CCMP)

Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (CCMP) is an encryption protocol that forms part of the 802.11i standard for wireless local area networks (WLANs), particularly those using WiMax technology. CCMP was the second security protocol introduced as a replacement for WEP in the 802.11i amendment CCMP made from scratch using the modern AES block cipher. CCMP is based on the CCM of the AES encryption algorithm. CCM combines CTR for confidentiality and CBC-MAC for authentication and integrity. CCM protects the integrity of both the MPDU Data field and selected portions of the IEEE 802.11 MPDU header.

CCM is a generic authenticate-and-encrypt block cipher mode. CCM is only defined for use with 128-bit block ciphers, such as AES. For the generic CCM mode there are two parameter choices. The first choice is M, the size of the authentication field. The choice of the value for M involves a trade-off between message expansion and the probability that an attacker can undetectably modify a message. Valid values are 4, 6, 8, 10, 12, 14, and 16 octets. The second choice is L, the size of the length field. This value requires a trade-off between the maximum message size and the size of the Nonce[10].

III. SERVICES AND METHODS

Network security is mostly achieved through the use of cryptography, a science based on abstract algebra. But here the term is used to refer to the science and art of transforming messages to make them secure and immune to attacks from the point of view of security of Wireless Technology[11]. There are different kinds of security algorithm or cryptography techniques broadly, classified as symmetric & asymmetric key cryptography algorithms. They are further classified as stream cipher and block cipher. DES(Data Encryption Standard) and AES (Advanced Encryption Standard) ciphers are referred to as block ciphers because they divide the plaintext into blocks and use the same key to encrypt and decrypt the blocks.

The purpose of the paper is to evaluate these different security algorithms, RSNA and Pre-RSNA algorithms. However the RSA(named for its inventors Rivest, Shamir, and Adleman) is the most common asymmetric key(Public Key) algorithm is used, while the research activity may include ElGamal another asymmetric-key algorithm and its difference with the RSA. There are different software development kit available used for developing & evaluating such algorithms such as C++, java & matlab.
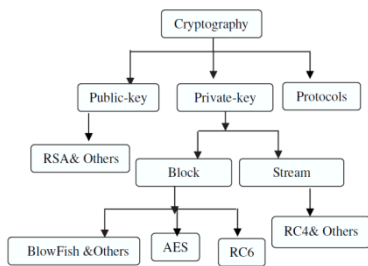
Fig 5 : Encryption Algorithms Classification

Cryptography Services

Cryptography has several applications in network security. Cryptography can provide five services. Four of these are related to the message exchange. The fifth is related to the entity trying to access a system for using its resources. IEEE Std 802.11 provides the ability to protect the contents of messages. This functionality is provided by the data confidentiality service. IEEE Std 802.11 provides three cryptographic algorithms to protect data traffic: WEP, TKIP, and CCMP. That means one can use the devices conforming this IEEE standard or WPA2 devices for security evaluation purpose.
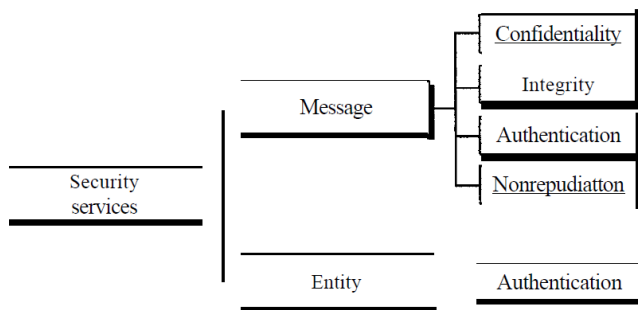
Fig 6 : Cryptography Services

Security Services

Cisco, netgear devices are available for such conformity one can create scenario and can check the security practically as per requirement. Besides the security methods may include the simulator such as NS2, Matlab, Qualnet and/or Opnet for evaluation purpose. The specific aspects of this paper is to investigate earlier security aspect called pre-RSNA within the framework of main objectives i.e. RSNA in order to develop a Secure Model for Wireless Local Area Network.

IV. RESULTS AND DISCUSSIONS

Earlier various attacks have been shown at WEP. When WEP failed to deliver the Security, the Temporal Key Integrity Protocol (TKIP) was built around WEP to fix its flaws and provide backwards compatibility with older equipment. On November 8, 2008, German researchers released a paper demonstrating a practical attack against the Temporal Key Integrity Protocol (TKIP) encryption algorithm used to secure Wi-Fi networks that are certified for Wi-Fi Protected Access (WPA). Motoral inc 2008 analyzed and recommends that enterprises must use AES-CCMP encryption with their WPA or WPA2 deployments. Motorola WLAN infrastructure is fully certified for AES-CCMP. [16] Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (CCMP) is an encryption protocol that forms part of the 802.11i standard for wireless local area networks (WLANs), particularly those using WiMax technology. Various Papers has been published for analyzing CCMP.

Wireless LAN deployments should be made as secure as possible. Standard 802.11 securities are weak and vulnerable to numerous network attacks. CERT-In Monthly Security Bulletin-February 2012 reports that 95 security incidents were reported to CERT-In from various National/ International agencies. As shown in the figure 7, 44% incidents related to Phishing were reported in this month. Other reported incidents include 22 % Virus/Malicious Code ,03 % unauthorized scanning , 31 % incidents related to technical help under the Others category. 2460 Indian websites were defaced during February 2012[24].
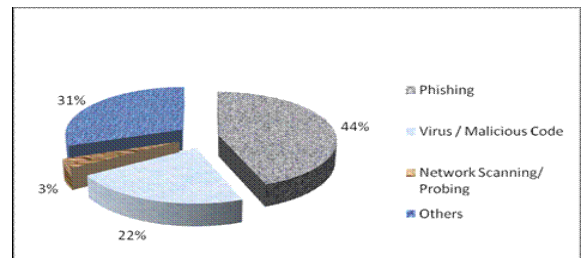
Fig 7 : Security Threats shown by CERT-In

CERT-In Website Intrusion and Malware Propagation : is tracking malicious URLs on regular basis. In the month, February 2012, CERT-In tracked 475 websites infected with malicious contents. A user visiting these URLs is redirected to malicious sites which downloading malicious code such as virus, worm, trojan. keylogger, rootkit on to the user's computer[24].
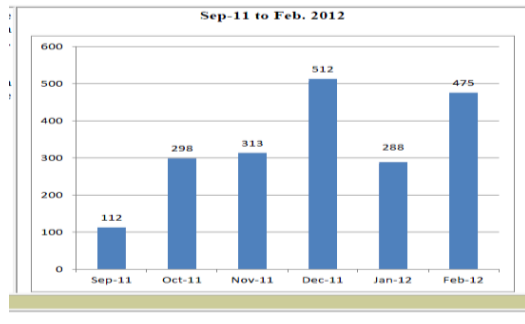
Fig 8 : CERT-In shows WIMP attack Tracking Sep-11 to Feb-12

V. CONCLUSION

This paper has highlighted WLAN vulnerabilities and concluded that Wireless Security is always major issue. The purpose of this paper is to educate the public at large and protecting them from several serious attacks. However it is impossible in this paper to cover all the risks and vulnerabilities pertaining to wireless LANs. The most severe and most common vulnerabilities have been covered. Protecting a wireless network requires best planning considering the big or small size of network. The main point of considerations are : Not relying on WEP to provide security for the network, Limiting, as much as is possible, who can attach to a network , Surveying the interference and jamming likelihood for a planned wireless LAN before it is installed. Practical approaches have also been necessary to be secure from such attacks.

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AUTHORS

First Author MOHD. IZHAR, Associate Professor, HMR Inst. of Tech. & Mgt, GGSIP University, Delhi, Ph.D. Scholar of Mewar , University, NH-79, Gangrar, Chittorgarh (Rajasthan) India, email : mohd.izhar.delhi@gmail.com

Second Author – MOHD. SHAHID, Ph.D. Scholar of Mewar University, NH-79, Gangrar, Chittorgarh (Rajasthan) India email : shahidpdmce@gmail.com

Third Author – DR. V.R.SINGH, Director, PDM College of Engg., Bahadurgarh, MDU University, recognized supervisor of Mewar University, NH-79, Gangrar, Chittorgarh (Rajasthan) India-312901, email : vrsingh@ieee.org.

Correspondence Author – MOHD. IZHAR. email : mohd.izhar.delhi@gmail.com

A Study of Adjustment in Relation to Anxiety among Male and Female College Students of Gurgaon district in Haryana

Dr.Jitender Kumar [*] **and Mr. Sunil Kumar** [**]

[*] Associate Prof. Deptt of Education M.D.U. Rohtak.
[**] Assistant Prof. Drona college of Education,Gurgaon

Abstract- Education includes all those life experience of a child from which he or she learns something. It is important for the teacher to recognize that every activity of the pupil whether he is aggressive, co-operative, delinquent, or in fact doing anything, he is making adjustments. The adjustment he makes may not be a good one so far as society is concerned but it is an adjustment. Its purpose is to satisfy some or the other need of the individual. The teachers are more concerned with the adjustment because the primary purpose of education is to train children for life. The process of adjustment starts right from the birth of the child and continues till his death. When the internal needs of the human beings oppose external demands, conflicts arise in mind. This creates tensions, frustrations etc, and it produce anxiety. Anxiety is one of the major psychological variables which are considered as an important part of personality development. Now a days the society the educational institutions the schools, the family are too complex that the students are facing a lot of problems in their daily life in relation to their adjustment, anxiety, and academic achievement. It is the responsibility of the researcher, teachers and parents that the problem should be indentified very soon and immediate remedial measures should be provided to the students for the betterment of their lives. Thus the present study was undertaken to get an understanding of the anxiety and its effects on the adjustments of male and female college students. The students of the low anxiety groups possess better adjustment and academic achievement than high anxious group of students. The results of the present investigation have got many educational implications.

Index Terms- Anxiety, Adjustment

I. INTRODUCTION

Education is considered is to be an integral part of human life. An uneducated man is not more than an animal so, it has been considered as one of the primary need of every civilized person. Hardly a century back education was privilege wit relatively few people enjoyed. But now, it is accepted that everyone has a right to get education especially in democratic country like India.

The term "education" cannot be circumscribed. It is a vast term. Education includes all those life experience of a child from which he or she learns something. The true education comes through the stimulation of the child's power by the demands of the social situation in which he finds himself.

Education should be imparted to children according to their aptitude, interest and capacities. It is important for the teacher to recognize that every activity of the pupil whether he is aggressive, co-operative, delinquent, or infact doing anything, he is making or adjustment to life. The adjustment he makes may not be a good one so far as society is concerned but it is an adjustment. Its purpose is to satisfy some or the other need of the individual. The teachers are more concerned with the adjustment because the primary purpose of education is to train children for life. The process of adjustment starts right from the birth of the child and continues till his death.

When the internal needs of the human beings oppose external demands, conflicts arise in mind. This creates tensions, frustrations etc, and it produce anxiety. Anxiety is one of the major psychological variables which are considered as an important part of personality development. Psychologists find abnormal anxiety interferes in the organized behavioral sequence. Therefore it acts like an adverse stimulus also for the development of student potentialities. Thus anxiety should not cross its threshold value otherwise it will reach its abnormal level.

The conflicting state of mind also leads to the development of maladjustment in the personality of the individual.

II. OBJECTIVES OF THE STUDY

The investigator has carried out the present study with the following objects:-
* To compare the high anxious group of male and female on social adjustment.
* To compare the average anxious group of male and female on social adjustment.
* To compare the low anxious group of male and female on social adjustment.

III. HYPOTHESIS

The following hypothesis was framed to achieve the objectives of present study:
➢ There is no significant difference in social adjustment between male and female high anxiety scores.
➢ There is no significant difference in social adjustment between male and female average anxiety scores.

> There is no significant difference in social adjustment between male and female low anxiety scores.

Sample:

The sample of the present study consisted of 100 college students out of which 50 were male and 50 were female college students of Gurgaon district in Haryana. The sample was selected on the basis of simple random sampling technique.

Collection of data:

The investigator obtained permission from head of the institutions to collect data from the students. The purpose of the test was explained to the sample subjects, separate instructions were given as to how to give response to items in adjustment inventory and anxiety questionnaire. It was ensured that no item was left.

Administration and scoring of Adjustment inventory:

The adjustment inventory contained 88 items to differentiate between well adjusted and poorly adjusted students in various aspects of life. Every item had three options to each question always, sometimes and never. In case of positive item the students who agreed to as "always" was given plus 2 "sometimes" was given plus 1 and "never" was given 0 score. In case of negative item response "always" was given 0 "sometimes "was given plus 1 and "never" was given plus 2 scores.

Administration and scoring of Anxiety inventory:

The anxiety questionnaire contained 100 items dealing with certain sample of behavioral situation that most of the people experience at one time or the other.

For anxiety inventory student marked their answer as "True" and False and was given plus 1 mark for true and for "False"0 was given according to manual of the scale.

These scores were then summed up to get anxiety score.

Statistical technique used:

Since it was comparative study mean standard deviation and't' value were considered appropriate to find out the significance of difference between two groups.

IV. FINDINGS

❖ Table 1 shows the difference in social adjustment level between male and female high anxiety group of college students. The male college students showed a high mean score in the social adjustment (52.2) than female college students (45.67). The calculated value of T ratio was 3.64 which is significant at 0.05 and 0.01 level It means that there is significant difference in social adjustment level between male and female high anxiety group of college students.

Table 1
Social Adjustment between male and female of high anxiety scorers

Sr. No.	Group	Mean	S.D.	SED	t-value	Level of significance
1.	Male	52.2	2.93	1.79	3.64	significant
2.	Female	45.67	3.68			

Table value of't-ratio' at df =12 at 0.05 and 0.01 levels are 2.18 and 3.64 respectively.

❖ Table II shows the difference in social adjustment between male and female average anxiety group of college students. The male college students showed a high mean score in social adjustment (43.76) than the female college students (39.53). The calculated value of T ratio was 1.67 which is not significant at 0.05 and 0.01 levels. It implied that there is no significant difference in social adjustment of male and female average anxiety group of college students.

Table II
Social adjustment between male and female average anxiety scorers

Sr. No.	Group	Mean	S.D.	SED	t-value	Level of significance
1.	Male	43.76	5.76	2.25	1.67	Not significant
2.	Female	39.53	8.72			

Table value of 't-ratio' at df =38 at 0.05 and 0.01 levels are 2.02 and 2.70 respectively.

❖ Table III shows difference in social adjustment between male and female low anxiety groups of college students. The male college students showed a high mean score in social adjustment (45.65) than the female college students (43.30). The calculated value of T ratio was 1.21 which is not significant at 0.05 and 0.01 levels. It implied that there is no

significant difference in social adjustment of male and female low anxiety group of college students.

Table III
Social adjustment between male and female low anxiety scorers

Sr. No.	Group	Mean	S.D.	SED	t-value	Level of significance
1.	Male	45.65	6.79	1.94	1.21	Not significant
2.	Female	43.30	6.23			

Table value of 't-ratio' at df =44 at 0.05 and 0.01 levels are 2.02 and 2.70 respectively.

V. CONCLUSION

❖ There is significant difference in social adjustment level between male and female high anxiety group of college students which implies that social adjustment level is higher in case of male college students than female college students. Thus the hypothesis that there is no significant difference in social adjustment between male and female high anxiety scores is rejected.

❖ There is no significant difference in social adjustment between male and female average anxiety group of college students. It implied that social adjustment of male and female average anxiety group of college students does not differ significantly. Thus the hypothesis that there is no significant difference in social adjustment between male and female average anxiety scores is accepted.

❖ There is no significant difference in social adjustment between male and female low anxiety groups of college students. It implied that social adjustment of male and female low anxiety group of college students does not differ significantly. Thus the hypothesis that There is no significant difference in social adjustment between male and female low anxiety scores is accepted.

VI. EDUCATIONAL IMPLICATIONS

Adjustment and anxiety are two important factors in the mental and emotional development of any individual. It is the utmost duty of teachers and parents to develop excellent or at least good adjustment in male and female college students. They should be provided with opportunities to develop well adjustment and reduce anxiety level so that it may not cross its threshold value.

Now a days the society the educational institutions the schools, the family are too complex that the students are facing a lot of problems in their daily life in relation to their adjustment, anxiety, and academic achievement. It is the responsibility of the researcher, teachers and parents that the problem should be indentified very soon and immediate remedial measures should be provided to the students for the betterment of their life's. Students of the low anxiety possess better adjustment and academic achievement than high anxious group of students. The results of the present investigations have got many educational implications.

1. The better means of developing adjustment and reeducating anxiety should be included in the school programme the mental and emotional development of any for low adjustment and high anxious students.
2. The better educational facilities should be provided to the low adjustment and high anxious students to achieve success in every field of life in their career.
3. The male and female students should be made to feel that they are also the significant members of the society.
4. Teacher should create conducive environment and opportunities for the students who are not properly adjusted in the class-room as well as outside of the school environment.
5. Counseling and guidance centre's should be established for the students who are completely maladjusted and high anxious.

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AUTHORS

First Author – Dr.Jitender Kumar, Associate Prof. Deptt of Education M.D.U. Rohtak.
Second Author – Mr. Sunil Kumar, Assistant Prof. Drona college of Education,Gurgaon.

Preparation, Characterization, Thermal and Electrical Conductivity Properties of PVDF Composites

S. Devikala, P. Kamaraj and M. Arthanareeswari

Department of Chemistry, Faculty of Engineering and Technology, SRM University Kattankulathur-603 203, India.

Abstract- Using PVDF and ZrO_2, polymer composites were prepared by sol gel method. Various measurements such as X-ray diffraction (XRD), Scanning electron microscopy (SEM) and Differential Scanning Calorimetry (DSC) were used to characterize the composites. Thermal and electrical properties of the composite samples were studied. The conductivity of composites was found to increase with increase in temperature as well as with zirconia content. As temperature increases, the polymer chain acquires faster internal modes in which bond rotations produce segmental motion.

Index Terms- PVDF; ZrO_2; T_g; conductivity; composites

I. Introduction

PVDF is a polar polymer with excellent chemical, mechanical and electrical properties [1-4]. It's strong piezoelectric response, chemical and mechanical durability make it a valuable material for sensors and actuators. Piezoelectrics are a class of materials that can transfer mechanical energy to electrical energy and vice versa. The piezoelectric effect consists of a linear coupling between an applied electric field and an induced strain. The response of the material is proportional to the electric field or change in dimension. This predictable material property is extremely valuable in sensing and actuation [5,6]. Zirconia (ZrO_2) is an oxide which has a high tensile strength, high hardness and corrosion resistance. Zirconia based ceramics are routinely used in structural applications in engineering, such as manufacture of cutting tools, gas sensors, refractories and structural opacifiers [7]. The properties of the polymers and the ceramics could be exploited in the corrosion and gas sensing studies. Ceramic materials are typically brittle, possess low dielectric strength and in many cases are difficult to be processed requiring high temperature. On the other hand, polymers are flexible, can be easily processed at low temperatures. Conductivity studies of PVDF/TiO_2 has been reported [8]. Multiwalled carbon nanotube/poly(vinylidene fluoride) (MWCNT/PVDF) composites dielectric properties were studied [9]. In the present study, PVDF/ZrO_2 composite was prepared, thermal and electrical properties of composites were studied.

II. Experimental

2.1 Preparation of PVDZr Composites

A definite quantity of PVDF was dissolved in dimethyl formamide followed by the addition of a known quantity of ZrO_2 and then it was made into a paste in an agate mortar and was subjected to heat at 80 °C for 30 minutes in a hot air oven and made into a powder. PVDZr composites were prepared in the following proportions of PVDF and ZrO_2: PVDZr 1 – 9:1, PVDZr 2 – 8:2, PVDZr 3 - 7:3, PVDZr 4 -6:4, PVDZr 5 – 5:5 and PVDZr 6 – 4:6.

2.2 Characterisation Techniques

XRD patterns of PVDF, ZrO_2 and PVDZr composites were recorded using Philips X'PERT PRO diffractometer with Cu Kα (λ= 1.54060 Å) incident radiation. The peaks were recorded in the 2θ range of 20°–80°. The SEM images of polymer and polymer composites were recorded using Hitachi Scanning Electron Microscope SU1510. The samples were gold plated before SEM observation. The DSC scans of polymer composite samples were carried out only to measure glass transition temperature (T_g). The DSC plots of polymers and polymer composites were recorded using METTLER-TOLEDO DSC1. The electrical conductivity of composites were measured using Hioki 3522-50 LCR Meter. Testing temperature ranged from 30 to 60 °C at frequency ranging from 50 Hz to 5 MHz. The measured conductance G, from 50 Hz to 5 MHz is used to calculate ac conductivity, $\sigma_{(ac)}$ using the following expression:

$$\sigma_{(ac)} = G\, d/A \qquad\qquad (1)$$

where d is the thickness of the sample and A is the cross sectional area of the electrode.

III. Results and Discussion

3.1 XRD

The XRD pattern of pure PVDF has monoclinic structure. The peak positions (2θ = 18.48 (0 2 0), 20.18 (1 1 0), 26.60 (0 2 2), 34.91 (1 3 1), 38.81 (0 4 1) and 41.41° (2 2 1) and relative intensitites obtained for the polymer match with the JCPDS Card no. 38-1638 file, identifying it as PVDF with monoclinic structure with β phase Fig.1(a). The average crystallite size is found to be 0.1549 µm. The peak positions (2θ = 30.26 (0 1 1), 34.81 (0 1 1), 34.81 (0 0 2), 43.13 (0 1 2), 50.70 (0 2 0), 60.20 (1 2 1) and 74.53° (2 2 0) and relative intensitites obtained for ZrO_2 match with the JCPDS Card no. 50-1089 file, identifying it as ZrO_2 with tetragonal phase (Fig.1(b)). The average crystallite size is found to be 0.1756 µm. As the ZrO_2 content increases, the characteristic composite peaks at 30.26, 50.37, 50.70, 60.2 corresponding to the tetragonal phase ZrO_2, are obviously pronounced, and the peaks corresponding to PVDF diminish. The broad peak at region of of 2θ = 15-20°, showing the main crystalline property of PVDF disappears when ZrO_2 content increases. This shows that a small amount of PVDF may exist in the composite samples with higher ZrO_2 content(Fig.1(c) – (e)). The average crystallite size is found to be 0.1367 µm.

Fig. 3. SEM images of (a) PVDF (b) ZrO$_2$ (c) PVDZr 6
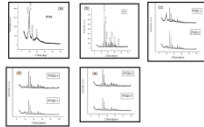
Fig. 1. XRD patterns of (a) PVDF (b) ZrO$_2$ (c) PVDZr 1 and 2 (d) PVDZr 3 and 4 (e) PVDZr 5 and 6

3.2 DSC

The T$_g$ of pure PVDF is found to be 38 °C whereas for PVDZr 1 and PVDZr 6 the values are found to be 35 and 31 °C respectively. The T$_g$ of polymer composites is decreased as compared to pure PVDF as shown in the figure. Probably, the mobility of PVDF chain is not constrained due to PVDF-ZrO$_2$ interaction. This interaction may be related to the dispersion of ZrO$_2$ in PVDF matrix. The incorporation of ZrO$_2$ considerably decreases the T$_g$ which enhances the polymer chain motion and increases volume fraction of the amorphous phase, which obviously increases the ionic transport process. It is also observed that composite with higher ZrO$_2$ content, possess low T$_g$ value. This may be attributed to highest conductivity of PVDZr 6 (Fig.2). It can be concluded that the cermic not only facilitates for ionic conductivity but also interacts with the polymer phase.
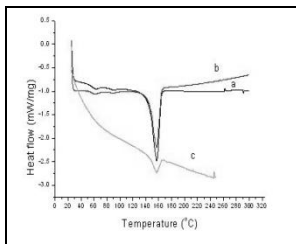
**Fig. 2. DSC plots of (a) PVDF (b) PVDZr 1 and (c) PVDZr 6
3.3 SEM**

The SEM images of PVDF, ZrO$_2$ and PVDZr 6 is shown in the Fig.3(a) – (c). SEM images reveal the porous nature of polymer composites, which inturn increases conductivity. Incorporation of ZrO$_2$ into the PVDF matrix, reduces the crystallinity and alters the orginial polymer structure and thus the conductivity of polymer composites increases. When the concentration of ceramic oxides are increased, the ceramic oxides are well dispersed and micropores distributed in part in the entire region of surface. It shows that the crystallinity of the composites decreases as the concentration of oxide is increases and it resembles the XRD pattern and also reponsible for higher conductivity. From the micrograph of composites, it can be seen that the addition of ceramic oxides increases the pore size, as a result of higher ionic conductivity [10]. It could be concluded that the presence of homogenous pore structure, leads to ion mobility, hence higher conductivity.
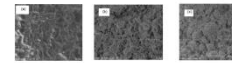
The room temperature AC conductivity and the temperature dependence of PVDZr composites are shown in Table 1. The conductivity increases with ZrO$_2$ content and temperature. The observed enhancement in the room temperature conductivity may be attributed to the incorporation of ZrO$_2$, gives rise to the possible change of chain conformation and it is confirmed by decrease in crystallinity and a relatively higher degree of amorphicity. The presence of higher levels of amorphicity is therefore expected to provide more free volume for the mobility of ions resulting in enhanced conductivity. from the temperature dependent conductivity values obtained for the composites, it is observed that the value of electrical conductivity increases with increasing temperature. This implies that mobile ions would migrate more easily through the conduction path formed by the modified network structure of PVDF chains. As temperature increases, the polymer chain acquires faster internal modes in which bond rotations produce segmental motion. This, inturn, favours hopping inter chain and intra chain movements, and, accordingly, the conductivity of the polymer composites becomes high. At low PVDF content, the semicrystalline nature of the PVDF may be hindered by the addition of higher content of ZrO$_2$, which results in higher segmental mobility in the amorphous phase and hence high ionic conductivity.

Table 1. AC conductivity of PVDF and PVDZr composites at different temperatures

	Conductivity(S/cm)			
System studied	303K	313K	323K	333K
PVDF	5.56×10^{-11}	7.85×10^{-11}	9.05×10^{-11}	3.78×10^{-10}
PVDZr 1	1.23×10^{-10}	1.573×10^{-8}	1.63×10^{-7}	1.12×10^{-6}
PVDZr 2	2.66×10^{-10}	2.071×10^{-8}	2.57×10^{-7}	2.01×10^{-6}
PVDZr 3	3.74×10^{-10}	3.842×10^{-8}	3.22×10^{-7}	3.85×10^{-6}

PVDZr 4	$4.78X10^{-10}$	$4.979X10^{-8}$	$4.04X10^{-7}$	$4.628X10^{-6}$
PVDZr 5	$5.46X10^{-10}$	$5.504X10^{-8}$	$5.68 X10^{-7}$	$5.88X10^{-6}$
PVDZr 6	$6.95X10^{-10}$	$6.438X10^{-8}$	$6.65X10^{-7}$	$6.68X10^{-6}$

IV. CONCLUSIONS

PVDZr composites were prepared by sol gel method. The main crystalline property of PVDF disappears when ZrO_2 content increases. The incorporation of ZrO_2 considerably decreases the T_g which enhances the polymer chain motion and increases volume fraction of the amorphous phase, which obviously increases the ionic transport process.SEM images reveal the porous nature of polymer composites, which inturn increases conductivity. At low PVDF content, the semicrystalline nature of the PVDF may be hindered by the addition of higher content of ZrO_2, which results in higher segmental mobility in the amorphous phase and hence high ionic conductivity.

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AUTHORS

First Author – S. Devikala, M.Sc, M.Phil, Ph.D, Department of Chemistry, Faculty of Engineering and Technology, SRM University Kattankulathur-603 203, India. sdevikala@gmail.com
Second Author – P. Kamaraj, M.Sc, Ph.D, Department of Chemistry, Faculty of Engineering and Technology, SRM University Kattankulathur-603 203, India. Kamaraj97@yahoo.co.in
Third Author – M. Arthanareeswari, M.Sc, M.Phil, Ph.D, Department of Chemistry, Faculty of Engineering and Technology, SRM University Kattankulathur-603 203, India. arthanareeswari@gmail.com

Correspondence Author – S.Devikala, sdevikala@gmail.com , sdevikala@yahoo.co.in, 9444844369.

Leachate Characterization and Surface Groundwater Pollution at Municipal Solid Waste Landfill of Gohagoda, Sri Lanka

Nirmala Dharmarathne, Jagath Gunatilake

[*] Department of Geology, University of Peradeniya, Sri Lanka

Abstract- As a developing country, protecting groundwater resources is extremely essential in Sri Lanka. Landfills are one of the main sources of water pollution. The filling of the Gohagoda disposal yard, takes place at a distance about 50m from Gohagoda water intake plant. In addition, there is several boreholes located close proximity of the landfill, which used for drinking and domestic purposes. A study of composition of landfill leachate and groundwater pollution conducted at Gohagoda landfill site, which is located at north-west of Kandy city. The Leachate sampled at nine different locations of the landfill. Groundwater samples were collected using auguring at five locations. In addition, to detect the seasonal variation of the water quality in the nearby water wells, four water samples obtained during both wet and dry seasons. Leachate and groundwater were physically and chemically characterized. Parameters measured were pH, Sulphate, Nitrate, Nitrites, Heavy metals (Pb, Zn, Ni, Cr, CO, Fe, Mn, Cu). The results showed that leachate of the landfill were most likely methanogenic phase, based on the alkaline pH value recorded. These results also showed that significant number of borehole were contaminated where concentration of physio-chemical parameters are above the W.H.O standards required for drinking water. Therefore, this landfill is a threat for the environment, and government should do sanitary landfill to prevent further contamination of groundwater as well as soil.

Index Terms- Leachate, Ground water, contamination

I. INTRODUCTION

Sri Lanka as a developing country with limited land space and rapidly increasing population rate, possible subsurface environmental pollution problem resulting from liquid and solid waste disposal is to be considered with high priority. The leachate produced by waste disposal sites contains a large amount of toxic substances, which are likely to contaminate the groundwater. It may cause adverse effects on public health if the concentrations present in water increased beyond the WHO standards. Leachate is streaming down to the river through the paddy fields located bellow the disposal site. There is a bad smell around the site produced from waste. Solid wastes consist of the highly heterogeneous mass of discarded materials from the urban community as well as the more homogeneous accumulation of agricultural, industrial and mining wastes. Several disposal methods are available and more ones that are prominent are open dumping, composting, incineration, and sanitary land filling etc.

However, lack of land for landfill and technologies for other treatment methods, open dump is resorted to in Sri Lanka. Nevertheless, it creates many environmental as well as heath problems.

The primary mechanism by which landfill contamination to groundwater is through generation of leachate and its infiltration bellow the water table. When Leachate from landfill mixes with groundwater, its forms a plume that spreads in the direction of the flowing groundwater. There are several forms of landfill emissions as gaseous emissions of volatile organic compounds, airborne particulate matter and landfill leachate (Slack et al., 2005). Among them, landfill leachate generation is a serious environmental problem associated with open dumpsites since landfill leachate is highly contaminated with different types of pollutants. The composition of landfill leachate varies from time to time and site to site due to the differences in waste composition, amount of precipitation, moisture content, climatic changes, site hydrology, waste compaction, interaction of leachate with the environment etc. (Kulikowska and Klimiuk, 2008; Umar et al., 2010)

Leachate contains large amount of organic matter (biodegradable and non-biodegradable), inorganic pollutants, heavy metals etc (Jaskelevicius and Lynikiene, 2009). The sources of pollutants are industrial products such as pesticides, paints, batteries, metals dumped. Pollutants in municipal landfill leachate can be classified in to four categories as (Alkassasbeh *et al.,* 2009; Asadi et al., 2008);Dissolved organic matter, Inorganic compounds, Heavy metals Xenobiotic organic substances.

Most of the lakes and rivers in the world are heavily polluted today and there are limited lands available for crude solid waste dumping. The increasing generation and accumulation of wastes produce serious environmental, economic, and social problems in both developed and developing countries. However, there is lesser likelihood to contaminate groundwater from solid wastes, which are dumped on open lands. The solid wastes comes from domestic households, institutions, industries etc. thus major elements, trace elements, heavy metals and other chemical substances could get concentrated in these sites. Due to leaching of those substances, groundwater can be contaminated up to un-acceptable extents. Landfills are sources of pollution of groundwater and soil due to the production of leachate and its migration through refuse. Leachate consists of high concentrations of physico chemical substances, which can pollute groundwater and soil. Water is one of the essential material required to sustain life and has long been suspected of being the sources of many of the illnesses of man. It

was not until a little over hundred years ago that definite proof of disease transmission through water was established.

In the present study the impact of leachate percolation on groundwater quality was estimated from an unlined landfill site at Gohagoda, Sri Lanka. Various physico-chemical parameters including heavy metals and nutrients were analyzed in leachate and in groundwater samples to understand the possible link of groundwater contamination. The effect of distance of landfill from groundwater sources were also studied.

II. MATERIAL AND METHODS

Water quality analysis

To detect the effect caused by the waste disposal site on the groundwater system Groundwater samples collected from 5 boreholes to study possible impact of leachate percolation into groundwater of the area, the water samples were collected using

Augur at 5 locations. Also in order to detect the water quality in the near by water wells, well water samples were obtained during both wet and dry season.

The powder pillow method for the spectrophotometer was used to measure the concentration of Nitrate, Nitrite, Sulphate, Phosphate of samples using the relevant wavelength. Heavy metal Cd, As, Zn, Cr, Fe, Mn, Co, Ni, Cu, Pb of the samples were measured using Atomic Absorption Spectrophotometer (AAS). AAS uses the flame atomic absorption method to calculation.

Leachate Analysis

Leachate sample were collected from several location (L1-L9). All suspended matter has been filtered using 42μm filter paper. Heavy metals, physical parameters, and nutrients in leachate samples were analyzed as mention in above

Table 1: Description of the sampling site

Sample no	Location	Depth to water table (m)
A1	Close to the landfill (25m), Downstream,450m elevation	1.8
A2	55m from the landfill, Downstream,447m elevation	1.35
A3	100m from the landfill 442.5m elevation, downstream	0.85
A4	150m from the landfill,440m elevation, Downstream	0.6
A5	Close to the river, Down stream,270m from the landfill	0.45

III. RESULTS AND DISCUSSION

Characteristic of Leachate

The pH of the Leachate depend not only the concentration of the acids that are present but also in the partial pressure of the CO_2 in the landfill gas that is in contact with the leachate. These results indicate that the leachates are at the later stage of methanogenic phase. This means that the age of landfill, rainfall and kind of waste are the most important factors which affect the composition of leachate. The average value of pH in leachate sample is about 7.9; it can be conclude that leachate is alkaline.

Electrical conductivity is used an indicator of the abundance of dissolved inorganic species or total concentration of ion. Electrical conductivity values show variety result between that Leachate. The highest value is obtained at the L9 with the value of 22.mS/cm where as the lowest value is obtained at the L1 with the value of 8.9mS/cm. However the EC value which are obtained for the leachate are not within the standard range of 0.7-4 mScm^{-1} required for treated waste water discharge determined by local standards. When considering the average value of conductivity (13.36 mS/cm) is leachate samples were conclude that leachate was high amount of mineral salt.

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Table 2: Insitu and Nutrients parameters of the leachate

Sample no	pH	Conductivity mS/cm)	NO_3^- In ppm	PO_4^{-3} In ppm	SO_4^{-2} In ppm
L1	7.83	8.9	6.3	26.3	2
L2	8.12	19	9.9	26.7	21
L3	7.9	10.9	26.9	19.6	17
L4	8.13	15.9	8.3	25.5	1
L5	8.2	13.8	10.6	31.8	3
L6	7.97	16.8	33.2	20.4	1.5
L7	7.84	9.8	6.9	18.1	2
L8	7.44	2.95	1.2	2.39	12
L9	8.41	22.2	2.1	24.4	180

The concentration of sulphate at the Leachate showed different values. The highest value is obtained at the L9 (Treatment plant) with the value of 180 mg/l. The treatment plant receives massive quantities of human excreta and other biological waste matter that can be the reason high value of sulphate concentration. In other Leachate samples sulphate concentration vary range between 1-17 mg/l. The concentration of nitrate for the leachate is range between 6.3-33.2 mg/l (Table 2). Average value of nitrate in leachate is about 14.5 mg/l. the nitrate of the leachate is chiefly from biological sources, human and animal excreta accounting for a large percentage of the total nitrogen load. The concentration of nitrogenous compound indicates the occurrence of extensive anaerobic bacterial activities. Nitrite oxidized in to the nitrate, which can be quickly assimilated by plant or otherwise reduced again to nitrite and NH_3. Therefore, the concentrations of nitrate for the leachate are higher than the nitrite. The concentration of phosphate of the Leachate showed different values. The highest value is obtained at the L5 with the value of 31.8 mg/l, where as the lowest value is obtained at the L8 with the value of phosphate is about 21.28mg/l.

The Concentration of heavy metals in leachate samples collected from the Gohagoda landfill site has been presented in table 3. The distribution of Fe at the Leachate shows different values. The highest Fe content of 9.2mg/l is measured at the L4 leachate sample; where as lowest content value of 1.18 mg/l is measured at the L5. The highest level of Fe in the L4 leachate

samples indicates that Fe and steel scrap are also dumped in the landfill. The dark brown color of the leachate is mainly attributing to the oxidation of ferrous to ferric from and the formation of ferric hydroxide colloids and complexes with fulvic/humic substances (chu et al., 1994).

The distribution of Mn at the leachates shows value range between 0.27-2.91 mg/l and average value is about 0.35 mg/l. Zn concentration for nine leachate site is varying in between 0.10-9.9 mg/l. The presence of Zn in the leachate shows that the landfill receives waste from batteries and fluorescent lamps. Lowest concentration of heavy metal is heavy metal is recorded for Pb with the value range between 0.001-0.031mg/l. the presence of law concentration of Pb in the leachate sample indicate the there is no disposal of Pb batteries, chemicals for photograph processing, Pb based paints and pipe at the landfill site. The distribution of Cu at the leachates shows different value. The highest Cu concentration of 13mg/l is measured at L4 sample, where as lowest content value of 0.08mg/l is measured at the L1. The high concentration of Zn, Cu, Fe, and Mn was reported in L4. On the other hand most of these results are not within the standard acceptable level of treated wastewater discharge determined by international standards. Cr (0-0.31mg/l), Ni (0.07-0.76) and Co (0.01-0.23mg/l) were also present in the leachate samples. A variety of waste is dumped at Gohagoda landfill site which likely indicate the origin of Zn, Cr, Cu and Ni in leachate.

Table 3: Heavy metals concentrations in leachate samples

Sample no	Element Concentration (ppm)						
	Zn	Cu	Fe	Mn	Cr	Ni	Co
LI	0.1	0.08	1.73	0.49	0.01	0.18	1.12
L2	0.5	0.31	17.8	0.57	0.01	0.76	0.23
L3	0.28	0.39	1.76	0.27	0.01	0.37	0.2
L4	9.9	13	92	2.7	0.01	0.42	0.16
L5	1.4	0.22	1.18	0.71	0.01	0.38	0.18

L6	0.77	0.39	5.19	2.91	0.01	0.52	0.01
L7	0.67	0.24	4.58	1.49	0	0.07	0.17
L8	1.39	0.27	8.9	0.67	0.06	0.07	0.16
L9	0.47	0.35	3.49	0.46	0.31	0.48	0.18

Groundwater Characteristics

pH values for all groundwater samples are shown in table 4. The highest value of 7.86 was measured in A5, where as the lowest value of 3.2 was measured in A1. The low pH value obtained for the underground water near the landfill is an indication of its effects on the water quality. The pH of the groundwater samples in A1, A2, and A3 borehole was about acidic, the range being 3.2-6.99. The results of the pH for all boreholes however are not agreement with the range value of 6.5-9.2 determined by international standards, which required for drinking water. The value of pH in the well water sample is ranged between 5.19-6.96, these result are not in agreement with the range value of 6.5-9.2 determined by international standards which is required for drinking water. In addition, there is clearly difference between pH value in dry and wet season. It can suggested that water samples carried out from well site sample collected during dry period show lower pH value that of the sample collected in wet period.

EC values show very different result between the boreholes. The highest value is in A1 (2.3 mS/cm) where as the lowest value recorded in A5 (0.1ms/cm). The high values of EC in A1,A2,A3,are higher than the range values of 0.45-1.0 mS/cm determined by local and international standards which is required for drinking water. These high conductivity values obtained for the underground water near the landfill is an indication of its effect on the water. Value of EC in the above three boreholes suggested that there is inorganic pollution compared to the other boreholes. Location near the landfill site so it may be due to the leaching of free ions from the waste. However the EC which are obtained for the well water samples are bellow or within the standards range. Also it can suggested that water samples carried out from well site during rainy period show higher EC value than the sample collected during dry period.
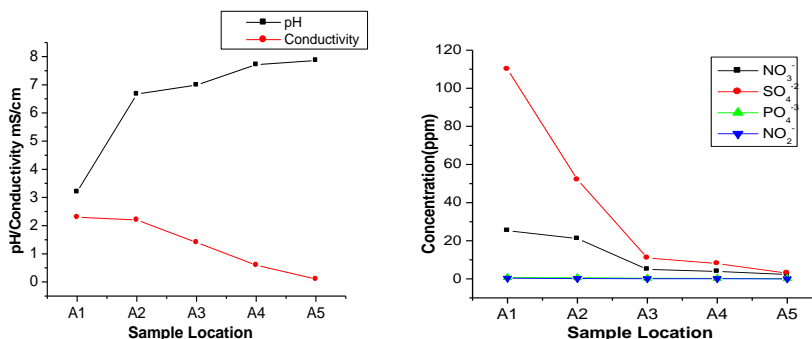
Figure 1 : Variation of pH, EC, nutrients values in ground water samples

Table 4. Insitu parameters and Nutrients parameters of the Ground water samples

Sample no	pH	Conductivity mS/cm	NO_3^-	SO_4^{-2}	PO_4^{-3}	NO_2^-
A1	3.2	2.3	25.3	110	0.72	0.296
A2	6.67	2.2	21.1	52	0.61	0.143
A3	6.99	1.4	5	11	0.33	0.1
A4	7.71	0.6	3.9	8	0.27	0.37
A5	7.86	0.1	2.3	3	0.07	0.023

The concentrations of sulphate between the boreholes are different. Concentration of sulphate in water sample are ranged from 3-110 mg/l in profile 1 and was significantly high at A1 (110 mg/l), where as the lowest concentration is measured in A5 with the value of 3mg/l. This high concentration of the sulphate value obtained for the underground water near the landfill is an indication of its effect on the water quality. The value of sulphate in well water sample is range between 4-49mg/l. Also there is clearly difference between the value of dry and wet season. It can be suggested that water sample carried out from well site sample

collected during dry period show lower value than the sample collected during wet period. The concentration of sulphate in groundwater in this study area did not pose any significant water quality problem, because these results are within the standards acceptable level of drinking water determined by local and international standards. Nitrogen is found in a number of different forms in water, as nitrogen, ammonia and oxidized nitrogen such as Nitrite and Nitrate. The nitrate level in groundwater is varied. The higher level recorded in A1 with the value of 25.3mg/l where as lowest value is recorded in A5 with

value of 2.3 mg/l. Some researchers have also reported increase in nitrate composition in groundwater due to the waste water dumped at the disposal site and likely indicate the impact of leachate which is further support that groundwater near landfill site is being significantly affected by leachate percolation. The concentration of nitrate in well water samples is range between 0.7-4.6 mg/l. also there is clearly difference between the value of dry and wet season. It can suggested that water samples carried out from well site sample collected during dry period show lower value that of the sample collected after the rainy period. The reason may be due to the high amount of leachate which migrates to the groundwater via soil. The highest PO_4^{-3} were measured at A1 with the value of 0.72 mg/l where as the lowest concentration is measured in A5 with the value of 0.17 mg/l. However Phosphate concentration is less compared to the other nutrient in water. Because phosphate were less soluble and poor mobility

unlike nitrate, usually converted in to insoluble form and fixed in the soil. Phosphate may be contributed from unprotected septic tanks and result of discharge of excreta effluent in which most of the phosphate may have been derived from domestic detergent powder, animal waste. The concentration of phosphate in well water samples is range between 0.09-0.24mg/l and did not pose to any pollution conditions. The concentration of phosphate in well water sample is range between 0.09-0.24 mg/l. (table2). Also water samples carried out from well site sample collected during dry period show lower value that of the sample collected after the rainy period. The reason may be due to the enhanced leaching of material by the rain and which migrates to the groundwater via soil. The groundwater samples were analyzed for heavy metal such as Fe, Mn, CO, Cu, Zn, Pb, and Ni. As. The results are shown in table 4.9.

Table 5: Heavy metal concentration in ground water samples

Sample	Element concentration (ppm)						
	Fe	Zn	Cu	Mn	Cr	Ni	CO
A1	17.6	0.58	0.44	29.2	0.2	0.05	0.8
A2	17.2	0.36	0.18	26.1	0.1	0.04	0.2
A3	4.2	0.20	0.06	14.0	0.05	0.02	0.06
A4	3.99	0.11	0.03	7.1	0.03	0.01	0.02
A5	1.2	0.11	0.04	1.49	0.01	0.01	0.02

Heavy metal remains in the waste or at the waste-rock interface as result of redox controlled precipitation reactions. Further the metal mobility is also controlled by physical sportive mechanism and landfill has and inherent in situ capacity for minimizing the mobility of toxic heavy metals (pohland et al., 1993). This fixing of heavy metals reduces the risk of direct toxic effect due to ingestion of leachate contaminated groundwater. However once the leachate leaves the site the situation changes. The leachate is generally strong reducing liquid formed under methanogenic conditions and on coming in to contact with aquifer material has the ability to reduce sorbet heavy metals in the aquifer matrix. The most important reaction is the reduction of Fe and Mn to more soluble species. Hence the concentrations of these components increase under favorable conditions close to a landfill and may lead to serious toxic risk.

Fe concentration in water samples varied from 1.2-17.6 mg/l in profile 1(table 5) and found well above the WHO permissible limit in many samples. This means that borehole is affected by the migration of leachate from the body of the landfill. Presence of Fe in water can lead to change of color of groundwater. Mn concentration in the water sample varied from 1.49-29.2 mg/l in profile. The highest value of 29.2mg/l is measured in A1, where as the lowest value of 1.49 is measured in A5 (figure 2). This means that borehole is affected by the migration of leachate from the body of the landfill. The high concentration of Mn in A1, A2, A3, A4 are not within the standard acceptable level of drinking water. The concentration of Mn was found to be remarkably high at site W4 wit the value of 2.85mg/l. in the wet period. The high concentration of Mn in W4

site is not within the standard acceptable level of drinking water. However Fe concentration of all well water samples is within the WHO standard value. Also there is clearly difference between the value of dry and wet season. It can suggested that water samples carried out from well site sample collected during dry period show lower value that of the sample collected after the rainy period.

The highest concentration of Cu found in A1 with the value of 0.44 mg/l where as the lowest concentration of Cu is found in A5 with the value of 0.04 mg/l in profile (figure 2). The high concentration of Cu in A1, A2 are not within the standard acceptable levels of drinking water determined by international standards. The reason may be due to the effect of these boreholes by the migration of leachate in to the groundwater The concentration of Cu in all well water samples did not pose any water quality problem. Also there is clearly difference between the value of dry and wet season. It can suggested that water samples carried out from well site sample collected during dry period show lower value that of the sample collected after the rainy period. The concentration of Zn in all borehole did not pose any significant water quality problems, because these concentrations are bellow the standards acceptable level of drinking water. The highest concentration of Zn 0.58mg/l was measured in A1, where as lowest concentration was measured in 0.11 mg/l in profile1. Also it can suggested that water samples carried out from well site sample collected during dry period show lower value that of the sample collected after the rainy period.

The metal Pb, Cd, Ni, Cr is characteristic as toxic one for drinking water. The content value of Ni measured in the groundwater is varied. however the concentration of Ni in all boreholes are not within the standard acceptable level of drinking water. The reason may be due to the high concentration of Ni in leachate, which migrates to the ground via soil.

The highest concentration of Cr found in A1 with the value of 0.2mg/l, where as the lowest concentration of Cr is found in A5 with the value of 0.01mg/l. high concentration of Cr in A1,
Identify the constructs of a Journa

A2, A3 are not within the standard acceptable level of drinking water. The reason may be due to the effect of this borehole by the migration of leachate in to the groundwater. However Cr concentrations of all well water samples (except W4) are within the WHO standard value. Also water samples carried out from well site sample collected during dry period show lower value that of the sample collected after the rainy period.
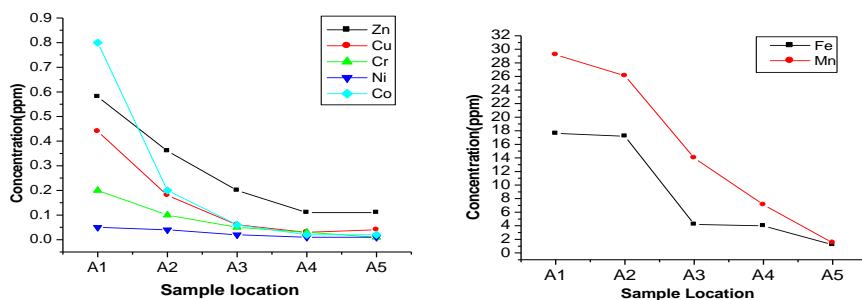
Figure 2: Variation of heavy metal along the profile

Table 6: Element concentrations of well water samples in both Dry and Wet period

Parameter	W1		W2		W3		W4	
	Wet Period	Dry Period	Wet Period	Dry Period	Wet Period	Dry Period	Wet Period	Dry Period
pH	5.19	6.8	5.69	6.1	6.78	6.96	6.52	6.78
Electrical Conductivity (mS/m)	0.1	0.25	0.26	0.36	0.7	0.82	0.3	0.69
Sulphate (ppm)	7	4	24	10	49	4	49	8
Nitrate (ppm)	2.5	2.1	4.6	4.3	1.3	0.7	3.2	0.4
Phosphate(ppm)	0.24	0.13	0.23	0.18	0.11	0.09	0.13	0.05
Zn(ppm)	0.22	0.12	0.13	0.11	0.12	0.18	0.14	0.06
Cu(ppm)	0	0.01	0.02	0.01	0.03	0	0.04	0.02
Fe(ppm)	0.29	0.11	0.24	0.22	0.54	0.52	0.58	0.53
Mn(ppm)	0	0	0.05	0	0.39	0.12	2.85	1.5
Cr(ppm)	0.05	0.02	0.05	0.03	0.1	0	0.06	0.12
Ni(ppm)	0.06	0.02	0.04	0.02	0.09	0.15	0.02	0.02
Co(ppm)	0	0	0.09	0.09	0	0	0.04	0

IV. CONCLUTIONS

Leachate of the Gohagoda landfill is most likely in methanogenic phase, which pH was 7.9. Most of parameters (including NO_3^-, Ni, Cu, Fe, CO) in the Gohagoda landfill Leachate exceeded the permissible limit required for treated wastewater discharge determined by the local and international standards. A1 and A2 are contaminated by Cu, Cr, Ni, Mn, Fe, CO and EC. A3 is contaminated by Cr, Ni, CO, Mn, Fe and EC. A4 is contaminated by Mn, Fe, CO. A5 is contaminated by Fe.

The concentrations of most of the measured parameters are the highest in borehole, which is close to the landfill. The groundwater quality improves with the increase in distances of

the borehole from the landfill site. As there is no natural or other possible reason for high concentration of these pollutans, it can be concluded that the leachate has significant impact on groundwater quality near the areas of the Gohagoda landfill site. Samples collected during dry season show lower concentration of elements and nutrients than the samples collected after the rainy season. That may be due to the enhanced leaching of material by the rain.

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AUTHORS

First Author – Nirmala Kumuduni Dharmarathne, Department of Geology, University of Peradeniya kumudu142@gmail.com
Second Author – Jagath Gunatilake, Senior Lecturer, Department of Geology, University of Peradeniya, aajkg@yahoo.com

Correspondence Author – Nirmala Kumuduni Dharmarathne, Department of Geology, kumudu142@gmail.com

Teaching football to girls - Analysis of designs and interventions of the teachers in the region of Kef

Maher Guerchi[1], Mohamed Ali Hammami[2], Hajer Sehli[2], Makram Zghibi[2]

[*] EFTS - Laboratoire Education, Formation, Travail et Savoirs UMR - Université de Toulouse
[**] Higher Institute of Sports and Physical Education, Kef,

Abstract- The study of the designs that put across the teachers of EPS on the teaching of sports with masculine implication contributed in a meaningful way to the understanding of the problems and difficulties that go along with the teaching of football discipline for girls. The results show that teachers' design manipulates implicitly or explicitly the strategies of lessons.To all intents and purposes, this research depicts the pedagogical practices and instructional choice that encompass intense consequences for girls. It also tempts teachers of EPS of the Kef region and other regions to reflect seriously on the sexism of the programs and the sexual division of data actually taught in schools.

Index Terms- designs; kind; didactic Interaction; and Sport of masculine connotation; Football

I. INTRODUCTION

The didactic research in physical education and sports conducted since the beginning of the eighties involved in teaching didactic activities of teachers. This state of fact is at the origin of the interest taken by didactic note makers to the process of interaction and content development as only it is implemented in classes, hence the interest in concrete situation of teaching-learning faculty development activity. The study of teaching and interactions analyzing content for students allow to finely scrutinize underlying designs. These melt in practice the assessment by the teaching on the nature of the encountered heterogeneities. Teachers' conceptions are critical in the educational functioning. They contribute significantly to the understanding of the problems and difficulties that convoy the teaching of content.

From the point of view of EPS teacher, entry into the activity should be adjusted to take into account both the expectations of girls and boys to discipline, while allowing an investment of all learners. In this context, academic Observatory of examinations in EPS of the Academy of Lyon under the direction of Labiche and Nesme (1998)[1], recalls "do not take into

account genetic differences and cultural populations girls and boys, on behalf of a proclaimed equality; it is actually to reproduce and maintain imbalance in the body. Otherwise, on a cultural level, to combat discriminatory representations. «Thus, the teacher should consider how to differentiate his/her interventions, how to adapt his/her material organization, how to evaluate, so as to address all his/her learners without "marginalizing" the female population. " This analysis is adapted by Davisse (2000), for whom "the ambition of a common culture implies taking account of the actual activity of the subjects in the diversity of their itinerant" (Davisse, 2000).

Indeed, shaped in the image of their sport practices, EPS teachers plan their passions and expectations on their students. Brophy and Good (1986) believe that the expectations of teachers exert effects on acquisitions of their students, as they would be inflexible. The teacher expects motor productions relating to each of his/her students. Without realizing it, it adopts him even an attitude and behavior in line with these expectations. They discreetly indicate to students the results and aspirations towards them (Rosenthal and Jacobson, 1975). However, students whom teachers have lower expectations, are often furthest from them, are treated as a group and rarely individually. Also, received interactions are less numerous, they are less frequently observed, regarded, sought by questions (Good, 1987).

This research focuses on the teaching of football, sports activity with male connotation. Daily, inequalities between girls and boys at the level of engagement and interactions with the intervener are accented. This influences implicitly or explicitly the contents of education proposed in the same space. It aims to identify designs that convey teachers of EPS in the region of Kef about football teaching in mixed classes. To study educational interactions between teachers and their students (girls / boys) during football sessions and observing how perceptions, the expectations of teachers can induce learning contrasting in football between girls and boys.

II. THEORETICAL FRAMEWORK

2.1. The designs

The meaning of the word design is very old. Qualified by "our knowledge of objects are only representations and knowledge of the ultimate reality is impossible. (Kant, 1724-1804). Similarly we nevertheless assign to Durkheim (1858-1917) the real paternity of the concept of representations, declaring that it is "a vast class of mental forms (sciences, religions, myths, space, time), opinions and knowledge without

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[1] Academic examinations Observatory of the Academy of Lyon in 1998 (under the direction of Jacques Labiche and Nesme Rene) "differences between boys and girls scoring in the Loire" in "Physical Education: Assessment - Rating exams, some elements thinking about differences in notation "ed. Rector of Lyon (this document is available on the website of the Academy of Lyon).

distinction. The concept is equivalent to the idea or the system; its cognitive characters are not specified. Gradually this concept "representations" will be taken more and more into consideration by research in social psychology, but with the appearance of the didactics of disciplines, this same concept has become «concepts» (Giordon & de Vecchi, 1987; Giordon & Martinand, 1988) to give greater meaning and clarity to the didactic research.   Giordon de Vecchi, (1987) stated that "in case of performances we prefer 'design' or 'construct'. The first focuses on the fact that it is, at one level, a set of coordinated ideas and coherent, explanatory, images used by learners to cope with situations-problems but more importantly, it highlights the idea that this set embodies an essential mental structure responsible of these contextual events." In this perspective, "our designs form a whole which combines scientific knowledge, beliefs, ideologies, social features, rational and aesthetic, emotional, affective dimensions..., these designs are continuously reinforced by our human or rather social practices...» (Clement, 1994).

2.2. The taking into account of the designs in education

The second generation specialists argue that designs that develop the learners about the world, natural or social phenomena, resist the efforts of education. Educational reflections underline that for effective teaching, it is important to take into account the designs of students as well as teachers. For Clement & al (1981) "a situation of education involves not only designs of the teacher and the students towards taught scientific knowledge, but also including their relation to this knowledge" They add that designs of students and teachers are a set of equipment for the didactic treatment useful in any educational thoughts. This reflection on the designs takes greater account of the learner and teacher in the teaching-learning process. In the class, the primary concern of the teacher is to 'emerge', 'reorganize' or 'develop' the pre-scientific conceptions of learners. To materialize designs of learners, teacher should adapt teaching strategies and teaching implementations via the execution of the situations in which he tries to identify the views of learners, it is what Astolfi, (1989) calls "make the State of spaces". But the question is; in an educational context, will the intervention of the teacher who is manifested by the adoption of educational strategies, be influenced by the designs or not?

In EPS, the activity of the teacher and his/her designs have been immediately recognized as a determinant of the functioning of the educational system. To the file of time, these designs feed on various elements such as initial training, educational experience, learning models and axiological choices to which it refers. On the ground, the designs can be expressed in the form of a speech, verbal or non-verbal intervention whose function is to guide the educational choice of teachers. These designs ' cannot thus be mistaken representations, ideologies or theories, (...). Likewise, designs as well as ideas may be located closer to the practices ' (Gougeon, 1993). A number of research on technical knowledge and scientists used by teachers of EPS have shown that designs have an influence both on the choice of the contents and procedures for the control of learning of students even if discrepancies can exist between the designs set out by teachers and what they implement during sessions of EPS (Amade-Escot1991). Other didactic research conducted in this direction have demonstrated that the knowledge of the teacher

and his beliefs are at the origin of any decision-making necessary for all interventions in action (Shavelson, 1976; Tesfay, 1989, Durand & Riff, 1993). All acts of teaching are the result of a sentient or unconscious decision of teachers after they have operated a complex processing of information of a teaching-learning situation (Shavelson, 1976).

III. MATERIALS AND RESEARCH METHOD

3.1 Population questioned

The study focuses on 187 of sport and physical education teachers (man, woman, specialist and non-specialist) who belong to the region of Kef.

3.2. The compilation of data procedures.

3.2.1. A survey by questionnaires

We considered in the first place, the study of the designs that convey EPS teachers about teaching football for a female population in mixed classes. We opted for the technique of the questionnaire in order to draw up the boundaries of the speech produced by teachers. To do this, we have used exploratory discussions which have allowed us to build a pre-questionnaire and after multiple changes have been constructed a questionnaire in the form of precise questions to have precise answers just by answering 'yes' or 'no '. Making issues in range, the subject must respond by classifying the answers proposed in an ascending order according to the importance of the choices.

Our questionnaire consists of two items:

• The first item is composed of the following questions: (issues no. 1, 2, 4, 5, 6, 8, 9, 10, 12, 13). These questions allow us to identify designs that guide teachers of EPS in the region of Kef in regard to the participation of girls in sports with a masculine connotation.

• The second item consists of remaining issues: (issues no. 3, 7, 11, 14, 15). In fact these questions allow us to detect the reasons justifying refusal of teaching football in schools.

IV. RESULTS

4.1.   Global study of the conceptions of teachers

The first issue of our investigation focuses on programming, of a cycle of football in schools in the region of Kef. It therefore seems important to stress that the majority of EPS in Kef region teachers do not teach the discipline of football in schools. Analysis shows a very significant difference at $P < 0.001$, only 20 teachers (10.69%) among 187 EPS teachers taught a football cycle, however, 167 surveyed teachers representing (89.30%) of the population reported that they have not programmed a cycle of football during their educational careers. These results are illustrated in the following figure.

Figure 1. The frequency of responses to question n°1.

Among those who taught the discipline of football 14 teachers (70%) have taught this discipline only for a group of boys, 6 teachers (30%) have programmed this discipline for mixed classes. Meanwhile, no teacher has taught football for girls.
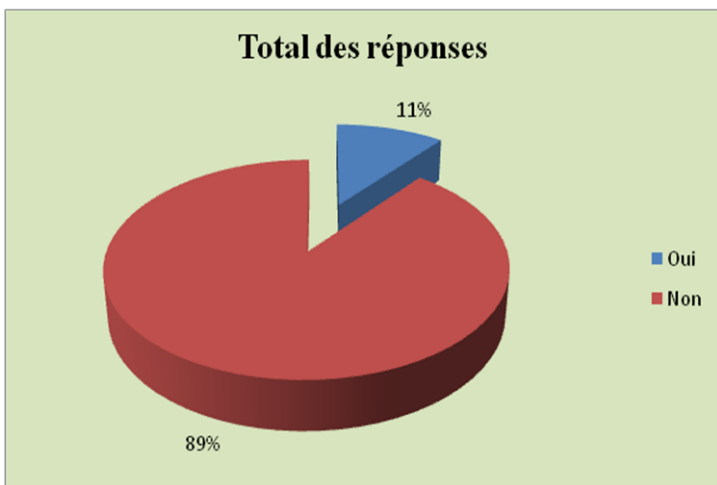
In the same perspective, when teachers are given the choice to program a cycle of football at the school, the results show that (40, 10%) of our population (75 teachers) refuses to teach this discipline in schools. While (59, 89%) of the population (112 teachers) say if they have the choice, they teach football. However, the (112 teachers) include only (5.35%) of teachers who prefer to work only with girls, (4, 46%) prefer working with mixed groups while (90, 17%) of teachers opt to the teaching of football for only groups of boys. The following figure illustrates our purpose.
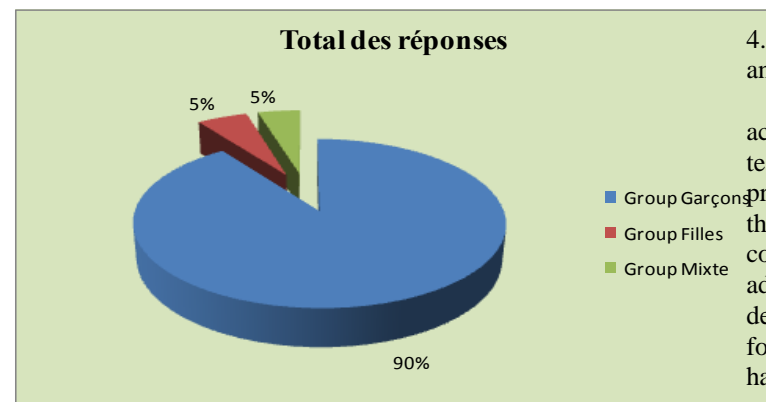
Figure 2. The frequency of responses to the question n ° 5.

Indeed, almost all of the surveyed teachers reported that girls should not practise sport activities with a male connotation such as football. The results show that 136 teachers, representing (72.72%) of our population, declare that they do not prefer girls to practise football. While only 51 teachers (27.27%) of the teachers surveyed have favorable notices for the participation of girls in sports such as football. We believe that this refusal is explained by designs that convey EPS Tunisian teachers about the practice of football. Among the population surveyed (3.74%), we find teachers who consider football as a sport of contacts and of violence, other teachers (41.17%) think that girls do not have the morpho-functional capabilities required to practise football.

When it comes to choose between several collective sporting disciplines to teach it to a mixed class, most of the teachers of EPS (55.61%) prefer a cycle of handball, (33.68%) prefer a round of basketball, while only (09,62%) choose a cycle

of football, and only 02 teachers (01.06%) provide priority a cycle of rugby. In fact, this attitude reflects the nature of the designs that convey teachers of EPS in the region of Kef on the practice and teaching of football. Indeed, the majority of these teachers avoid explicitly setting the discipline of football for mixed classes. In fact, these teachers consider that the presence of girls and boys in common areas of game will have a negative effect on their quality of intervention with students. Then, there are (70, 05%) of the population surveyed think that the terms of regulations will be more effective with single-sex classes and especially with only boys. This observation leads us to realize the structure groups during teaching certain collective activities that have logic of cooperation and opposition in the school setting.

The teacher as a person, analyzes, manages, organizes and gives meaning to the information provided to learners, girls and boys. The contents of education in football have not escaped this process which leads to an individual appropriation. Indeed, the teacher must multiply his/her efforts at the level of the dialogue and the level of the choice and the implementation of learning situations.

In no case, the space and materials were considered as major causes that prevent teachers of EPS in Kef region from programming and teaching the discipline of football in scholar facilities. From this perspective, most of the surveyed teachers say they do not consider the teaching of the discipline of football as simple personal beliefs.

4.2. Statistical study designs that convey the teachers by gender and specialty

The results of our research indicate a variation of responses according to the kind and the specialty of the teacher. Indeed, teachers of EPS in Kef region avoid implicitly or explicitly the programming of a cycle of football at the school. Then there are the majority of specialist and non-specialist teachers, never contemplated to program a cycle of football. Same beliefs adopted by non-specialist teachers (83.33%) of our population, declare that they will not ever think to program a cycle of football at the school. While only (17.02%) specialists teachers have programmed a cycle of football at the school.
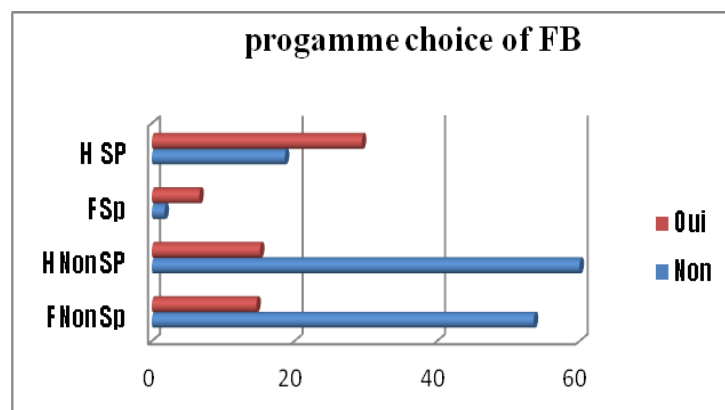
Figure 3. The responses of teachers relating to programming of a cycle of football

Our intention is to measure to what extent the choice of a round of football programming is influenced by designs that convey teachers in connection to the participation of girls in the

practice of a sport with a masculine connotation such as football. We note a variation of responses between specialist teachers (men and women) and non-specialists. The comparison shows that those who prefer to program a cycle of football at the school are specialists with 6.66 percent for women compared with 1.78% and 29.46 percent for specialists 18.66% men. While non-specialist teachers voluntarily avoided the programming of this discipline in schools with a percentage for (53, 57%) for non-specialist female and (59, 99%) for non-specialist males. Secondly, when it comes to choose the group of students to teach, the choice of our population study is focused on trained groups consisting only of boys with (94,34%) among non-specialist teachers in football and a percentage of (95, 74%) of specialist teachers. Same designs for non-specialist women in football where there are (80%) of the population prefer to teach groups of boys. However, specialist teachers especially women with (57, 14%) adopt a different attitude by focusing on the teaching of groups of girls. This explains the importance granted for the formation of groups of students when it comes to teach sports with male connotation in the school setting. In Tunisia classes are mixed, so EPS teachers explicitly avoid the programming of the discipline of football at the school.
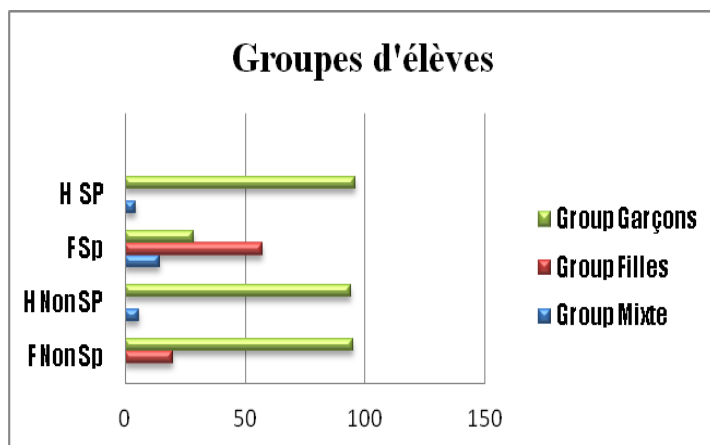
Figure 4. The responses of teachers relating to the choice of groups

Comparison of choices of the groups shows that the Group of boys dominates all other choices. This may be explained by the social representations of teachers who send away girls from some sport activities including football because it is regarded as a male activity. The following percentages show that (67, 60%) of non-specialist teachers prefer that girls engage in activities other than football. It the same conception for specialist and non-specialist teachers with (80, 88%) for the first and80.64%for the second. In due course, the real supporters of participation of girls in the practice of football are specialist teachers with a percentage of (98, 97%).

In the classroom students are considered somehow 'asexual learners'. Yet in Tunisia, the issue of diversity has never been the subject of a specific didactic or pedagogical reflection. Indeed, the space of the classes which is the center of interactions between teachers and students are deeply marked by social representations of masculine and feminine. This description of mixed classes, as goaded by the research, leads to clearer conclusions regarding equality/inequality. Thus, learners (girls or boys) receive in the same educational space, a large amount of information on behaviors considered to be socially appropriate to their sex. They are guided through expectations of interveners as well as educational interactions. In this perspective, teachers believe that teaching male activities such as football for mixed classes makes their job intervention more difficult. (With a percentage of 64.78% of female non-specialists and 85, 71% of female specialists and 87.09% among non-specialist males and 89.36% for specialist teachers).
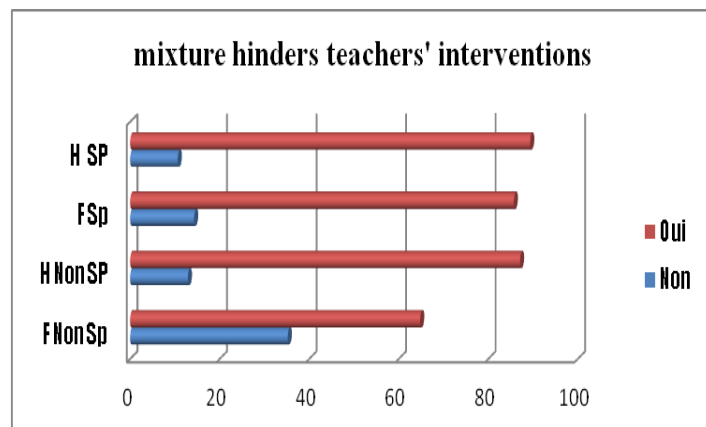
Figure 5. The responses of teachers relating to the mixture

V. DISCUSSION

The majority of EPS in Kef region teachers being consulted consider football as a sport with a male connotation, for this reason they prefer to teach this discipline only for boys. We can assume that the teachers' statements reflect many things about their conceptions. AMADE-Escot, C (1989) says that "contents exist only when they were built, they do not stand as inherent, inviolable or defined objects." And this activity involves always implied designs which are more often the teacher's concerns; the aims of the teaching, the analysis of APS used and programmed, as well as the representations of the person to form, and how he/she specifically learns. "The development of content, the education is a task performed by teaching through the filter of the programs. Indeed, in the region of Kef EPS teachers, that we have asked, explicitly avoid teaching the discipline of football in school.

In fact, interviewees justify their choice of objectives and contents to teach and their appeal to unisex groups by the fact that the discipline of football is sexually connoted and more suitable for boys than for girls. They consider that football enhances male knowledge whereas girls deserve something else. These teachers feel a certain comfort even they mix groups, they point the difficulty in this discipline to manage and confront a heterogeneity of culture, representations of social as well as physical resources among their students. These teachers describe their difficulties to teach this discipline, they generally try to respond by separating groups (girls and boys). In fact, those surveyed fear that girls suffer from the mixture in this discipline even if they do not express everything openly. Indeed, the heterogeneity of the learners in this discipline does not stop in the mixture, but it takes other dimensions social, physical, motivational.. . To face this, surveyed teachers say most often we

resort to groups composed solely of boys or girls with the proposal of a teaching-learning content that differs from one group to the other.

In fact, it must be asked if this separation of groups and content to teach does not replicate performance differences rather than a simple matter of learning and mastery of any skill. Thus, behind this separation, a hierarchy can be established which will have an impact on physical performance. Forms of work mostly used and announced by teachers of EPS in the region of Kef who were part of our population seem to favor the involvement of boys in football activity. These, say that they arrange the space, they select and propose content in favor of boy learners. In reality, these teachers do not treat girls and boys in the same way when it comes to encourage them, teach them techniques and provide them with opportunities to practise football. Girls receive less instruction or non-optimized quality instructions. They solicit them less and given fewer opportunities to exercise and develop their motor skills. Boys learn an effective technique. For girls, they learn ineffective techniques, insofar as teachers focus on objectives and inappropriate content and a pedagogy that does not sufficiently take into account their specific resources and their reasons to act.

It should be noted that the proposed contents refer to the different more often implicit designs given to teachers of EPS with regard to how their students learn the discipline of football. Therefore, the success or the failure of the latter of learning is interpreted in different ways. Didactic analysis from the interventions of teachers and teaching content lead us to say with certainty that teachers of our EPS study make choices of content and education interventions geared towards a male motor promoting the engagement of boys.

VI. CONCLUSION

At the end of this research, we find that the choice and the terms of collective sport practices in schools in Kef region do not favor the teaching of sport disciplines with male connotation. Teachers of EPS in Kef region explicitly avoid the teaching of football and especially for mixed classes. While those who have taught this discipline, promote separation between the two sexes and frequently opt to organize unisex groups. Teachers of EPS in Kef region, marked by a men's football culture, show strong negative prejudices towards female learners. Indeed, they have doubts about their resources and plan on them mediocre achievements. They also organize their teachings from the goals and implementations that prioritize and distinguish the girls from the boys. We consider that taking account of conceptions of EPS teachers on the teaching of football could be considered as a point of junction of the pedagogical and sociological intervention approaches. Moreover, it is in the context of interventions that these conceptions are forged in terms of educational strategies and implemented educational perspectives.

Intervention and the content taught in football have been addressed from the perspective of educational interactions. Organized and expressed in terms of reporting: relationship to space, relation to time, report to the interventions and evaluation report. Beyond an arbitrary selection of certain procedures or certain conduct, the analysis shows that teachers of EPS in the Kef region order , organize and formalize some knowledge to make them accessible to learners. This process of didactic transposition relies on a partial analysis of the lines of girls and boys which actually privilege boys. Indeed, teachers of EPS in Kef region believe that knowledge in football is still in favor of boys and is not assimilated by the girls. For this reason, they extract, eliminate or instead they insist on certain simple and easy technical elements to master for the sake of the educational and optimal value of girls. In fact, in schools, school teachers are convinced of the limits of the physical and technical resources of the girls and they are convinced of their low skills in the discipline of football. For this reason the choice of teaching-learning situations remains strongly marked by strong negative prejudices towards the skills of girls. Similarly, in apprenticeships, emphasis is always related to the acquisition of simple and easy technical elements in an analytical way for girls while the complex situations with dominant opposition and cooperation reign for boys.

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AUTHORS

First Author – Maher Guerchi, EFTS - Laboratoire Education, Formation, Travail et Savoirs UMR - Université de Toulouse, Email: guerchimaher@yahoo.fr

Second Author – Mohamed Ali Hammami, Higher Institute of Sports and Physical Education, Kef

Third Author – Hajer Sehli, Higher Institute of Sports and Physical Education, Kef

Fourth Author – Makram Zghibi, Higher Institute of Sports and
Physical Education, Kef

Real Time Wireless Agricultural Ecosystem Monitoring for *cucumus melo .L* Cultivation in Natural Ventilated Greenhouse

J.E Mohd Salih*, A.H Adom*, A.Y Md. Shakaff**, M.A Shuib***

* School Of Mechatronic Engineering, Universiti Malaysia Perlis, Arau 02600, Perlis, Malaysia
** Centre of Excellence for Sensor Technology and Application (CEASTech), Universiti Malaysia Perlis, Arau 02600, Perlis, Malaysia
*** Abi Agro Private Limited, No.7, Kampung Tengah Abi, Kangar 01000, Perlis, Malaysia

Abstract- A method for real time monitoring agricultural ecosystems is described in this paper. Soil moisture content and microclimate condition are regarded as the essential parameters in various agricultural activities such as irrigation scheduling and nutrient management. For the demand of real time monitoring soil moisture content and microclimate conditions at fertigation cultivation field, this study presents the hardware development of monitoring device that contained a microcontroller, wireless communication module, two soil moisture sensors, temperature and humidity sensors. Soil moisture sensor specifically calibrated for growing medium used in the field provides volumetric water content reading during irrigation intervals. The prototype monitoring device connected to a host personal computer, which was installed with custom made data acquisition and graphical software provided real time remote access to soil moisture, temperature and humidity in observed *cucumus melo .L* cultivation environment. Field validation tests have verified that the developed wireless monitoring can significantly improve the monitoring systems deployed in agriculture. The real time information on micro climate inside cultivation area is important for farmer to better understand plant water requirement in agricultural environments and precision agriculture operations. This could benefit two thousands fertigation farmers in the country to achieve reductions in operation cost and produce better yield.

Index Terms- real time wireless monitoring, soil moisture monitoring, volumetric water content, micro climate information

I. INTRODUCTION

The used of agricultural ecosystem or micro climate information are vital to successful farming operations in precision agriculture. Any methods used to accurately estimate plant water requirements must take the environmental and plant factors into account. Depending on the soil type, stage of crop development, and climatic conditions, a well managed agriculture field would require multiple daily irrigations to avoid water stress and yield reduction. Most farmers lack adequate sensing technology and on-the-fly data interpretation capabilities to do an effective irrigation scheduling. Existing irrigation decision support systems include the modeling approach (regional or site-specific) direct crop stress measurement and soil moisture measurements or a combination of these methods [1]-

[7]. Modeling approaches use climatic data and soil water balance to predict availability of water to a crop, with an inherent weakness of reliance on the quality of its data input which may or may not incorporate any real-time site-specific measurements. Both [1] and [2] also acknowledged the importance of quality site-specific soil water hydraulic data for crop modeling. Modeling has useful predictive ability for yield, but there are limitations for real-time irrigation scheduling, where quality data which include the effects of site-specific rainfall, rooting depth and compaction zones are essential [7].

Soil moisture monitoring decision tools for irrigation on set are perhaps the most widely used. Recent advances have been made to automatically link soil moisture monitoring sites to software decision tools linked to irrigation systems [1]-[5]. Irrigation control system based on wireless sensor network (WSN) and real time agricultural ecosystem data provides a potential solution to optimize water management by remotely accessing in-field soil and climate conditions. The soil water content plays an important role in governing crop growth and yield. To monitor soil water content dynamically in the root zone, a sensor technique, which has high accuracy and reliability, rapid response, low energy consumption and cost, is desired [8],[9].

The objective of this study was to fabricate and test a wireless programming and data monitoring device that is capable of monitoring volumetric water content and climate condition in the fertigation farming facilities simultaneously. Field testing and evaluation was conducted for *cucumis melo L.* plant cultivate using fertigation method under natural ventilated green house. The wireless monitoring device will be used as part of a larger study to evaluate the optimization of irrigation management in fertigation sector in Malaysia. Other practical applications include variable rate irrigation (VRI), fertilizer dosing control and data acquisition in agricultural and aquaculture. A multiple wireless devices that integrated together to create wireless sensor network (WSN) will allow precision agriculture operations among two thousands fertigation farmers in the country to achieve reductions in operation cost and produce better yield.

II. MATERIALS AND METHODS

A. Hardware Description

A wireless programmable and data monitoring device was designed around the BasicStamp 2 microcontroller (Parallax). The primary feature of the controller is capable of running a few

thousand instructions per second and was programmed with simplified but customized form of Basic programming language [10]. Besides BasicStamp2 microcontroller, the other components includes flashfly wireless programming module (BlueWolf) with XBee Pro S1 wireless module (Digi) and 433 Mhz Radio frequency (RF) transceiver (Parallax). Figure 1 shows the electronic layout of entire system arranged in printed circuit board (Figure 2). The developed device main printed circuit board was designed so that all wireless components can be stacked on top of each other, minimizing the dimension of the main board to 60 mm in length and 55 mm in width. The microcontroller was assembled on top of the USB Stamp adapter board which interfaced with flashfly transceiver module.
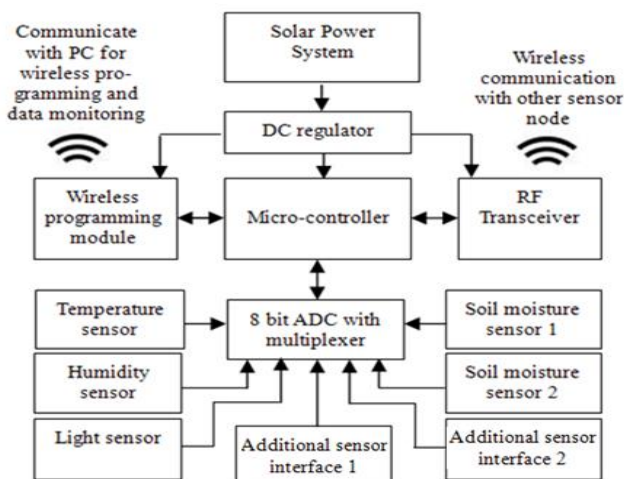
Figure 1: Layout of the electronic system for designed device

Figure 2: Electronic hardware assembly on printed circuit board

The flashfly system consists of base transceiver module and remote transceiver module. XBee Pro S1 wireless module act as wireless bridge between these two modules. Flashfly system allows wireless downloading of a program, and hence eliminates the tedious task of having to connect the system fixed platform to a computer before any programming changes can be made. This advantage and user friendly method plays a vital role during sensor calibration operations during field test validation. An 8-bit serial input/output analogue to digital converter with multiplexer (ADC0838) used to read voltage level from every sensor and

send the digital values to the microcontroller for signal conditioning and unit conversion for real-time data monitoring. A 433MHz RF transceiver communicate with other wireless monitoring devices across fertigation farming area. All electronic components were assembled inside a weatherproof box. Air temperature and humidity sensors were position at the front of the electronic box to permit air exchange, and the light sensor is located on top of the electronics box. The whole unit is very compact and can be moved or installed anywhere inside the fertigation field without the need for any wiring. Power is provided by solar power system which consists of rechargeable lithium ion batteries (12V, 3800mAh), solar charge controller circuit and 1 watt solar panel. The battery is recharged by 1 watt solar panel that provides energy during daylight operation. Data is sent wirelessly to a host PC located up to 1000 meters in line of sight distance. It was a critical requirement that the device consume as little power as possible. Power consumption is minimized by putting the device into "sleep" mode between data transmissions.

The sensor nodes are provided with several integrated sensors. Temperature sensor, LM35DZ (Texas Instruments) and humidity sensor HSM20-G (Shenzen Mingjiada Electronics) provide reading for air temperature and relative humidity inside the test area [11]. Both temperature and humidity readings provides a voltage output proportional to the temperature (°C) and ambient humidity (%) and are read by the ADC0838. To achieve an acceptable accuracy of wireless monitoring system prototype, temperature and humidity sensor were calibrated using wireless weather station WS-2810 (La Crosse Technology). In this calibration procedure, raw sensor readings (i.e sensor output voltage) from sensors were fine tuned and conditioned using microcontroller program into corresponding temperature in °C and percentage of relative humidity. Plastic package CdS photocells, NORPS-12 (Silonex Incorporated) monitors the incident light intensity for day rollover and trigger the monitoring device in sleep mode for power saving [12]. An increase in light above the "night" threshold indicates that a new day has dawned. External soils moisture sensors are attached to the system to provide volumetric water content (VWC) of the soil. Advantages of soil moisture monitoring include determining soil moisture depletion, adequacy of irrigation wetting, patterns of soil moisture extraction due to root uptake of water and trends in soil with time during the irrigation season [13]. Soil moisture is determined using a specialized sensor VH400 manufactured by Vegetronix. The VH400 is a low low-power and robust soil moisture sensor. The sensor probe provides a linear voltage signal proportional to soil moisture by measures the dielectric constant of the soil using transmission line techniques [14]. The probe is insensitive to water salinity, and will not corrode over time as conductivity based probes do. The volumetric water content for coconut coir dust, growing medium used in field, was conducted inside the laboratory. Coconut coir dust or commercially known as coco peat is an agricultural by-product obtained after the extraction of fiber from the coconut husk [15]. As a growing medium, coco peat can be used to produce a number of crop species with acceptable quality in the tropics [16]. Coco peat is considered as a good growing media component with acceptable pH, electrical conductivity and other

chemical attributes [15]. The VWC is defined as the volume of water per volume of bulk soil [17].

$$\theta = Vw\,/Vt \qquad (1)$$

Eq.1 is shows the calculation of volumetric water content, θ (cm³/cm³). Vw is the volume of water (cm³) and Vt is the total volume of bulk soil sample (cm³). Using soil sampler and water lost from soil during oven drying, Eq.2 and Eq.3 shows the calculation for volume of water, Vw.

$$mw = mwet - mdry \qquad (2)$$

$$Vw = Mw\,/\rho w \qquad (3)$$

Where mw is the mass of water, $mwet$ is the mass of moist soil (g), $mdry$ is the mass of the dry soil, and ρw is the density of water (1g/cm³). In addition to the volumetric water content, the bulk density of the soil sample can also be calculated using Eq.4. Bulk density, ρb is defined as the density of dry soil (g/cm³).

$$\rho b = mdry\,/\,Vsoil \qquad (4)$$

The output of the VH400 sensors range is between 0 V to 2.98V where 0V is when sensors are inserted in dry soil and 2.98V when inserted in the water or soil has reach maximum water holding capacity. Eq.5 to represent relationship between sensor output ($Vout$) in Volt and 8-bit ADC value.

$$ADC = Vout\,/\,(0.0195) \qquad (5)$$

B. Embedded Control

The embedded control for the wireless monitoring device is written using software called BasicStamp Editor. The micro controller will perform on board sensor signal conditioning, data acquisition and communication with the host PC. The program flow chart for wireless monitoring device is given in Figure 3. Each subroutine for every sensor will read 20 sensor readings and calculate the average of 8-bit ADC value in decimal number. This is to filter and eliminate small signal fluctuations in between sensor readings. The program execution time for one cycle is 7 seconds. With 53 seconds in sleep mode, the wireless monitoring device will send data to the PC every one minute. The device will remain in sleep mode when light sensor reaches the dark threshold value to minimize power consumption.

C. Monitoring Software Description

To ensure reliable communications, the host PC is responsible for time stamping data and ensuring that wireless monitoring device is functioning correctly. Data of asynchronous 9600 baud, no parity, 8 data bits, 1 stop bit and inverted polarity that contain decimal value of air temperature, humidity and VCW for two sensors sent from wireless monitoring device to based station receiver. The base station receiver decoded the message and then sends over the USB interface to the host PC. In this application, custom made monitoring and control template using StampPlot Pro software (SelmaWare Solution) was used for data acquisition and graphical plotting for incoming data. The sample screenshots

for the data acquisition and graphical plotting for incoming data from wireless sensor node are shown in Figure 4.
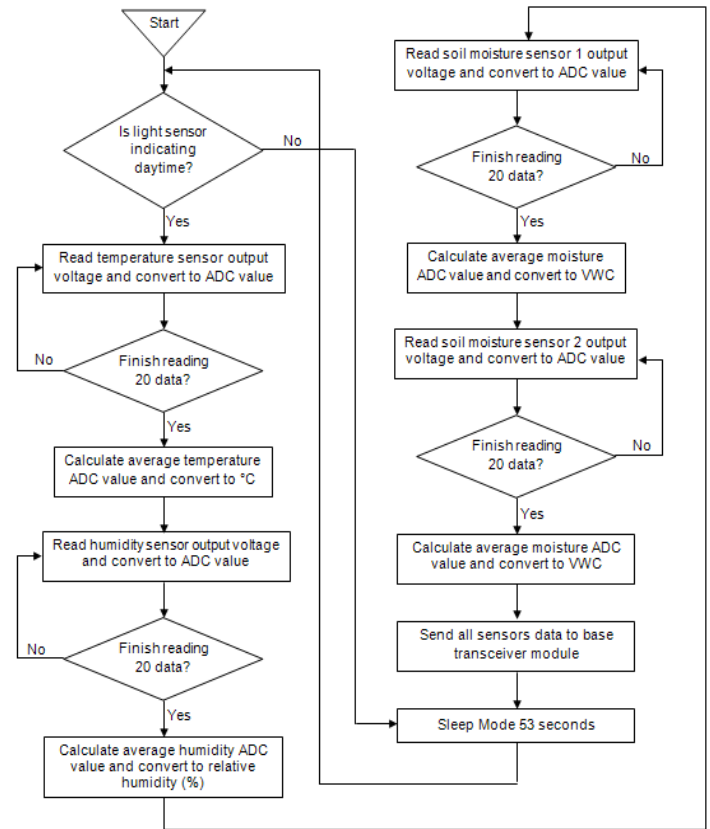
Figure 3: Program flowchart for wireless monitoring device
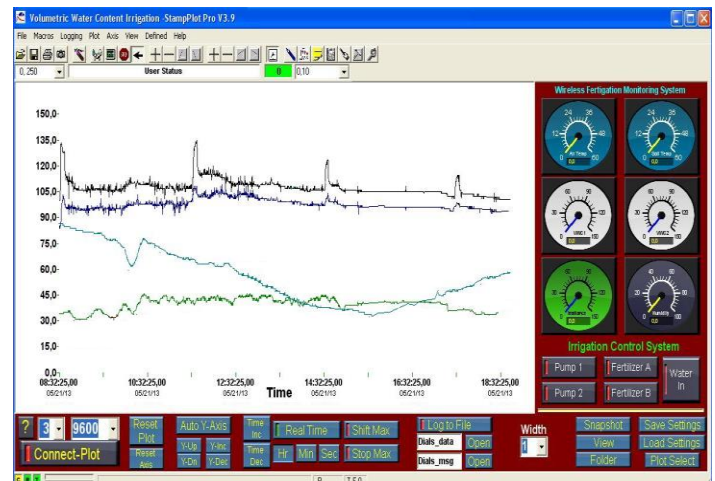
Figure 4: Screenshots for data acquisition and graphical plotting

D. Data Monitoring Testing and Validation

The field test experiment was conducted in fertigation facilities of Abi Agro Private Limited in near the town of Kangar, Perlis, Malaysia (6.47°N, 100.2°E, 15 m altitude), over a 3-week period (18th May to 6th June, 2013). There were 20 units of natural ventilated greenhouse with a dimension of 60 feet in length and 10 feet in width each. 2000 units of *cucumis melo L.*or locally known as rock melon were cultivated from 15th April till

the end of July, 2013 during the 10-week melon seasons. Figure 5 shows the rock melon plan during farming period on the test side. `Rock melon` is a suitable plant example planted using fertigation system in Malaysia because it was a high return and short period of growth. For rock melon grown in closed fertigation systems, desired EC is between 1.6 dS/m to 3.8 dS/m with growth period between 70 to 80 days [18]. The amount of nutrient delivered range from 500ml to 2000ml per day according to plant growth stage. Small amounts of fertilizer are used in the early stage of cultivation. Dosage is increased as fruit load and nutrient demands grow as plants approach the end of the crop's cycle. The field validation test serves as a proof of concept of the newly proposed wireless programmable monitoring system. The validation tests are intended to study the real time capabilities and the reliability of the monitoring system prototype. They were also, intended to collect and capture the spatial and temporal variability of soil moisture in between irrigation interval. The soil moisture data is vital to estimate nutrient uptake under changing ecosystems by the crops for irrigation optimization.

Figure 5: Test site for rock melon fertigation farming

III. RESULTS AND DISCUSSIONS

A. Calibration Equation of Soil Moisture Sensor

In a calibration routine conducted prior to the field validation test, coconut coir dust samples used in the fertigation farm have been dried and weighted, and pre-defined amount of water have been added. The volumetric water content calibration curves for to soil moisture (*S1* and *S2*) used in the system are shown in Fig.6. These curved were used during validation field test by wireless monitoring system to convert the voltage from sensor reading into 8-bit ADC value proportional to volumetric water content.
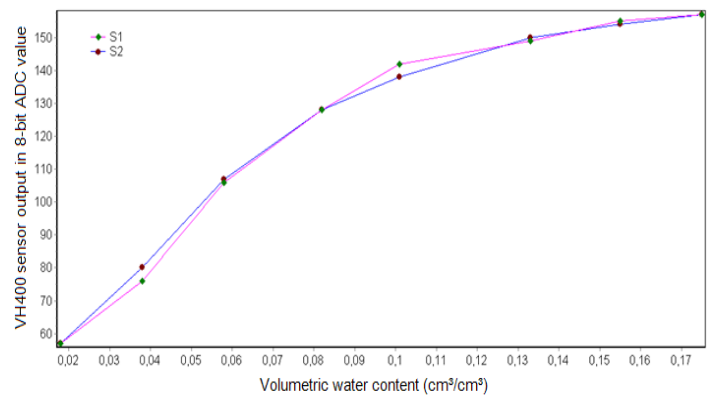
Figure 6: Calibration curves constructed for soil moisture sensor

B. Soil Moisture Monitoring

After the completion of the calibration process, the soil moisture sensors were placed in the middle of container bag representing a typical root zone of crop. As shown in Figure 7 (a), the real time of soil moisture value in VWC during irrigation period on May 21, 2013. The plant was irrigated at 8.30 am, 11.30 am, 2.30 pm and 5.30 pm during that day. In each irrigation period, a total of 350 cm³ of nutrient injected to the plant. The immediate up rise in sensor reading in ADC value show the irrigation process has occurred. First irrigation at 8.30 am has increased the sensor reading (S1) from 84 to 95 for S1 or 0.045 to 0.05 cm³/cm³ in VWC index. Meanwhile another sensor (S2) shows increment of VWC from 0.057 to 0.062. The monitoring device constantly sends wireless VWC data between irrigation intervals. Figure 7 (b) shows sensors reading in the 2nd irrigation period at 11.30 am, the sensors starting to show decline trend. Both sensors have recorded an average of decline of 0.06 cm³/cm³ after 3 hours before third irrigation. Meanwhile during third irrigation interval between 2.30pm till 5.30pm (Figure 7(c)) the sensor has recorded minimum sensor distortion and average decline in VCW for both sensors at 0.06 cm³/cm³.

C. Temperature and HumidityMonitoring

Real time temperature and humidity profile measured during May 21, 2013 has been recorded and analyzed. Figure 8 has shown the average 10 minutes data stating from 8.30 am till 5.50 pm. The average air temperature during monitoring period is 37.8°C and maximum temperature at 46.1°C. Average humidity recorded at 52.6 % and maximum and minimum at 88.2 % and 30.8% respectively. The use of clear plastic screen as a roof in natural ventilated green house result in an increase of the air temperature and humidity compared to outside the green house environment. This is mainly due to the reduction in ventilation and impaired heat removal from crop canopy and used of silver shine covering cultivation area.

IV. CONCLUSION

In this paper, preliminary results have been presented illustrating the design, development, the implementation and the validation of real time wireless monitoring system for agricultural ecosystems. The prototype monitoring system consist of temperature, humidity and soil moisture sensors which are wirelessly connected to host PC installed on rock melon

cultivation site provide remote access to disseminate relevant soil information for scheduling irrigation planning. The real time information on micro climate is important for farmer since rock melon plant physiological is temperature sensitive. High air humidity is conducive to fungal especially downy and powdery mildew disease that commonly effected rock melon farmer in Malaysia. Nevertheless, the monitoring systems can be further improved in some respect. The current system has been designed for additional sensor interfaces such as solar radiation sensor and soil temperature sensor to better understand plant water requirement. Further field test that include several wireless monitoring devices performing wireless sensor network may be devised to further investigate the irrigation optimization potential.
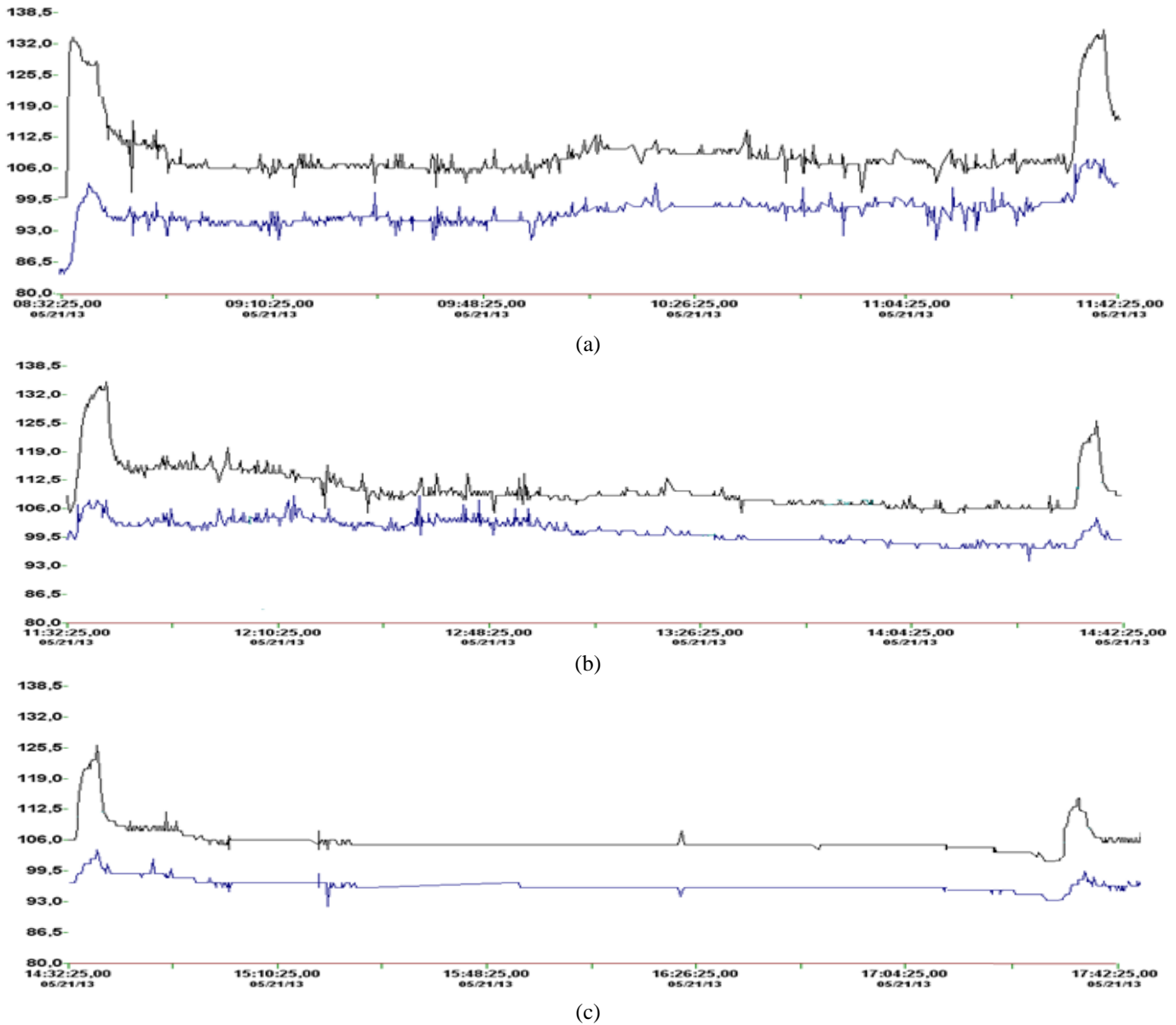
Figure 7: (a) Real time sensor reading for *S1* and *S2* between 1st and 2nd irrigation interval, (b) real time sensor reading for *S1* and *S2* between 2nd and 3rd irrigation interval and, (c) real time sensor reading for *S1* and *S2* between 3rd and 4th irrigation interval
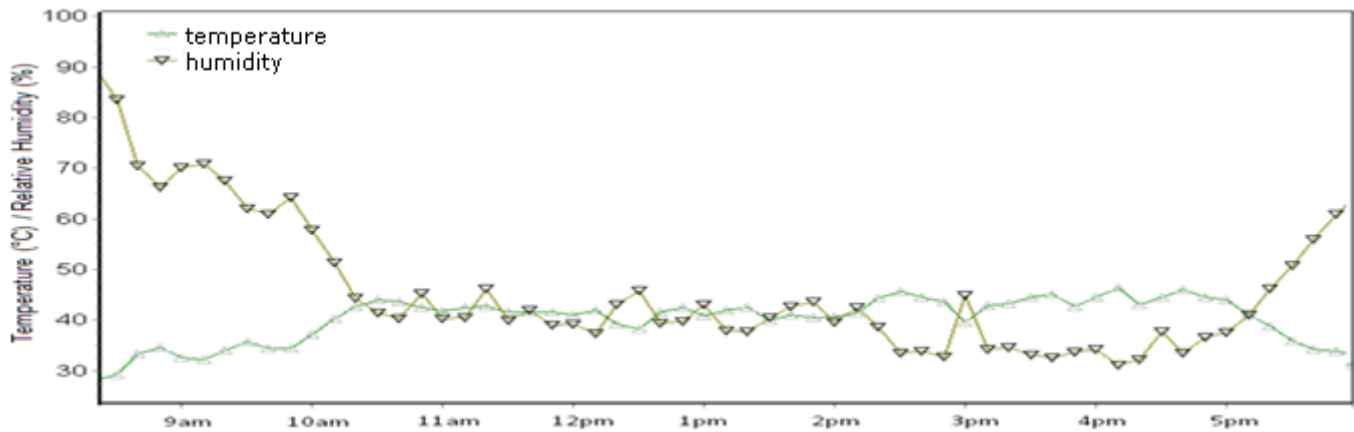
Figure 8: Average 10 minutes sensor reading on May 21, 2013

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AUTHORS

Jefri Efendi Mohd Salih – Lecturer, School of Mechatronic Engineering, jefri_salih@unimap.edu.my

Abdul Hamid Adom – Professor, School of Mechatronic Engineering, abdhamid@unimap.edu.my

Ali Yeon Md. Shakaff –Professor, Centre of Excellence for Sensor Technology and Application (CEASTech), , aliyeon@unimap.edu.my

Mohd Ashraff Shuib – Manager, Abi Agro Private Limited, ashraff@abiagro.com.my

Correspondence Author – Jefri Efendi Mohd Salih, jefri_salih@unimap.edu.my, +6049885210

Employee Engagement: A Shared Practice in Varied Organizations

Dr Parveen Prasad

Associate Prof, MU College of Commerce

Abstract- Employee Engagement is an important driver in an organization to achieve its goals. Engagement is known to be manifested in an employees' deep interest in the organization's principles and in an inculcation of a sense of job satisfaction and commitment. In a work context, the value of employee engagement as a continuous activity to work jointly with collectively discussed inputs is known to produce positive outcomes in an organization in terms of efficiency, productivity and innovation. This research paper attempts to identify the factors as constructs and examine the relationship between various factors influencing the characteristics of employee engagement. In this research work, 153 respondents working in varied organizations formed a sample to measure the various variables and their relationship to understand the need for employee engagement consciousness in organizations today. In this research work, factor analyses and correlation analyses have been incorporated.

Index Terms- employee engagement, innovation, organization principles

I. INTRODUCTION

Employees are known to make a critical difference when it comes to innovation, organizational performance, competitiveness and organizational success. It has been established that today, organizations expect their employees to be proactive, show initiative, collaborate with others, take responsibility for their own career development and be committed to a high quality of performance standards. In order to achieve this from the employees, organizations are known to be conscious in creating a work context, where characteristics of employee empowerment, talent management practices, flat hierarchical structure, development of employee centric relations, extension of challenging assignments, leading to the environment of learning from the employees at various levels, and taking their inputs, are being actively adopted. Lincoln and Kalleberg (1990) in their primary research hypothesized that difference in organization's commitment of Japanese and American workers are due to differences in organization structures and strategies of Japanese and American firms rather than to cultural differences in attitudes towards work. They found support that organization commitment accounts for much of the difference in organization behavior and is facilitated by differences in organization structures and practices. These features are related to characteristics of the working context in an organization.

II. REVIEW OF LITERATURE

Ulrich (1997) writes in his seminal book," Human Resource Champions" how employees' contribution becomes critical business issues because in trying to produce more output with less input, companies have no choice but to try to engage not only the body but also the mind and soul of every employee (p 125).A positive organizational behavior (POB) focuses on a wide range of positive behaviours of engaged employees in flourishing organizations.

Luthans (2002) contention is how POB is "the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed and effectively managed for performance improvement in today's workplace (p 59). POB studies individual positive psychological conditions and human resource strengths that are in one way or the other, related to employee well being or performance improvement. POB studies examine the role of states like self efficacy, optimism, hope and resilience. "Psychological Presence" or to be fully there is a concept that emerged from role theory and is defined as an experiential state that accompanies " personally engaging behavior" that involves the channeling of personal energies into physical, cognitive and emotional labour. (Kahn, 1992).Kahn presents a comprehensive theoretical model of psychological presence. Maslach and Leiter(1997) assumed that "engagement is characterized by energy, involvement and efficacy, which are considered to be direct opposites of burnout dimensions . Engaged employees are known to have a sense of energetic and effective connection, with their work activities and they see themselves as able to deal completely with their demands of their job. Absorption was found to be a relevant aspect of engagement after 30 interviews were carried out. (Shaufeli et al, 2001). Engagement is defined as a positive, fulfilling, work related state of mind that is characterized by vigour, dedication and absorption. Engagement refers to a persistent and pervasive, affective/ cognitive state characterized by vigour, dedication and challenge. Involvement is described as a psychological integration with one's work or one's job. (Kaningo,1982; Lawler and Hall, 1970). Dimension of engagement and absorption is characterized by being fully concentrated and deeply engaged in one's work, where time passes quickly and one has difficulties in detaching oneself from work. Work is established to be powerful potential to fulfill other important roles and needs of the individual such as self esteem, fulfillment, identity, social interaction and status. Other findings show that highly involved employees tend to spend more time and effort on the job than workers who are less

involved. They also tend to be more committed to work and to contribute more to their organization. (Manheim et al, 1997).

III. BACKGROUND OF THE STUDY

In this study, I sought to examine the factors of Employee Engagement through a cross sectional survey of personnel in varied manufacturing and service industries around the industrial hub of Pimpri - Chinchwad areas in Pune. Specifically, the study aimed at understanding the structure of the Employee Engagement scale and an identification of constructs or factors related to employee engagement and their correlations between them. The examination of factors related to engaging employees at the work place is significant in several ways. The study will showcase the strengths of various strategies, considered to be generic, which implies they are best for all companies, to be adopted by organizations as it is believed that this can bring about improvement in innovation among personnel, enhance their retention and job satisfaction with learning.

Field research was guided by the following research questions:
1. What are the factors related to employee engagement?
2. How are these factors interrelated to produce desirable outcomes?

IV. STUDY METHODOLOGY

A cross sectional design was used by the study. The target population of the study consisted of personnel working in the manufacturing and service industries in the industrial township of Pimpri Chinchwad areas. The sample, based on judgemental method, consisted of 153 personnel. In this research, a questionnaire was used as instrument to collect data. The first section consisted of questions related to personal details of the respondents, namely name, age, name of the organization and designation. The second section was adapted from an anonymous survey instrument titled "Engagement Survey"purported to be conducted before the introduction of a performance management

in order to establish trends. It consisted of 20 statements, mentioned in first person, related to areas of employee engagement. In order to answer the research questions on the factors related to employee engagement, the following sample items were presented, to which the respondents were guided by a 5 point Likert scale(fully agree to strongly disagree).
. I am very satisfied with the work I do
. My job is interesting
. I know exactly what I am supposed to do
. My job is challenging and so on. There were 20 items in all.

V. DATA COLLECTION AND ANALYSIS

The researcher assured all respondents of confidentiality. All the questionnaires administered were returned after being fully completed. Initially the item analyses for the 20 items of the employee engagement scale were carried out. The item remainder correlations for all items were satisfactory and statistically significant. The cronbach Alpha too was quite high at 0.89 , which implies the internal consistency of items.

Factor Analysis of the Employee Engagement Scale:
In order to understand the structure of the Employee Engagement scale, the factor analysis of this scale was carried out. The correlation matrix was visually scrutinized for its suitability for factor analyses. Bartlett's test of sphericity was also computed which yielded a test statistic of (chi square 825.616, ,df= 190) indicating that the obtained correlation matrix significantly departs from the identity matrix, thus indicating its suitability for factor analysis. Kaiser Meyer Olkin measure of sampling adequacy has also been calculated which turned out to be 0.816

The correlation matrix was subjected to Principal Component Analysis (PCA) and a varimax rotated six factor solution was obtained. The six factor solution was found to be more interpretable and the same is reported in the following Table No 2. Table 1 reports the descriptive statistics and the item remainder correlations.

TABLE 1: DESCRIPTIVE STATISTICS AND ITEM REMAINDER CORRELATIONS

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ee1	78.42	86.930	.534	.823
ee2	78.58	89.600	.429	.827
ee3	78.58	89.034	.372	.829
ee4	78.67	91.066	.276	.833
ee5	78.82	85.585	.470	.824
ee6	78.72	92.638	.015	.863
ee7	78.59	87.361	.482	.825
ee8	78.71	85.262	.559	.821
ee9	78.88	86.807	.444	.826
ee10	78.84	86.107	.473	.824
ee11	78.63	86.104	.505	.823
ee12	78.93	86.140	.493	.824

ee13	78.79	86.101	.482	.824
ee14	78.71	87.759	.418	.827
ee15	78.75	87.793	.417	.827
ee16	78.81	86.615	.495	.824
ee17	78.92	84.236	.538	.821
ee18	78.69	88.069	.407	.828
ee19	78.58	87.574	.457	.825
ee20	78.39	90.240	.376	.829

TABLE 2: VARIMAX ROTATED FACTOR ANALYSIS

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
ee19	.681	.488	-.167			
ee17	.678		.289	.232		
ee18	.626			.252	.130	-.137
ee7	.564	.208	.161		.348	
ee1	.533	.217	.528			.144
ee13	.457	.139	.174		.378	.252
ee20	.106	.681		.226		-.133
ee9		.621	.263	.159	.185	.154
ee3	.133	.571	.292	-.183	.245	
ee14	.289	.542		.139		.100
ee2		.134	.820	.265		
ee12	.200		.552		.341	.337
ee8	.359	.385	.457		.231	
ee16	.160	.208	.116	.694	.202	
ee10	.402		.237	.648		
ee15		.392		.609	.162	.201
ee4				.159	.811	-.147
ee5	.275	.106		.387	.561	.157
ee6						.846
ee11	.285	.342	.214	.216		.464

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 12 iterations.

Using 0.35 as cut off point, it is noted that each of the Factors is defined by the following items:

Factor 1: Enhancing Commitment and Job satisfaction
19.I am happy about the values of this organization(0.681)
17. I believe I have a good future in the organization (0.678)
18. I intend to go on working for this organization (0.626)
7. I get plenty of opportunities to work on this job(0.564)
1. I am very satisfied with the work I do(0.533)
13. I have no problems in achieving a balance between my work and my private life(0. 457)
10. My contribution is fully recognized (0.402)

Factor 2: Leadership
20. I believe that products provided by this organization are excellent (0.681)
9. I get excellent support from my boss(0. 621)
3. I know exactly what I am supposed to do(0.571)
14. I like working for my boss (0.542)

Factor 3: Positive Working Conditions
2.My job is interesting(0.820)
12. It is easy to keep up with the demands of my job (0.552)

8. The facilities/equipment provided are excellent (0.457)

Factor 4: Employee Centric Relations
16.I think this organization is a great place to work with (0.694)
10.My contribution is fully recognized (0.648)
15. I get on well with my work colleagues (0.609)

Factor 5: Challenging Assignments
5. My job is challenging(0.561)
4. I am prepared to put myself out to do my work (0.811)

Factor 6: Learning Focus
6.I am given plenty of freedom to decide how to do my work(0.846)
The variance explained by the factors was 58.903%.

The study has a validity construct. The six factors extracted from factor analyses are fairly in general agreement with the body of literature that mentions employee engagement constructs similar to the findings. It also appears to have content validity as the study fairly measures the theoretical construct that it was designed to measure. The construct validity of each factor was evaluated using a factor analyses as explained above (Hair et al, 1992).

VI. Discussion

In Kahn (1990) conceptualization, we see engagement occurring when individual are emotionally connected to others and are cognitively vigilant. When they know what is expected of them, they have that they need to do their work, have opportunities to feel an impact and fulfillment, have a chance to improve and develop, they get immense fulfillment in their work. This is what we understand as an employee engagement. In talent management, the broadly defined constructs include job involvement (Lawler & Hall, 1970) and organizational commitment (Porter& Steers,1982). The factors of job satisfaction and organizational commitment have received considerable attention from industrial and organizational psychologists, management scientists and sociologists. Lincoln & Kalleberg (1990) hypothesized that differences in organizational commitment of Japanese and American workers are due to difference in organization structures and strategies of Japanese and American firms rather than cultural differences in attitudes towards work. This mentions the importance of strategies and policies towards being more employee centric. Analysts often define job satisfaction with reference to the needs and values of individuals and the extent to which these needs and values are satisfied in the work place. The structure of the employee engagement scale mentions the importance of this value in one of its constructs. In order to further elaborate,the Job Description Index developed by Smith, Kendall and Hulin(1989) breaks out the overall measure of job satisfaction into satisfaction with the supervisor, satisfaction with the   supervisor, satisfaction with the coworker, satisfaction with work, satisfaction with pay, satisfaction with promotion. Another commonly used measure job Diagnostic Survey of Hackman and Oldham (1985) maintains that job satisfaction is associated with five core dimensions: skill variety, task identity, task significance, autonomy, feedback from others. Other findings show that highly involved employees tend to spend more time and effort on the job than workers who are less involved. They also tend to be more committed to their work and to contribute more to their organization. (Jans, 1984,Manheim et al, 1997). Thus achieving and maintaining a positive goal centrality should be a positive goal sought by an organization. Even in the key components of Total Quality Management (TQM) model as a framework suggested by Malcolm Balridge National Quality Award(MBNQA), leadership and people management issues, in a survey carried out in Australia among 102 manufacturing organizations, by Danny Samson and Militer Ziovoki(1999), were found to be the most important predictors of performance in organizations. Leadership element included individual development, organizational learning, management of the environment, and people management practices included sharing strategic directions, multiskilling of employees, empowerment of employees and flexibility.

VII. Conclusion

This study will conclude by making some recommendations to organizations, as informed by the findings of the study. Organizations, in order to enhance their performance and develop competitiveness need to concentrate of employing practices and strategies that focus towards building career and future employability of the employees, train employees at all levels to accept challenging assignments, develop values among personnel, secure inputs of the personnel before designing the vision, mission and taking important decisions. These features are strongly interrelated as revealed in this study. Employee engagement practices of being transparent in communication, offering employees a work and life balance, following ethical principles in working, facilitating and creation of an environment of empowerment and freedom, all being interrelated are purported to surely go a long way in garnering a sense of commitment and job satisfaction, an urgent necessity in these times of vulnerability, uncertainty, complexity and ambiguity (VUCA).

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Authors

First Author – Dr Parveen Prasad, Associate Prof, MU College of Commerce, Email: parvin_prasad@hotmail.com

Production of Biodiesel from Vegetable Oil Using CaO Catalyst & Analysis of Its Performance in Four Stroke Diesel Engine

*Sruthi Gopal, *Sajitha C.M, **Uma Krishnakumar

*Department Of Chemical Engineering, Government Engineering College, Kozhikode , Kerala, India
**Department Of Chemical Engineering, National Institute of Technology, Calicut , Kerala, India

Abstract- The production of biodiesel from vegetable oils stands as a new versatile method of energy generation in the present scenario. Biodiesel is obtained by the transesterification of long chain fatty acids in presence of catalysts. Transesterification is an attractive and widely accepted technique. The purpose of the transesterification process is to lower the viscosity of the oil. The most important variables affecting methyl ester yield during the transesterification reaction are the molar ratio of alcohol to vegetable oil, reaction temperature, catalyst amount and time. Biodiesel is renewable, biodegradable, non-toxic, and essentially free of sulfur and aromatics. It can be used in diesel engines by blending with conventional diesel in various proportions. Biodiesel seems to be a realistic fuel for future. It has become more attractive recently because of its environmental benefits.

This paper discuses the production of biodiesel from coconut oil by transesterification with methanol using Calcium Oxide catalyst. The effect of various reaction parameters on the yield is studied and the variables were optimized experimentally. The optimized conditions for CaO sample was found to be 4hrs, 600C, 4:1 methanol to oil ratio and catalyst amount was 0.6% of oil. Also studied the influence of various biodiesel blends on four stoke diesel engine. The engine characteristics like specific fuel consumption and total fuel consumption, the brake and indicated thermal efficiencies of the engine with various biodiesel blends were investigated. The blends used for analysis includes B10, B20, B30.The experiment was conducted using conventional diesel as well. The results obtained with biodiesel are compared to those obtained with conventional diesel. Thus by the comparative study efficiency of using the biodiesel blends in diesel engines was analyzed. The experimental results proved that the use of biodiesel blends in 4 stoke diesel engines is a viable alternative to diesel.

Index Terms- Biodiesel, Fatty Acid Methyl Ester, Four stroke diesel engine, Transesterification

I. INTRODUCTION

Energy consumption is inevitable for human existence. Man relies immensely on it for various sectors of life like transportation, power generation, industrial processes, and residential consumption. World energy consumption doubled between 1971 and 2001 and the world energy demand will increase 53% by the year 2030. It is estimated that petroleum consumption will rise from 84.4 to 116 million barrels per day in USA until year 2030[1].Petroleum-based fuels are limited reserves concentrated in certain regions of the world. These sources are on the verge of reaching their peak production. The fossil fuel resources are shortening day by day. At the same time its consumption rate is pacing on an alarming rate. The world currently faces an energy crisis. The global fossil fuel prices have been increasing dramatically way beyond the imaginations of common men. The scarcity of known petroleum reserves will make renewable energy sources more attractive. Also the extensive use of fossil fuels has led to various environmental problems including pollution, increase in the amount of CO_2 and other green house gases in the atmosphere, global warming etc.

The depletion of fossil fuel has forced the mankind to find alternate ways of energy generation which is renewable, environmental friendly and technically suitable in conventional engines without any modifications. Among the various alternatives biofuels especially biodiesel stands out as promising method. Biodiesels are esters of long chain fatty acids derived from vegetable oils or animal fats. They are produced by the transesterification reaction of long chain fatty acids by alcohols, primarily methanol or ethanol, in presence of catalysts [2]. The direct use of alcohols as fuel causes corrosion of various parts in the engine. The transesterification process solves this problem.

Biodiesel fuels are attracting increasing attention worldwide as a blending component or a direct replacement for diesel fuel in vehicle engines. Biodiesel is a vegetable oil which can be used in diesel engines after some adjustments and modifications. Vegetable oils are the primary source of biodiesel. They can be of edible or non edible nature. Edible oils like coconut oil, soybean oil, sesame oil, palm oil, sunflower oil can be used. Non edible oils include algal oil, rubber seed oil, Jatropha curcas, rape seed oil, canola oil etc. In addition to these used oils can also be used for biodiesel production which is more economical. Oils of animal origin derived from sheep and beef tallow, fish oil etc also serves as source of biodiesel. Vegetable oils contain saturated hydrocarbons (triglycerides) which consist of glycerol and esters of fatty acids. In addition, fatty acids have different numbers of bonds and carbon chain lengths.

The utilization of biofuels or vegetable oil in internal combustion engines was reported during 1920–1930 and Second World War from all around the world. Germany, Argentina, Japan, Belgium, Italy, France, the United Kingdom, Portugal, and China have tested and used different types of biofuels [3]. The investigation of vegetable oils as fuel started in 1978 and 1981 in the United States and South Africa, respectively. In 1982, methyl ester was produced in Germany and Austria from

rapeseed oil, and a small pilot plant was built in Austria at 1985. Commercial production of methyl ester first began in Europe in 1990. More than 2.7 million tones biodiesel was produced in Europe in 2003, but their target is around 20% total diesel market in 2020. In addition, the USA future plan for biodiesel production is around 3.3 million tons in 2016 [4].

Detailed studies were made in several papers for the selection of catalyst needed for the process. There are two kinds of catalysts typical to any biodiesel process: homogeneous and heterogeneous. If the catalyst remains in the same (liquid) phase to that of the reactants during transesterification, it is homogeneous Catalytic transesterification. On the other hand, if the catalyst remains in different phase (i.e. solid, immiscible liquid or gaseous) to that of the reactants the process is called heterogeneous catalytic transesterification. The heterogeneous catalytic transesterification is included under Green Technology due to the following attributes: (1) the catalyst can be recycled (reused), (2) there is no or very less amount of waste water produced during the process and (3) separation of biodiesel from glycerol is much easier [5].

The inventor of biodiesel engines, Rudolf Christian Karl Diesel (1858–1913) demonstrated the use of vegetable oils as a substitute for diesel fuel in the 19th century. He believed the utilization of biomass fuel will become a reality as future versions of his engine are designed and developed [6].In recent years, lots of studies are being done to determine the suitability of vegetable oil and its derivatives as fuel or additives to the diesel. Transesterification followed by blending with conventional diesel is the commonly adoptable way to use the vegetable oil as fuel in diesel engines. Christopher [7] conducted some tests in Chicago using biodiesel as the alternative fuel for in-service motor coaches. This was an exploratory investigation to determine the effect of fuel on the engine performance characteristics and infrastructure needed to use this fuel. This testing proved that the biodiesel could easily be used as a feasible alternative fuel. Choi [8] conducted tests on biodiesel blended with diesel fuel in the concentration of 20 and 40% by volume on a single cylinder caterpillar engine, using both single and multiple injection strategies. The experimental results of these researchers support the use of biodiesel as a viable alternative to the diesel oil for use in the internal combustion engines.

In this study biodiesel is produced from coconut oil by transesterification with methanol in presence CaO catalyst. Coconut oil can be used for the production of biodiesel in a simpler and easier way. The advantage of using this crop is due to its high abundance in south East Asia especially in India. In India kerala stands first in the production of coconut. Kerala is called as the land of coconuts. So the production of biodiesel from coconut oil stands as a promising way of energy utilization in our perspective. The crop is cultivated in hectares of areas in kerala as well as other states of India. Apart from India countries like Thailand, Malaysia and Indonesia are also leading producers of coconut. The advantage of this crop is its resistance to sustain in temperate climates and also the poor soil conditions. Each coconut tree can bear about 14 coconuts per month for 65 years .That comes to about 6000 coconuts per acre. This natural sustainability and abundance of coconut makes it popular. And also if we compare the properties of coconut oil it is also significant while we chose it for FAME production. The specific energy and other properties of coconut oil is comparably good than other oils. The values are closer to petroleum diesel. Heterogeneous transesterification was selected since catalyst can be recycled, reused after reaction. Hence powdered CaO which is a heterogeneous catalyst was employed. Also it makes the separation of ester and glycerol layer is comparatively easier. Methanol which is less commercially important and cheaper than ethanol was used.

This paper discusses the influence of the various reaction parameters like temperature, time, Methanol to oil ratio and catalyst amount were studied. These variables were optimized experimentally. Also various blends were prepared by mixing conventional diesel and biodiesel in different proportions. The trials were run on conventional diesel, pure biodiesel and blends of biodiesel blended with conventional diesel in different proportions .Biodiesel can be blended in many proportions with conventional Diesel. B100 is pure biodiesel. B10 blend is 10 volume percentage pure biodiesel blended with 90 volume percentage of conventional Diesel. Similarly other blends were also prepared containing 20% and 30% biodiesel proportions. It was tested in four stroke diesel engine and performance characteristics were analyzed.

II. EXPERIMENT

A. Materials & Reagents

Dried coconut shells (copra) were collected from various locations. Oil from shells was extracted using mechanical press. The extracted oil was collected and stored. 98% methanol, CaO powder was purchased from chemind.

B. Reactor Set Up

The reactor unit was setup consisting of stirrer and a water bath which gives a provision for heating up to 100^0C. It has volume of about 3 liters approximately.

C. Procedure

Coconut oil was preheated to the reaction temperature. Lye was prepared by mixing methanol with catalyst CaO. Then the mixture was stirred well and then allowed to settle. Two separate layers will be formed, upper layer consists of fatty acid methyl ester (FAME) and lower layer consists of glycerol. The procedure was repeated for various combinations of temperature, alcohol to oil ratio, catalyst amount at different reaction times. Optimization of the parameters was made experimentally.

D. Engine Testing

A single stage cylinder, constant speed, 4-stroke water cooled diesel engine developing 8 HP at 850 rpm was used for the engine test which is shown figure 1. The detailed specification is given in table 1.

Fig.1: Four Stroke Diesel Engine

Type of stroke	4 stroke
Engine make	Anil Engine
BHP	8 HP
Speed	850 rpm
Bore	114.3
Diameter of rope	20 mm
Diameter of brake drum	320 mm

Table I: Engine Specifications

The fuel tank is connected to a graduated burette to measure quantity of fuel consumed in unit time. The thermal energy generated is known as the calorific value of the fuel. A part of this energy alone gets converted into mechanical power of the piston movement, known as the indicated power (I.P). A little amount of indicated power is used to overcome the frictional losses of the engine known as frictional power (F.P) and the remaining is delivered as the useful power output of the engine known as Brake power (B.P). Experiments were carried out initially using conventional diesel fuel to generate the base line data for various loads. After recording the base line Data, tests were carried out using B10, B20, B30 biodiesel blends .The engine tests were conducted at various loads by increasing the load on the brake drum and the parameters related to performance characteristics such as specific fuel consumption (SFC), total fuel consumption (TFC), brake thermal efficiency (BTE) and indicated thermal efficiency (ITE) were recorded. The experimental data generated are documented and presented using appropriate graphs.

III. RESULT AND DISCUSSIONS

Each parameter that depend the reaction was optimized. The results were tabulated and graphs were plotted.

A. Optimization of Reaction Time
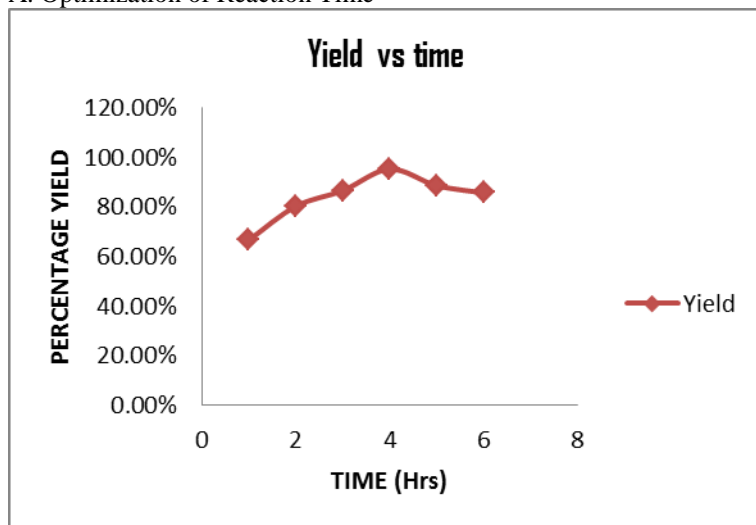
Fig.2: Optimization of Reaction Time for CaO Sample

The optimization of reaction time was done by keeping all other parameters as constant and by conducting the experiments for various reaction times. The optimum value was found at the time were maximum yield was obtained. The optimum time required for the reaction was about 4hrs for with CaO catalyst. Initially the yield was less when time was low since the reaction requires more time to complete while using heterogeneous catalyst. Gradually as the time increased the yield also increase and reached a maximum at 4hrs .At 4hrs the yield was 95.33%.Then the yield declined as the time increased the percentage yield was only 88.66%. So the optimum was taken at 4hrs.

B. Optimization of Reaction Temperature

The experiment was carried up to 70^0C for finding the optimum required temperature for the reaction. The maximum yield was obtained at 60^0C. For temperatures higher than 60^0C, the yield was less because it exceeds the boiling point of methanol which results in evaporation of alcohol during the reaction.
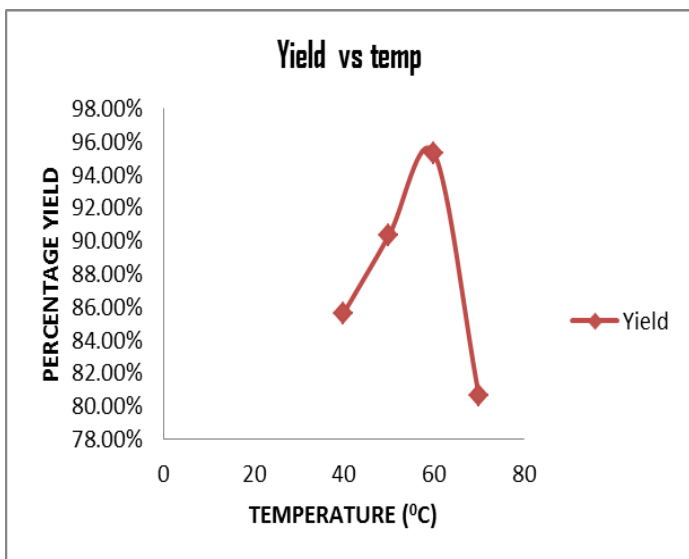
Fig. 3: Optimization of Reaction Temperature for CaO Sample
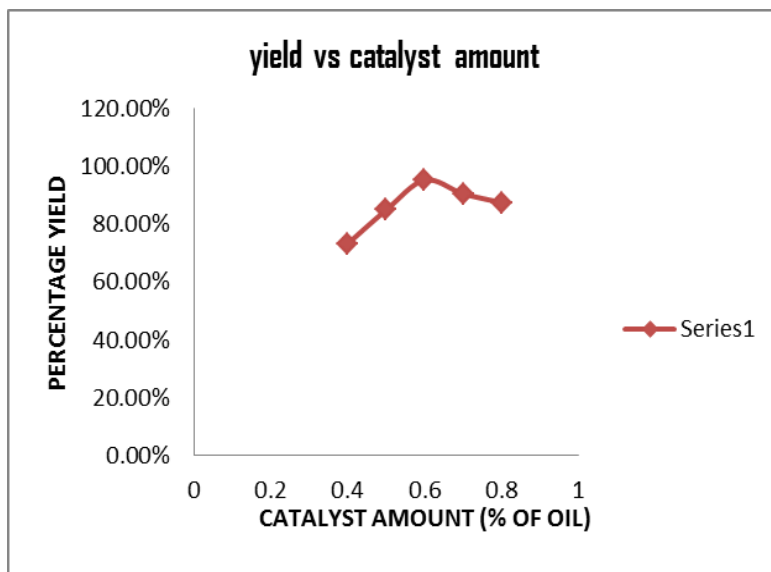
Fig.5: Optimization of catalyst amount for CaO Sample

C. Optimization of methanol to oil ratio
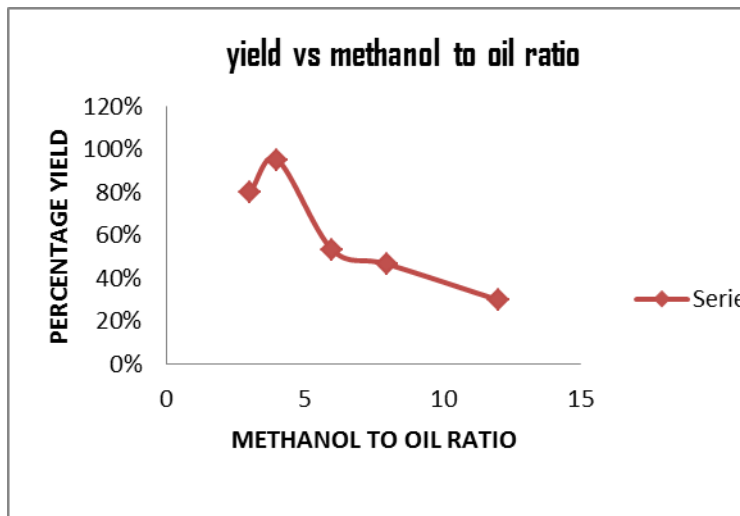
Fig. 4: Optimization of methanol to oil ratio for CaO Sample

The amount of alcohol needed for is an important factor that determines the rate of formation of ester or biodiesel product. Experiments with methanol to oil ratio starting from 3:1 to 12:1 were done and the optimum was found at 4:1.

D. Optimization of catalyst amount

Normally the amount of catalyst required is less when we carry out the experiment with a heterogeneous catalyst like CaO. So a lesser range was chosen for doing the experiment starting from 0.4% to 0.7%. However the yield was very low when catalyst amount was less than 0.4%. From the experiment it was found that the optimum amount of catalyst required is only 0.6% of oil used.

E. Total Fuel Consumption (TFC)

Accurate measurement of fuel consumption is very important in engine testing work. The figure 6 shows the comparison between the fuel consumed by various biodiesel blends and conventional diesel. The amount of fuel required is higher as the amount of biodiesel in the blend increases. This may be due to the lower calorific value of biodiesel. However the values are comparable with that of conventional diesel.
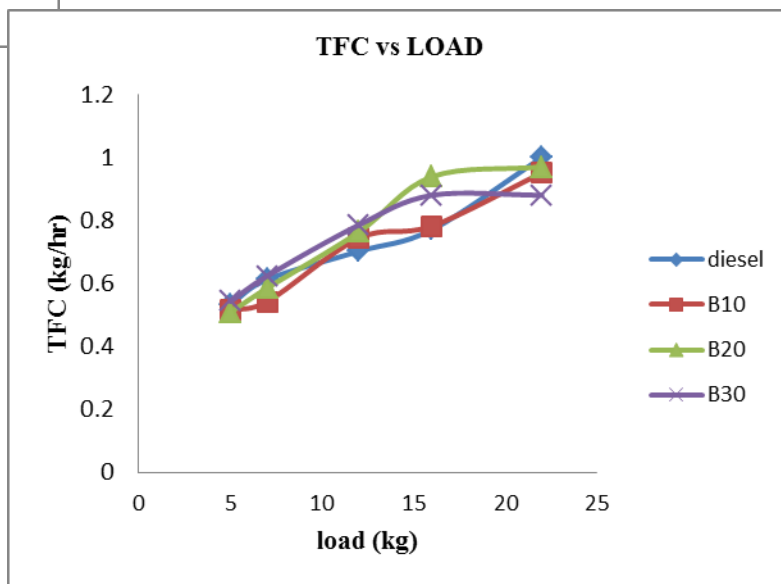
Fig. 6: Variation of TFC with Load

F. Effect of Load on Specific Fuel Consumption
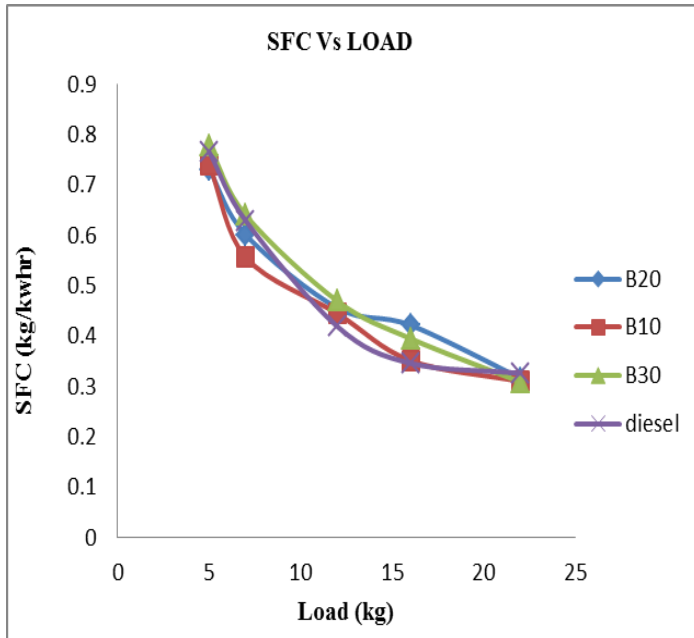
Fig.7: Variation of Specific Fuel consumption with Load

Specific Fuel Consumption (SFC) is a measure of the efficiency of the engine in using the fuel supplied to produce work. It is desirable to obtain a lower value of SFC indicating that the engine used less fuel to produce the same amount of work. Fig. 7 gives a comparison of SFC of various blends of biodiesel with that of conventional diesel. The specific fuel consumption keeps on decreasing with increasing load. Fuel consumption is more for biodiesel blends since the calorific value of biodiesel is lesser than conventional diesel. However the value of SFC of biodiesel blends are not very high when compared to pure diesel. This shows that the using of blended biodiesel is economically acceptable.

G. Effect of Load on Brake Thermal Efficiency
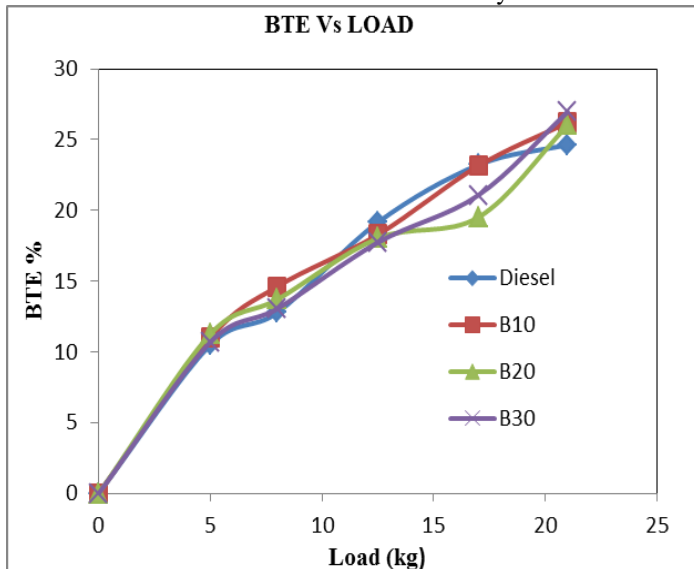
Fig. 8: Variation of Brake Thermal Efficiency with Load

The brake thermal efficiency is defined as the ratio of brake horse power to the heat energy of the fuel supplied during the same interval of time. Figure 8 shows the variation of brake thermal efficiency with different loads for different biodiesel blends and pure diesel. From the plot it is clear that thermal efficiency increases with load. This is due to the reduction in heat loss and increase in power developed with increase in load. The brake thermal efficiency of biodiesel blends is slightly lower than conventional diesel. This reduction in brake thermal efficiency with biodiesel blends was due to higher viscosity, poor spray characteristics and lower calorific value. The higher viscosity leads to decreased atomization, fuel vaporization and combustion.

H. Effect of Load on Indicated Thermal Efficiency
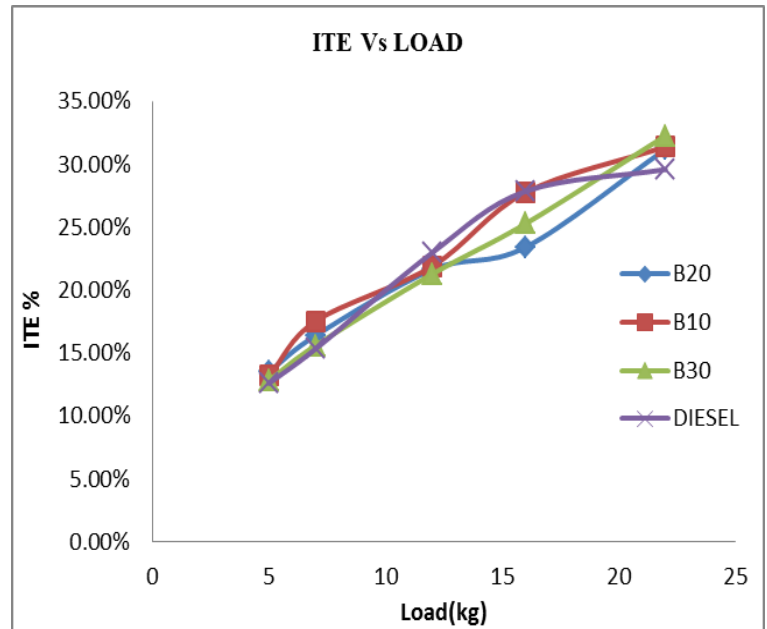
Fig. 9: Variation of Indicated Thermal Efficiency with Load

The efficiency of various biodiesel blends and conventional diesel is shown in figure 4.3. Here efficiency increases with load. However the efficiency of the prepared biodiesel blends is comparable with the efficiency of conventional diesel. Hence the biodiesel blends can be used in engines to obtain good performance.

IV. CONCLUSIONS

The reaction parameters time, temperature, methanol to oil ratio and catalyst amount were optimized experimentally. The values obtained were 4 hrs, 60^0C, 4:1 and 0.6% of oil respectively. Engine test results shows that all biodiesel blends were showing values closer to that of diesel values which is evident from the graphs. Thus it can be inferred that biodiesel blends can be efficiently used in engines without any modifications and also with satisfactory performance. All the performance curves obtained from the experiment validate the statement. Efficiency attained was well closer to conventional

diesel efficiency and also the amount of fuel consumed was not very high.

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AUTHORS

First Author – Sruthi Gopal, Department Of Chemical Engineering, Government Engineering College, Kozhikode , Kerala, India, sruthi1989gopal@gmail.com
Second Author – Sajitha C.M, Department Of Chemical Engineering, Government Engineering College, Kozhikode , Kerala, India
Third Author – Uma Krishnakumar, Department Of Chemical Engineering, NIT, Calicut

Correspondence Author – Sruthi Gopal, Department Of Chemical Engineering, Government Engineering College, Kozhikode , Kerala, India, sruthi1989gopal@gmail.com

Descriptive study on treatment cost for fever during outbreak of Dengue fever in Pondicherry

Dr. P.S.Vinothkumar[*]**, Dr. K.N.Prasad**[**]**, Dr. Basavaraj M Ingalgeri**[***]**, Dr. G.Gnanamani**[****]

[*] Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India
[**] Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India
[***] Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India
[****] Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Abstract- **Background:** Patients suffering from fever are scared about the possibility of Dengue fever during the outbreak of Dengue due to uncertain clinical manifestation. The members of the community seek treatment irrespective of their social economic status. The cost incurred for such diagnostic and treatment activities are not known. Efforts have been made to estimate such costs in this study. **Aims and Objective:** To estimate the total cost and per capita cost, direct cost and indirect cost of treating fever cases during outbreak period of 3 months. **Methodology:** Cross sectional, community based, house to house survey of all fever cases among 496 houses was undertaken in Kudapakkam of Pondicherry. Data was collected using pretested questionnaire by interviewing the cases and the dependents at their door steps during the 1st week of November 2012. Direct cost and indirect cost for fever treatment was estimated using different parameters. **Results:** The data on 98 fever cases were analyzed with respect to total cost, PerCapita cost, direct cost and indirect cost for fever treatment. Children accounted for one third of the cases and nearly 50% of the cases were in the age group of 16-45 years. The total cost of ₹54,900(931USD) & ₹47,147(812USD) and PerCapita cost incurred was ₹1247 (21USD) & ₹873(15USD) among male and female cases respectively. The indirect cost for men was two folds higher than females representing financial burden to the family. Cost of treating male child was twice the cost to treat female child in the age group of less than six years. **Conclusion:** The costs of treatment for male child were higher compare to female child. The economic burden to the family is high when the male members are affected which drains the considerable amount of their family income.

Index Terms- Community based, Dengue, Direct cost, Fever, Indirect cost, PerCapita, Outbreak.

I. INTRODUCTION

Dengue is an emerging vector borne disease in many tropical and sub-tropical regions of the world. Dengue fever outbreak makes an impact on the health status, economic condition and social burden to the community. Although the case fatality rate of 10-15% from Dengue hemorrhagic (or) Dengue shock syndrome, the people who are suffering from fever during outbreak are literally scared about Dengue fever and its complications due to uncertain clinical course of disease. The economic burdens of Dengue fever were estimated using different models and process in many countries [1,2,3,4]. The economic burden from Dengue fever is higher than that of Japanese encephalitis, upper respiratory tract infection, Hepatitis B in Southeast Asia region accounting for annual cost of 1.65 USD Per Capita.

The outbreak of Dengue fever is reported in many regions within India either seasonal or cyclic pattern since last two decades [6, 7, 8]. The actual cost of treatment of suspected Dengue fever or fever from other causes during outbreak is not exactly known in Indian situation and availability of such literatures are rare. Many members of community seek treatment for fever immediately during outbreak of Dengue fever irrespective of their socio-economic condition. An effort is required to know the cost incurred for treating suspected Dengue fever or fever due to other causes. Hence this study was conducted with an objective to estimate the total and Per Capita cost, direct and indirect cost of treating fever cases outbreak period of 3 months.

II. METHODS

This is a cross sectional, community based, descriptive study conducted during first week of November 2012 in Kudapakkam. Kudapakkam is semi-urban area of Pondicherry, house to house survey of all fever cases among 496 houses was done by direct interview using pretested questionnaire. The confirmed Dengue fever cases were traced to this community from inpatients of Sri Lakshminarayana Institute Medical Science & hospital, Pondicherry. There were 116 fever cases during 3 months period between August and October 2012. All efforts were made to collect the data of patients by visiting their houses on three occasions and it was possible to collect information of 98 cases. The data was collected on age, sex, education, occupation; daily wage on salary, money spent on consultation, medicine, lab investigation, hospitalization, transport, and number of people accompanied the person, no of days absent for work or studies, etc from each patients and care takers. The data on the cost was calculated as Indian rupees (1 US Dollar = 58₹ during 2012). Direct cost for treatment was estimated by money spent on Doctor fees, medicine cost, hospitalization and investigation cost. Indirect cost for treatment

was estimated by money incurred on Transport, Loss of pay or wages of sick and caring person, etc.

III. RESULTS AND DISCUSSION

There were 98 fever cases (Male 44 & Female 54) in this study and there were four confirmed cases of Dengue Fever in this population traced from Sri Lakshminarayana Institute Medical Science & hospital.

Table 1: Description of Fever Case in Kudappakam Village

Age Groups in years	Male n=44	Female n=54	Total n=98 (%)
1 – 6	4	12	16 (16.3)
7 – 15	11	9	20 (20.4)
16-30	10	10	20 (20.4)
31-45	14	13	27 (27.5)
46-60	2	7	9 (9.1)
61-75	2	4	6 (6.1)
Occupation			
Student	17	13	30 (30.6)
Salary	2	1	3 (3.1)
Daily wager	20	10	30 (30.6)
Not working	22	13	35 (35.7)

Not Working includes House wives, less than 6 years children, Old age people

Table 1 shows Children less than 15 years of age accounted for one third of the total cases. Forty seven (48%) of 98 fever cases are in the age group of 16-45 years. This shows the fever was affected to economically productive age group of the community. Majority of the affected adults were daily wagers by occupation accounting for 30.6 Percent.

TABLE 2: Distribution of Total Cost, Direct Cost & Indirect Cost of Fever Treatment

Cost	Male		Female			Total
	Total	Percapita	Total	Percapita	Total	Percapita
Total cost	54,900	1,247	47,146	873	1,02,046	1,041
Direct cost	20,400	463	30,049	556	50,449	514
Indirect cost	34,500	784	17,097	316	51,597	526

Note: Figures are in Rupees

Table 2 shows Total cost of fever treatment among males was ₹54,900(931USD) and females was ₹47,147(812USD), percapita total cost accounts for ₹1,247(21USD) & ₹873(15USD) among male and female respectively. Indirect cost of treatment for male patient is (62.7%) higher than the direct cost (38.3%) of treatment. It may be because of Transport, loss of daily wagers by patient and care takers etc. The total cost spent for treating 10 Dengue Fever was ₹28,900(480USD) and PerCapita was ₹2890(48USD).

Table 3: Distribution of Direct & Indirect Treatment Cost According To Sickness Absenteeism

| Reason for absenteeism (44) | Male | | | Female | | |
	No.	Direct cost Total (PerCapita)	Indirect cost Total (PerCapita)	No.	Direct cost Total (PerCapita)	Indirect cost Total (PerCapita)
Sick Person	23	17,750(772)	24,554(1067)	10	4,500(450)	7,578(758)
Caring Person	4	0	5,632(1408)	7	0	6,286(629)
Total	27	17,750(772)	29,986(2475)	17	4,500(450)	13,864(1388)

Note: Figures are in Rupees

Table 3 shows the PerCapita for indirect cost was ₹2,475(21USD) & ₹1388(18USD) for men and women respectively on account of absenteeism. The indirect cost for men in both sick and caring person was two folds higher than females representing financial impact on the family and community. The indirect cost for men (₹24,554 = 423USD) was much higher than the indirect cost for females (₹7,578=131USD) as a result of their sickness. The median number of sickness absenteeism days was 4 (range 1-20 days).

Table 4: Distribution of Fever Treatment Cost Among Under Six Years Children

Under 6 years	No of cases	Direct cost (PerCapita)	Indirect cost (PerCapita)	Total cost (Percapita)
Male	4	700(175)	3,323(830)	4023(1006)
Female	12	3,600(327)	2,777(252)	6377(532)
Total	16	4,300(286)	6,100(406)	10400(650)

Note: Figures are in Rupees

Table 4 shows the total PerCapita cost of treatment for less than six years male child is twice the cost of treating a female child. Indirect treatment cost for Male child is four folds higher compare to female child. This shows the attitude of the family members and community towards the priority and preference for male child treatment. The study was conducted in India during 2006 epidemic among serologically confirmed cases of inpatient was calculated to the 432USD per patient [5]. The economic burden of Dengue illness in Malaysia is estimated by 2USD per patient [3]. In this study, PerCapita cost for treating 10 confirmed Dengue fever cases was estimated as 2890₹ (48USD). Nearly 21USD for male and 15USD for females was spent as PerCapita for getting the fever treatment at the community level during the outbreak. This shows the amount of panic created by Dengue fever in the community with mass media reports. The overall economic burden of Dengue would be higher than the cost associated with Dengue after prevention and control measures. Children below 6years with sickness were taken for treatment by the parents irrespective of their economic conditions. In this study, indirect cost for male child four times more compare to getting treatment for female child for fever showing gender wise priorities for seeking treatment for fever in this community.

IV. CONCLUSION

The total Per Capita cost for treatment of fever for male and female was ₹1,247(21 USD) & ₹873 (18 USD) respectively. Majority of the affected adults were daily wagers by occupation influencing the economically productive age group of the community. Cost of treating male child was two folds higher compare to female child especially among less than six year aged children.

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AUTHORS

First Author – Dr. P.S.Vinothkumar, Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Second Author – Dr. K.N.Prasad, Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Third Author – Basavaraj M Ingalgeri, Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Fourth Author – Dr. G.Gnanamani, Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Correspondence Author – **Dr P.S.Vinothkumar,** Email Address: drpsvinothkumar@gmail.com, Telephone: Office: 413-2661998 Fax; 413-2661996 Mobile: +91 9629039123

Development and Acceptability of Synthetic Granite Tiles: An Alternative Construction Material

Ronald M. Marty, Ed. D, Antonio E. Pegos

College of Industrial Technology, University of Rizal System, Morong Campus, Sumulong St., Morong, Rizal, Philippines

Abstract- Granite tiles are expensive construction material usually use for tiling of floor. The main focus of this study was the development of synthetic granite tiles as an alternative construction material. The development and fabrication of synthetic granite tiles underwent different procedures. It started with the design and construction of molder. Based from the experimentation of the synthetic granite tiles can be fabricated in different sizes, shapes and thickness which is comparable to the existing granite tiles. During the try-out and revision period the following were observed: The proportion of pebbles resins and hardener had a relation on the drying time of the product. The more hardener is added the shorter the drying time of the tile; however, excessive hardener can caused the synthetic granite tile to crack. Different thickness, sizes, shapes and colors found out to be feasible to fabricate. The tile hygroscopic property was found out to be water resistant and it did not absorb water for twenty four (24) hours. The brittleness of the tile was also the subject of testing and revising portion of this study by exposing the product under the sunlight for eight (8) hours and it was found out that product did not crack even though it was exposed directly in the sunlight.

Index Terms- Granite, Synthetic Tiles, Alternative Construction Materials, Resins

I. INTRODUCTION

The economic progress of a country depends on technological advancement and manpower development. In a country like the Philippines with an unstable economy and an overblown population, one of the programs of the government leadership is towards research and development. This program will surely strengthen the government initiatives towards industrialization and progress.

In the recent years, the construction industries underwent changes in the past. Innovations for construction industries were introduced and new construction products were invented and developed because of the growing scarcity of construction materials and increasing environmental concern of the populace today.

Granite is a construction materials use for tiling floors and walls. It is an expensive materials and costly because of its beauty and attraction to the builders and house owner. Although granite is abundant in the country the quarrying problems occur because of this activity. Soil erosion and flooding in the lowlands also attributed to quarrying. Because of its use as paving block and as a building stone, the quarrying of granite was, at one time, a major industrial activity. Granite is a coarse or medium-grained intrusive igneous rock that is rich in quartz and feldspar; it is the most common plutonic rock of earth's crust, forming by cooling of magma at depth (Britannica 2006).

Alfonso (2004) observed that because of limited types of tiles available, there is a need to find new, durable and beautiful types that are inexpensive, versatile and easy to maintain. As a solution he invented a tile having a marble like finish. The result of his study showed that these types of tiles were strong and durable and can withstand any kind of weather. It can be used either for flooring or wall panels', tabletops and the like.

Ondo et. al (2003) conducted a study entitled the "Development and Acceptability of Powdered Shells for Making Tiles". The study made used of powdered *Bayuko* shells into tiles. The acceptability of the product was determined using the different criteria as follows: quality, durability, workability, usefulness and economic aspect. The result of the evaluation found out that the new product was very acceptable with regards to the criteria cited.

Las Marias (1995) pointed out in their invention entitled " Process of Producing Water Resistant Laminated Hardboard " could be made from a mixture of wood and agricultural wastes, such as saw dust or other fine particles such as polyvinyl chloride (PVC) which is applied as an overlay to laminate the hardboard sheet

Bacon et. al. (2003) findings in their study entitled "The Development of Laminated Corn Peeling Board" found out that the corn peeling board is comparable with other existing panel products and using polyvinyl acetate glue was stronger binding result than plastic resin glue.

Polymer Products Philippines Inc. (2007) stressed out that a premix polyester resin is a general purpose semi flexible polyester resin used primarily with fiber glass reinforcement to make glass reinforce plastic products which require some resiliency for greater toughness and impact resistance such as boats, car bodies, tanks, etc. It also used for fiber glass cladding for strong structural repairs on metal, wood or fiber glass. It can be used for filling cracks, gaps and fractures.

Republic Act 9157 or otherwise had known as "An Act Establishing the University of Rizal System in the Province of Rizal" section 2 states that:

The University shall primarily offer higher professional and technical instructions and training in science and technology and promote research, extension and production services, advanced studies and specialized training in all fields deemed relevant to the development goals of the province of Rizal.

Along these lines, this section mandates the university to conduct research and other programs that will lead to the attainment of the development goals of Rizal province. As a support to this mandated law and with these above cited

problems and observations the researchers had prompted to conduct a developmental study on the discovering a synthetic granite tiles as an alternative construction materials. The new product will lessen the quarrying of granite hence, this study will also support the programs on environment.

II. CONCEPTUAL FRAMEWORK

The conceptual model of this study is shown in a form of paradigm on the figure 1 shown below. The Coombs system approach or the input, throughput and output was utilized in the development of the synthetic granite tiles
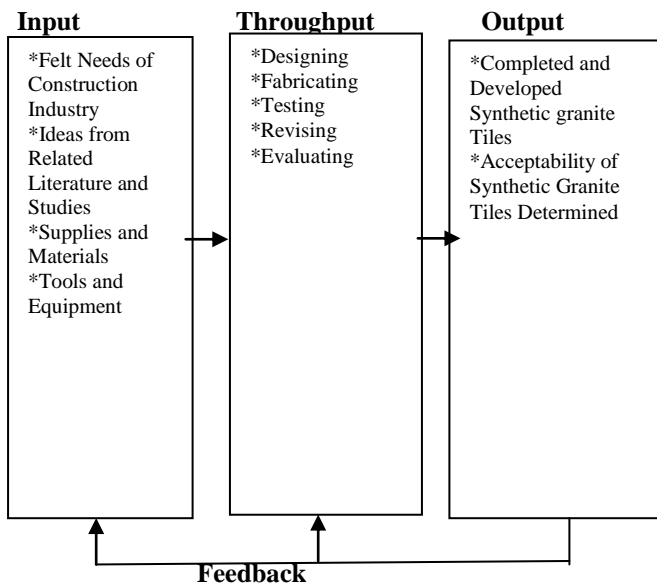
Figure 1. Conceptual Model in Developing the Synthetic Granite Tiles

The input of this study are felt needs of construction industry as an alternative construction materials, ideas from related literature and studies, supplies, materials, tools and equipment.

The throughput consists of designing, fabricating, testing, revising and evaluating the acceptability of the developed project in terms of aesthetic design, workability, economic aspect, durability and safety and maintenance.

The output of this study is completed synthetic granite tiles made of stone pebbles and a premix polymers resins. Furthermore the acceptability of the said project was determined.

The feedback refers to the overall evaluation made by the researchers to ensure the efficiency and better performance of the product, the arrows connecting the different figures symbolized the relationship of each other towards the attainment of its objectives.

Objectives

This study aimed to develop a synthetic granite tiles. Specifically, this study attempted to:
1. design and fabricate a synthetic granite tiles;
2. perform try-out and revision;
3. determine acceptability of the product in terms of:

3.1 aesthetic design;
3.2 workability;
3.3 economic aspect;
3.4 durability; and
3.5 safety and maintenance.
4. compare the significant difference between the existing granite tiles and synthetic granite tiles in terms of the abovementioned variables.

III. METHODOLOGY

In conducting this study, the researchers adapted the developmental type of research design since this study focused on developing and fabricating a synthetic granite tile. The developmental research is defined as the progress and innovating existing product of science and technology. This explanation guided the researchers to decide that mentioned research design is most suited to use since this study focused on the development of an alternative construction materials.

Descriptive method was also utilized since researchers made used of a questionnaire checklist in determining the level of acceptability in terms of aesthetic design, workability and safety and maintenance of the synthetic granite tile. Score card was also used to record the impact test of the product in terms of durability.

The Profile of Sample

The respondents of this study were professionals such as Civil Engineers Architects, instructors and professors of civil technology. Likewise, skilled workers such as supervised industrial trainees of Civil Technology, construction industry personnel together with some construction workers were also considered respondents of this study. A complete set of questionnaire was distributed to the respondents. The retrieved questionnaires determined the total numbers of respondents.

Table 1 presents the number of respondents from each category. There were ten (10) professionals and twenty (20) skilled workers for a total of thirty (30) respondents.

Table 1. Population and Sample

Category	Sample	Percentage
Professionals	10	33.3%
* Civil Engineers	4	
* Architects	2	
* Instructors & Professors of Civil Technology	4	
Skilled Workers	20	66.7%
* Construction Industry Personnel	5	
* Construction Workers	5	
* Civil Technology SIT Trainees	10	
Total	30	100%

Method of Gathering Data

The prototype of the products were prepared and fabricated. Different colors pebbles were tried out. Revisions were also conducted in order to reach the functional stage of the product. After the try-out and revisions period the synthetic granite tiles were subjected to evaluation process by the respondents.

Questionnaires were distributed and the samples of the products were also shown to the respondents. The respondents evaluated the samples in terms of aesthetic design, workability, safety and maintenance. The durability criterion was evaluated through an impact test with the used of score card.

Tallying of the data gathered and then application of statistical procedures and interpretation of data followed next.

The Research Instrument

To measure the acceptability of the product in terms of aesthetic design, workability, economic aspect, safety and maintenance a questionnaire checklist was developed by the researchers and validated by the different experts in the field of research and Civil Technology to serve this purpose.

The questionnaire consists of 20 items, 1 - 5 items pertain to the variable that measures aesthetic design, 6 – 10 items are associated to the workability criterion, 11 – 15 items belong to economic aspect and 16 – 20 items are related to safety and maintenance factor of the finished product.

To determine the durability of the product a score card was used. The strength was tested in the following manner. The tile was placed on a flat surface underneath a gauge 26 sheet metal. A load was dropped on the metal and this was done repeatedly with a weight of 0.5 and 1 kilo and a dropping weight height of 1 meter, 2 meters and 3 meters. The procedure was also done to the commercial tile to compare its strength with the synthetic granite tile. A result of the test was recorded in the score card with the following score:

5 – No cracks
4 – Few chips and cracks
3 – More cracks but did not break into fragments
2 – Broken into fragments
1 – Extensive damage.

Data processing and Statistical Treatment
To accomplish the research objectives, the following statistical tools were used:

Analysis	Statistical Tools
1. To design and fabricate a synthetic granite tiles	1. Qualitative description
2. To test capability and limitation of the developed product	2. Qualitative description
3. To determine acceptability of the product in terms of aesthetic design, workability, economic aspect, durability, safety and maintenance	3. Weighted Mean
4. To compare the significant difference between the existing granite tiles and the synthetic granite tiles in terms of aesthetic design, workability, economic aspect, durability, safety and	4. Independent t-test

maintenance

Table 2 shows the scale and verbal interpretation used in interpreting the result of evaluation for aesthetic design, workability, economic aspect, durability, safety and maintenance.

Table 2. Scale and Verbal Interpretation Used in Interpreting the Result of Evaluation

Scale	Scale Interval	Verbal Interpretation
5	4.20 – 5.00	Very Much Accepted (VMA)
4	3.40 – 4.19	Much Accepted (MA)
3	2.60 – 3.39	Accepted (A)
2	1.80 – 2.59	Slightly Accepted (SA)
1	1.79 – 1.00	Not Accepted (NA)

IV. RESULTS AND DISCUSSION

Testing and Revising the Product

The product underwent a try-out and revision period through experimentation. Before starting on working with the premix polyester resin the researchers mixed up several small experimentation batches to familiarize with the material.

The experiment focused on the proportion of pebbles, resins and hardener. Likewise, the researchers also experimented on the amount of hardener being poured to the mixture in relation to the drying time. The thickness, sizes, shapes and colors were also tried out in this study. The tile was soaked into the water for twenty four (24) hours to test hygroscopic property of the project. The brittleness of the tile was also the subject of testing and revising portion of this study by exposing the product under the sunlight for eight (8) hours.
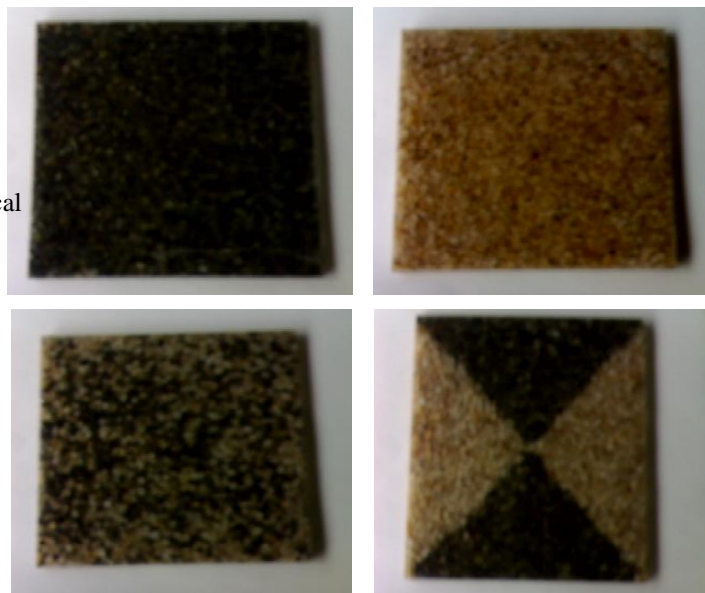
Figure 2.Developed Synthetic Granite Tiles

Acceptability of the Product

Table 3. Computed Weighted Mean on the Acceptability of Synthetic Granite Compared to Existing Granite Tiles in Terms of Aesthetic Design

Synthetic Granite Tiles				Existing Granite Tiles		
The Tiles:	WX	VI	R	WX	VI	R
1. duplicate the design of an original granite tiles	3.77	MA	3	4.07	MA	1
2. contribute to the internal beauty of the house.	3.8	MA	2	3.63	MA	3.5
3. substitute the traditional design of existing granite tiles.	4.13	MA	1	3.77	MA	2
4. improve the general appearance of floors and walls	3.67	MA	4	3.63	MA	3.5
5. provide different sizes, shapes and colors.	3.63	MA	5	3.4	MA	5
Average Weighted Mean	3.8	MA		3.7	MA	

The average weighted mean is 3.8 and 3.7 for synthetic granite tiles and existing granite tiles respectively and both interpreted as much accepted in terms of aesthetic design.

Table 4. Computed Weighted Mean on the Acceptability of Synthetic Granite Compared to Existing Granite Tiles in Terms of Workability

Synthetic Granite Tiles				Existing Granite Tiles		
The Tiles:	WX	VI	R	WX	VI	R
6. reduce the time of work when installing the tiles	3.97	MA	3	3.93	MA	2
7. are easy to handle and store.	4.00	MA	2	3.87	MA	4
8. maintain the squareness and flatness of the surface when utilize as floor tiles	4.33	VMA	1	4.37	MA	1
9. maintain the perpendicularity of the wall surface when utilize as wall tiles	3.77	MA	5	3.9	MA	3
10. are easy to cut when work requires straight and curve cutting.	3.87	MA	4	3.23	A	5
Average Weighted Mean	3.97	MA		3.96	MA	

This implies that synthetic granite tiles are comparable to the commercially produced granite tiles with respect to workability variable. The average weighted mean for workability criterion is 3.97 and 3.96 respectively for synthetic granite tiles and existing granite tiles, both verbally interpreted as much accepted.

Table 5. Computed Weighted Mean on the Acceptability of Synthetic Granite Compared to Existing Granite Tiles in Terms of Economic Aspect

Synthetic Granite Tiles				Existing Granite Tiles		
The tiles:	WX	VI	R	WX	VI	R
11. support low-cost construction materials	3.97	MA	2	3.23	A	2.5
12. reduce garbage problem. and fabrication process is environment friendly	4.0	MA	1	2.97	A	4
13 save time and effort during the installation period of the tiles.	3.27	A	5	2.93	A	5
14. save construction materials.	3.93	MA	3	3.23	A	2.5
15. reduce labor cost of labor because the product is lighter in weight and easy to install	3.72	MA	4	3.27	A	1
Average Weighted Mean	3.78	MA		3.13	A	

The average weighted mean for synthetic granite tiles is 3.78 with a verbal interpretation of much accepted, while the existing one got an average weighted mean of 3.13, verbally interpreted as accepted. This signifies that the developed new product is more acceptable than the existing product with regards to economic aspect. These findings and observations were supported by the Ecological Solid Waste Management Act of 2000 which mandated and encourage the business and industry sectors to participate and invest in ecological solid waste management projects to manufacture and environment friendly products, to introduce develop and adopt innovative processes that shall recycle and reuse materials, conserve raw materials and energy, reduce waste, and prevent pollution.

Table 6. Computed Weighted Mean on the Acceptability of Synthetic Granite Compared to Existing Granite Tiles in Terms of Safety and Maintenance

Synthetic Granite Tiles				Existing Granite Tiles		
The tiles:	WX	VI	R	WX	VI	R
16. are provided with slip resistant ingredients to prevent slipping.	3.97	MA	2	3.67	MA	3.5
17. are assured of anti-cracking mixture to avoid accidental cracking.	3.07	A	5	2.87	A	5
18 are easy to maintain its glossiness of the surface.	4.0	MA	1	3.97	MA	1
19. are moist resistance and weatherproof.	3.73	MA	3	3.67	MA	3.5
20. do not produce harmful odor when newly installed.	3.67	MA	4	3.73	MA	2
Average Weighted Mean	3.67	MA		3.58	MA	

The average weighted mean for safety and maintenance variable got 3.67 for synthetic granite tiles while 3.58 for the existing product but both obtained a verbal interpretation of much accepted. To summarize, the two products satisfied the standard of respondents for safety and maintenance aspect.

The next table revealed that both the existing granite tile and synthetic granite tiles can withstand load of 0.5 kilo weight being dropped in the surface of the tiles on a different height level of 1, 2 and 3 meters. However, when the weight was increased to 1 kilo there is few chips and cracks on the surface of the synthetic granite tile with a dropping height level of 2 meters and more cracks were observed when the dropping height is increased to 3 meters same as with existing granite tile. The average weighted mean is 4.5 and 4.67 for the synthetic granite tile and the existing granite tile respectively. However, both tiles were rated very much accepted in terms of durability. It implies that the developed tile can be compared to the synthetic granite with regards to durability criterion.

Table 7. Computed Weighted Mean on the Acceptability of Synthetic Granite Compared to Existing Granite Tiles in Terms Durability

Synthetic Granite Tiles					Existing Granite Tiles		
Weight	Height (in meter)	WX	VI	R	WX	VI	R
0.5 kilo	1 meter	5	4.67	2.5	5	VMA	3
0.5 kilo	2 meters	5	VMA	2.5	5	VMA	3
0.5 kilo	3 meters	5	VMA	2.5	5	VMA	3
1 kilo	1 meter	5	VMA	2.5	5	VMA	3
1 kilo	2 meters	4	MA	5	4	VMA	3
1 kilo	3 meters	3	MA	6	4	MA	6
Average Mean Weighted	4.5	VMA		4.67	VMA		

Table 8. Composite Table on the Acceptability of Synthetic Granite Compared to Existing Granite Tiles

Synthetic Granite Tiles				Existing Granite Tiles		
Variables	WX	VI	R	WX	VI	R
1. Aesthetic Design	3.8	MA	3	3.7	MA	3
2. Workability	3.97	MA	2	3.96	MA	2
3. Economic Aspect	3.78	MA	4	3.13	A	5
4. Safety and Maintenance	3.67	MA	5	3.56	MA	4
5. Durability	4.5	VMA	1	4.67	VMA	1
General Average Weighted Mean	3.94	MA		3.81	MA	

In general the acceptability of the two products gained a verbal interpretation of much accepted with a general average weighted means of 3.94 and 3.81 for synthetic and existing granite tiles respectively. This further implies that the new product can be compared to the commercial granite tiles in terms of the variables cited above.

Significant Difference Between the of Synthetic Granite Tiles Compared to Existing Granite Tiles

Table 9. Computed t-Value on the Differences of the Evaluation Made by the Respondents on the Acceptability of Synthetic Granite and Existing Granite Tiles

Variables	X_1	X_2	D	Df	t_c	t_t	Ho	VI
1. Aesthetic Design	3.8	3.7	0.1	8	0.370	1.860	A	NS
2. Workability	3.97	3.96	0.01	8	0.037	1.860	A	NS
3. Economic Aspect	3.78	3.13	0.65	8	2.403	1.860	R	S
4. Safety and Maintenance	3.67	3.58	0.09	8	0.334	1.860	A	NS
5. Durability	4.5	4.67	0.17	8	0.628	1.890	A	NS
General Average Weighted Mean	3.94	3.93	0.01	8	0.037	1.860	A	NS

This means that the respondents were satisfied with the two construction materials having no differences in terms of aesthetic design, workability, durability and safety and maintenance. However, in terms of economic aspect the synthetic granite tiles were very much better than the commercial tiles. Seemingly, the new product reduce garbage problem and the fabrication process is environment friendly because quarrying of granite will be surely reduced.

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings
The salient findings of the study are the following:
1. Designing and Fabricating the Project
The design and fabrication of a synthetic granite tiles underwent different procedures. It started with the design and construction of molder. Based from the experimentation of the synthetic granite tiles can be fabricated in different sizes, shapes, thickness and colors which is comparable to the existing granite tiles.
2. Testing and Revising the Product
Based on the try-out and revision the following findings were observed: The proportion of pebbles resins and hardener had a relation on the drying time of the product. The more hardener is added the shorter the drying time of the tile; however, excessive hardener can caused the synthetic granite tile to crack.

Thickness, sizes, shapes and colors found out to be feasible to fabricate. The tile hygroscopic property was found out to be weather proof and it did not absorb water. The brittleness of the tile was also the subject of testing and revising portion of this study by exposing the product under the sunlight for eight (8) hours and it was found out that product will not crack even though it was exposed in the sunlight.

3. Acceptability of the Product
    3.1 The average weighted mean is 3.8 and 3.7 for synthetic granite tiles and existing granite tiles respectively and both interpreted as much accepted in terms of aesthetic design.
    3.2 The average weighted mean for workability criterion is 3.97 and 3.96 respectively and both verbally interpreted as much accepted.
    3.3 The average weighted mean for synthetic granite tiles is 3.78 with a verbal interpretation of very acceptable, while the existing one got an average weighted mean of 3.13, verbally interpreted as accepted.
    3.4 The average weighted mean for safety and maintenance variable got 3.67 for synthetic granite tiles while 3.58 for the existing product but both obtained a verbal interpretation of much accepted
    3.5 Both tiles were rated very much accepted in terms of durability with an average weighted means of 4.5 and 4.67 respectively for synthetic and existing granite tiles

    4. Significant Difference Between the of Synthetic Granite Tiles Compared to Existing Granite Tiles

    This means that the respondents were satisfied with the two construction materials having no differences in terms of aesthetic design, workability, durability and safety and maintenance. However, in terms of economic aspect the synthetic granite tiles were very much better than the commercial tiles.

VI. CONCLUSIONS

    1.   Based on the findings the study concludes that:
 Synthetic granite tile can be fabricated out of locally available raw materials.
    2. Too much hardener can cause the synthetic granite tile to crack. It is further concluded that the product is not water absorbent and can withstand the heat of the sun.
    3. Synthetic and existing granite tiles were both much accepted in terms of aesthetic design, workability and safety and maintenance. For synthetic granite tiles were evaluated much accepted, while the existing one got a rating of accepted for economic aspect. And for durability both tiles were rated very accepted.
    4. This study concludes that both construction materials had no differences in terms of aesthetic design, workability, durability, safety and maintenance but in terms of economic aspect the synthetic granite tiles were very much better than the commercial tiles.

RECOMMENDATIONS

On the basis of the above findings and conclusions, the following are recommended:

1. Financial assistance should be provided to faculty who possess technical know how and inventive skills in developing alternative products.
2. Mixing machine should be designed and developed for mass production purposes.
3. Marketability of the developed product should be studied further.
4. Further study should be undertaken to attain maximum efficiency of the product.
5. Follow up study on the experimentation of other binding substance should be conducted.
6. The product should be patented.

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AUTHORS

First Author – Dr. Ronald M. Marty is a Full Fledge Professor of the College of Industrial Technology at the University of Rizal System He was a recipient of scholarship training on Maintenance Woodworking Machine at CSR Training Center, Rimini, Italy under the Bilateral Technical Assistance Program of National Economics and Development Authority (NEDA) and the Government of Italy. He was a recipient of Outstanding Vocational Educator Award of the Southern Tagalog Association of Vocational Education in 2011., ronald_marty@yahoo.com

Second Author – Mr. Antonio E. Pegos is an Associate Professor I of the College of Industrial Technology at the University of Rizal System, Morong Campus, A Civil and Furniture and Cabinet Making Technology specialist, graduated Master of Arts in Teaching major Civil Technology at Marikina Polytechnic College.

The Effect of Feeding Different Levels of Brewer's Dried Grain Yeast Mixture on the Performance of White Leghorn Chicks

[1]**Zewdu Wondifraw**, [2]**Berhan Tamir**

[*] Department of Animal Science, College of Agriculture and Natural resources, Debre Markos University, Debre Markos, Addis Ababa, Ethiopia.
[**] College of Veterinary Medicine and Agriculture, Debre Zeit, Addis Ababa, Ethiopia.

Abstract- This experiment was conducted to evaluate the effect of feeding different levels of Brewer's Dried Grain Yeast mixture (BDGY) on the performance of white leghorn chicks. A total of three hundred twenty four day-old white leghorn chicks were grouped in to 18 pens of 18 chicks each, and randomly assigned to six treatments (control; 6% BDGY; 12% BDGY; 18% BDGY; 24% BDGY; 30% BDGY) according to a completely randomized design (RCD). Brewer's Dried Grain Yeast mixture was composed of 80% brewer's dried grain (BDG) and 20% brewer's dried yeast (BDY). The mean dry matter intake and cost of feed per kg live weight gain did not vary ($P > 0.05$) among the dietary treatments. However, significantly ($P < 0.01$) lower daily gain and dry matter conversion ratio ($P < 0.05$) were obtained in chicks fed 24% BDGY and 30% BDGY than the rest of dietary treatments. Similarity in growth performance between chicks fed the control and 18% BDGY was observed. Based on this, it could be concluded that Brewer's Dried Grain Yeast mixture could be incorporated in chick's rations at the level of 18% without any adverse effect on growth performance so as to increase the economic efficiency

Index Terms- brewer's dried grain yeast, dry matter conversion ratio, dry matter intake, weight gain, economic efficiency.

I. INTRODUCTION

The use of cereal grains as the basis of poultry rations seems irrational under present conditions for the developing country where population growth places an increasing pressure on food supplies [1]. Ever-rising prices of ingredient remain to be the greatest single item determining the profit margins in poultry farming especially in developing countries. The most appropriate strategy for these countries is likely to be the development of dietary formulations, which allow locally available new ingredients to be used. Such an approach would reduce food costs as well as the dependency to import new materials [2]. Ethiopia is not self sufficient in cereal grains and could not provide the bulk of concentrate feeds for poultry. There are shortages of protein supplements and micronutrients which are needed for the preparation of balanced rations. Scarcity of poultry feed in the country is the major problem and the expected output from chicken is very low. Utilization of alternative feed ingredients in poultry ration is a key determinant of successful poultry production. The use of industrial by-products in animal nutrition represents a valuable means of the indirect production of food from industrial by-product [3]. Therefore, the search for alternative protein source has become urgent. Among the non-conventional feedstuffs, which could be used in the compounding of poultry rations are brewer's dried grain and brewer's dried yeast. Brewer's dried grain (BDG) and brewer's dried yeast (BDY) are valuable source of CP, ME and many of the B-vitamins and rich in P, but relatively low in Ca. These materials are also considered to be good sources of un-degradable protein and water soluble vitamins [4]. [5] described that 35 to 45 kg of DM can be obtained in the residues from the production of 1000 liters of beer.

The presence of a number of brewing industries in Ethiopia suggests that large volume of brewer's dried grains and yeast is produced every year. Currently small proportion of this by product is used as dairy cattle feed and large quantities accumulate at production sites causing disposal and public health problems. This huge by product has not yet been extensively utilized as a feed source for poultry. Therefore, the objective of this study was intended to evaluate the potential use of brewer's dried grains and yeast which could be used in poultry feeding on the performance of white leghorn chicks under intensive management condition.

II. MATERIALS AND METHODS

2.1. Study Area

This study was carried out in Ethiopia at Alemaya Agricultural University which is located at 42^0 3'E longitude, 9^0 26' N latitude at an altitude of 1980 m.a.s.l and 515 km east of Addis Ababa. The mean annual rainfall of the area amounts to 780 mm and the average minimum and maximum temperatures are 8.5 and 23.4^0 C, respectively.

2.2. Management of Experimental Birds

A total of three hundred twenty four day-old white leghorn unsexed chicks with an average body weight of 33.88 ± 1.8 g were purchased from the university poultry farm. All the chicks were randomly divided into 18 pens with 18 chicks/pen. The 18 pens were randomly assigned to six treatment groups. Replicates were housed in the partitioned house with all the necessary facilities for 8 weeks experimental period. Standard vaccination schedule was done and strict sanitary measures were followed during the experimental period. The chicks were vaccinated with live vaccine against Newcastle Disease on day eight, through

drinking water. Chloramphenicol and OTC[TM] Plus was given in the drinking water against salmonellosis and for the treatment as well as control of a wide range of bacterial infections.

2.3. Experimental Diets

The feed ingredients, which were used in the formulation of the different experimental ration of this study were mixture of brewer's dried grain and yeast, noug seed (*Guizotia abyssinica*) cake (mechanically extracted), corn grain, wheat short, soybean grain, vitamin premix and salt. The wet brewer's grain and dried brewer's yeast were obtained from Harar brewery. The wet brewer's grains were sun-dried for four consecutive days by sparsely spreading on canvas. All the ingredients, except the wheat short, brewer's dried yeast and vitamin premix were hummer milled to 5 mm sieve size. The six treatment rations used in this study were formulated on an isocaloric and isonitrogenous basis having 12.28 MJ/kg DM of metabolizable energy and 20% crude protein. Feed and water were provided on *ad libitum* basis. Feed intake and refusals were weighed and recorded every day to estimate the feed consumption for each replicate and treatment. The chicks were also weighed individually at the beginning and subsequently every 7 days during the experimental period and at the end of 8 weeks by sensitive balance.

2.4. Laboratory Analysis

Representative samples were taken from each of the feed ingredients used in the experiment and analysed before formulating the actual dietary treatments at Debre Zeit National Veterinary Institute in the nutrition and biochemistry laboratory. Feed samples were analyzed for dry matter (DM), crude protein (CP), ether extract (EE), crude fiber (CF) and ash [6]. The metabolizable energy (ME) levels of feed ingredients was calculated using the formula ME (kcal/kg DM) = 3951 + 54.4 EE - 88.7 CF - 40.8 Ash [7].

2.5. Measurements and Observations

Feed intake of each replicate was recorded daily throughout the experimental period. Individual weight of each replicates was taken once per week. The body weight measurements were used to determine pen averages and to calculate the feed conversion ratio. The average feed intake was recorded (g/day). Feed conversion ratio was calculated as gram feed intake /per gram body weight gain. Body weight gain was calculated by subtraction of the live body weight at the beginning of the week from that of the second measuring date (BWG, g/d). Feed cost per live weight gain was computed by the cost of feed consumed to attain a kilogram (kg) live weight gain.

Table 1. Ingredients of experimental diets fed to white leghorn chicks

Ingredients (%)	T1 (%)	T2 (%)	T3 (%)	T4 (%)	T5 (%)	T6 (%)
1. BDGY mixture (BDG: BDY)(80:20)	__	6 (4.8:1.2)	12 (9.6:2.4)	18 (14.4:3.6)	24 (19.2:4.8)	30 (24:6)
2. Noug seed cake	30.00	24.00	18.00	12.00	6.00	_
3. Corn crushed	50.00	50.00	48.00	47.00	46.00	52.00
4. Wheat short	9.30	9.30	11.30	12.30	13.30	11.30
5. Soybean whole crushed	10.00	10.00	10.00	10.00	10.00	10.00
6. Vitamin premix	0.20	0.20	0.20	0.20	0.20	0.20
7. Salt	0.50	0.50	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00	100.00	100.00
Calculated nutrient content						
ME (Kcal/kg DM)	2905.51	2915.41	2919.13	2925.94	2932.75	3016.49
CP (%)	20.71	20.35	20.11	19.82	19.52	19.45
ME: CP ratio	140.31:1	143.24:1	145.13:1	147.65:1	150.24:1	155.08:1
CF (%)	8.15	8.24	8.28	8.32	8.56	8.79

2.6. Experimental Design and Statistical Analysis

The data collected were analyzed as completely randomized designs following the procedures suggested by [8] and adopting one way ANOVA using SPSS [14]. When the analysis of variance indicated the existence of significant difference among treatment means, Duncan's Multiple Range Test (DMRT) were employed to test and locate the treatment means that are significantly differed from the rest.

III.   RESULTS AND DISCUSSION

[11] **3.1. Dry matter (DM) intake**

The mean daily dry matter intakes of the six groups of chicks fed the six treatment rations for 8 consecutive weeks are shown in Table 2. The statistical analysis showed that there is no significant difference in dry matter intake (P > 0.05) between the

dietary treatments. This result agrees with previous result of [9] who reported insignificant differences (P > 0.05) in mean dry matter intake between starter chicks containing 25% BDG and their counterpart fed the control diet. This might be due to the fact that all diets contain similar level of nutritive value mainly energy, protein and crude fiber. Thus, BDGY did not affect the DM intake of chicks and it improved the mean daily and cumulative feed consumption of chicks. This is an advantage for producers, as brewer's dried grain (BDG) and brewer's dried yeast (BDY) is regarded as a waste material that can be bought cheaply, and reduce the production cost without affecting the feed consumption. In contrast to this finding, [10] reported significant difference in dry matter intake (P < 0.05) between the dietary treatments with different level inclusion of BDG in chick's diet.

[12] **3.2. Mean Body Weight Gain**

The effect of including different levels of BDGY in chicks ration on body weight gain is presented in Table 2. The mean

daily body weight gain of chicks during this study was 3.29, 3.04, 3.08, 2.91, 2.73, and 2.60 g fed on T1, T2, T3, T4, T5 and T6, respectively. The control diet had significantly higher body weight gain than T5 and T6. There were non-significant difference among T2, T3, T4, T5 and T6. This result is in agreement with the findings of [11] who reported significant variation in the average body weight and daily weight gain with diets with 0, 25, 50 %, 75% and 100% inclusion level of urea-treated and fermented BDG. They have also showed that Broiler chicks can tolerate inclusions of urea-treated and fermented BDG up to 50%, which is about 16.70 % of the diets. Additionally, [10] reported significant difference in daily body weight gain (P < 0.05) between the dietary treatments with *Atell*a (residue of home brewed beer), Brewers grains and Noug seed cake as the sole source of protein in feeding of baby chicks indicating that Brewers grains is superior to *Atell*a in nutritive value as measured by chick growth performance.

In case of the group fed with the diet containing 24 and 30% BDGY, body weight gain was significantly lower than the group fed with control diet due to increased level of crude fiber. Accordingly, incorporation of BDGY in chicks ration above 18% in TMR, resulted in progressive declining of mean daily body weight gain. In monogastric animal, fiber represents the insoluble matter of plant cell walls that is indigestible by animal enzymes, but can be partially degraded by gastrointestinal microflora [12]. According to [13], inclusions of high fiber ingredients are usually limited because of the poor metabolizable energy contents and it affects performance and nutrient utilization of chicken. High amount of crude fiber in poultry rations reduce feed efficiency, growth, egg production and time of food passage throughout the digestive system.

Table 2. Means of chick's dry matter intake, weight gain and dry matter conversion ratio of treatment diets

Treatments	Dry matter intake (g/chick)		Body weights (g/chick)		Weight gain (g/chick)		DMCR (g DMI/g BWG)
	Total	Daily	Initial	Final	Total	Daily	
T1	910	16.18[a]	34.71[a]	218.9[a]	184.27	3.29[a]	4.92[a]
T2	950	17.10[a]	33.50[a]	203.77[ab]	170.27	3.04[ab]	5.62[ab]
T3	890	16.57[a]	33.37[a]	205.95[ab]	172.58	3.08[ab]	5.38[ab]
T4	940	16.56[a]	34.62[a]	197.62[ab]	163.00	2.91[ab]	5.69[ab]
T5	900	16.29[a]	33.66[a]	186.54[b]	152.88	2.73[b]	5.97[c]
T6	840	15.22[a]	34.30[a]	180.03[b]	145.73	2.60[b]	5.85[c]
F-Test		NS	NS	**		**	*
SEM		0.51	0.57	5.86		0.10	0.22
C.V. (%)		7.97	2.9	5.10		6.15	6.84

Means with different superscripts in a column differ significantly, *P<0.05, ** P<0.01 & NS = Non significant

[13] **3.3. Dry Matter Conversion Ratio**

Dry matter conversion ratio of the experimental chicks expressed as grams of dry matter consumption per unit body weight gain were shown in Table 2. The mean dry matter conversion ratio expressed as gram of dry matter intake per unit of weight gained showed significant difference (P< 0.05) among the dietary treatments. A group fed with a diet containing 24% and 30% BDGY had significantly lower dry matter conversion ratio compared with a group that fed a diet containing 0, 6, 12, and 18% BDGY. This is perhaps related to the higher efficiency of feed utilization by chicks fed diets T1, T2, T3 and T4 as compare to T5 and T6 indicating their ability to digest and retain better dietary nutrients. Thus, more feed was needed to attain a unit gain in T5 and T6; this may be also due to the higher crude fiber content in the experimental diet that led to reduced body weight gain. This result is in agreement with the findings of [11] Isikwenu *et al*. (2005) who revealed significant difference in feed: gain ratio with diets 0, 25, 50 %, 75% and 100% inclusion level of urea-treated and fermented BDG. They have also showed that Broiler chicks can tolerate inclusions of urea-treated and fermented BDG up to 50%, which is about 16.70 % of the diets.

Treatment diets with 75% and 100% inclusion level of urea-treated and fermented BDG, which is about 25 % and 33.5% of the diets showed lower feed: gain ratio.

[14] **3.4. Economic Analysis**

The cost effectiveness of this experimental diet is shown in Table 3. Feed cost/live weight gain was 8.41, 8.67, 8.62, 8.59, 7.74 and 7.63 Birr for the groups fed on the control diet, 6% BDGY, 12% BDGY, 18% BDGY, 24% BDGY and 30% BDGY, respectively. The inclusion of BDGY in chicks ration and feed cost per kg were inversely proportional. The feed cost per kg was decreased with increasing BDGY in diets as compared with control group. The cost/kg feed of treatment containing 30% BDGY was lowest, due to the low price of BDGY and it had the positive effect on economic value of production. However, the daily gains of chicks in T6 were relatively lower. For this reason, treatment rations relatively with better daily gain and economic return could be recommended as the biological and economical optimum for raising chicks.

Table 3. Partial budget analysis of white leghorn chicks expressed as chick sale to feed cost ratio, feed cost/kg live weight gain and feed cost/chicken reared

Treatment	Total feed cost (Birr)	Total chick sales (Birr)	Chick sale to feed cost ratio	Feed cost/chicken reared	Feed cost/kg live weight gain
T1	74.65[a]	530.00	7.127[b]	1.407[a]	8.41[a]
T2	74.59[a]	510.00	6.850[b]	1.460[a]	8.67[a]
T3	69.37[b]	520.00	7.497[b]	1.373[a]	8.62[a]
T4	70.36[b]	500.00	7.130[b]	1.403[a]	8.59[a]
T5	67.14[c]	510.00	7.610[ab]	1.313[b]	7.74[b]
T6	63.56[c]	520.00	8.247[a]	1.220[b]	7.63[b]
C.V (%)			5.36	5.50	6.75
SEM	7.12		0.23	0.04	0.32
F-test	*		*	*	*

Means with different superscripts in a column differ significantly, *$P<0.05$

* Birr is Ethiopian currency which is equal to exchange rate 8.65 USD at the time of the research work.

IV. CONCLUSION

The results obtained in this study indicate that feed intake was not affected by the levels of inclusion of BDGY. However, daily body weight gain, dry matter conversion ratio (DMCR), cost of feed per chicken reared and feed cost/live weight gain varied significantly among dietary treatments. Growth rate was generally depressed progressively with increasing levels of BDGY in the ration. For this reason, T4 would be recommended as the biological optimum for raising chicks from day old to 8 weeks of age. Thus, this result clearly indicated that the inclusion of BDGY at 18% inclusion level in chicks ration reduces production cost, economically feasible and brought high economic efficiency without affecting feed intake, weight gain and feed conversion efficiency of chicks as compared to the control diet. Thus, In view of the shortage and the high costs of protein feed stuffs, exploitation of industrial by-products may make a substantial contribution towards better and more economic feeding of poultry.

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AUTHORS

First Author – Zewdu Wondifraw, PhD in Livestock Production and Management, Department of Animal Science, College of Agriculture and Natural resources, Debre Markos University, Debre Markos, Addis Ababa, Ethiopia. Email: - zewduwondifraw@gmail.com

Second Author – Berhan Tamir, PhD in Animal Nutrition, College of Veterinary Medicine and Agriculture, Debre Zeit. Email: berehantamir@yahoo.com

Correspondence Author – Zewdu Wondifraw, PhD in Livestock Production and Management, Department of Animal Science, college of Agriculture and Natural resources, Debre Markos University, Debre Markos, Addis Ababa, Ethiopia, Mobile +251910172313, fax + 251587711764, Email: - zewduwondifraw@gmail.com

P-Agents Seasonal Job Completion Model

Soma Sekhar Srinivas V.K, Suresh Babu.C, Madhu Mohan Reddy. P

Dept. of Mathematics, S. V. University, Tirupati, Andhra Pradesh, India.

Abstract- In this paper we study a __P-AGENTS SEASONAL JOB COMPLETION MODEL__ problem with seasonal job completion model. There are N-cities (N=1, 2, 3….n) and J jobs (1, 2,…q). The distance between each pair of cities is mentioned and is denoted by d_{ij}. For each city seasonal jobs have been mentioned for the agents whom they have to perform them in two seasons/periods. In the distance matrix the distance between each pair of the cities is **symmetric.** They have to do **m** jobs (truncated,i.e m<q) the agents starts from Head Quarter City and returns to it in the same path while completing all the **m** in both season jobs. The agents perform the first seasonal jobs at the cities when they move from Head Quarter City to the cities and they perform second seasonal jobs while return in the same path to the Head Quarter city. The aim of the problem is to find the paths of the agents such that the total distance travelled by them is minimum while completing all the **m** jobs. We consider a suitable numerical example and solved the problem by lexicographic search approach using pattern recognition technique.

Index Terms- Integer programming, Lexi-Search approach using Pattern recognition technique , Symmetric distance.

I. INTRODUCTION

The Travelling Salesman Problem is one of the most intensively studied problems in computational mathematics and is a kind of mathematical puzzle with a long enough history Crores, G.A[1].Many solution procedures have been developed such as Flood, M.M[3], Hardgrave, W.W & Nembanser, L.G[4] and Little, D.C.I.et al[7] for the travelling salesman problem.

Suppose a salesman wants to visit a certain number of cities allotted to him. He knows the distance/cost/time of journey between every pair of city 'i' and city 'j' denoted C_{ij}. The problem is to select a rout that starts from a given home city to passes through each and every city once and only once and returns to his starting city in the shortest path. Here in the present study we have considered a variation of the above and called the salesman as agent.

II. VARIATIONS OF TRAVELLING SALESMAN PROBLEM

There are many algorithms for usual one man TSP developed by researchers from time to time. But the problem has not received much attention in its restricted context. However, literature which is available with regard to the TSP with variations are discussed Das Shila [2,13], Jaillet P [5], Kubo & Kasugai [6], Pandit[8], Ramesh [9], Raviganesh G.S. Murthy & Das [11] and Srivastava Kumar, R.C. Garg and P. Sen [16].

Travelling purchaser problem (Ramesh T [9]) is another kind of variation to the TSP. Here there is of 'm' markets and a set of 'n' commodities. The cost of travel between each pair of markets and cost of each commodity at each market are known. A purchaser starts from one market and returns to it after purchasing all the commodities he needs. He may not visit all the markets, also may not purchase any commodity even if passes through a market. The purchaser is to find an optimal tour such that the total of the cost of travel and the cost of purchasing all the commodities is a minimum.

III. TRAVELLING SALESMAN PROBLEM WITH MULTIPLE JOBS

Bansal and kumar (1971) considered the above problem and proposed a dynamic programming approach for its solution. Nizmudhin [13]has considered the above problem with 10 stations and 20 jobs and solved the problem by lexicographic search approach. Suresh Babu [15]did a problem related to the TSP with multiple job facilities and solved the model by using pattern recognition based lexicographic search approach. He stated, there is a set of stations containing N elements and a set of jobs containing M elements those are to be performed by the salesman. The distance between each pair of stations and facilities for jobs at each station are known. A salesman in his tour may or may not visit all the stations and should not visit a station more than once. The problem is to find a tour of the salesman such that the total distance travelled by him is minimum, while completing all the M jobs.

In this problem there N {1,2,3,….n} cities. '**P-Agents'** have to do **m(<n)** jobs. The distance between each pair of cities is mentioned and is denoted by d_{ij}. The agents starts from a head quarter city he visits few cities and finish season 1 jobs while returns to head quarter city in the same path he completes season 2 jobs (total **m** jobs) in **P**- paths. The objective is to find minimum distance while completing all the **m** jobs in P- paths. In this sequel we developed a Lexi-algorithm using "Pattern Recognition Technique" to solve this problem which takes care of simple combinatorial structure of this problem.

IV. LEXICOGRAPHIC SEARCH USING PATTERN RECOGNITION TECHNIQUE

Lexicographic Search Approach is a systematized Branch and Bound approach, developed by Pandit [8] in the context of solving of loading problem in 1962. In principle, it is essentially similar to the Branch and Bound method as adopted by Little et.al.[7]. This approach has been found to be productive in many of the Combinatorial Programming Problems. It is significance mentioning that Branch and Bound can be viewed as a particular case of Lexicographic Search approach [Pandit - 1965]. The

name Lexicographic Search itself suggests that, the search for an optimal solution is done in a systematic manner, just as one searches for the meaning of a word in a dictionary and it is derived from Lexicography the science of effective storage and retrieval of information. This approach is based on the following grounds [Pandit - 1963].

(i) It is possible to list all the solutions or related configurations in a structural hierarchy which also reflects a hierarchical ordering of the corresponding values of these configurations.

(ii) Effective bounds can be set to the values of the objective function, when structural combinatorial restraints are placed on the Allowable configurations.

The basic principle is described as follows [Rajbhongshi [10]]. Consider a set of symbols A= (1, 2, 3,……, n) and the different possible sequences of length k of these symbols. Thus $(\alpha_1, \alpha_2, …, \alpha_k)$ is a k-word, formed from the alphabet of n symbols 1, 2, 3 ….. , n. The ith letter in this word is $\alpha_i \in A$. By defining an alphabetic order on the elements of A, we will be able to define a unique ordered list of words of length not exceeding m, where m is finite. Words of length k ≤ m are called incomplete words standing for the set or block of the (m-k)! Words of length k. Searching for an optimum word is a problem of finding the word of minimum value (in the case of a minimizing problem) in the Lexi Search defined by the solution of the problem. The search efficiency of a Lexi Search algorithm is based in this approach depends on the choice of an appropriate Alphabet-Table, where two conflicting characteristics of the search list have to be taken into account: one is the difficulty in setting bounds to the values of the partial words (that defines partial solutions representing subsets of solutions). The other difficulty is in checking the feasibility of a partial word. Thus we get two situations in the choice of the alphabet-table [Sundara Murthy [14]]. In this problem we get the process of checking the feasibility of a partial word is easy, while the calculation of a lower bound is bulky.

When the process of feasibility checking of a partial word becomes difficult and the lower bound computation is easy, a modified Lexi Search i.e. Lexi Search with recognizing the Pattern of the Solution known as **Pattern Recognition Technique** can be adopted. In this method, in order to improve the efficiency of the algorithm, first the bounds are calculated and then the partial word, for which the value is less than the initial (trial) value are checked for the feasibility. The pattern-recognition technique can be described as follows.

"A unique pattern is associated with each solution of a problem. Partial pattern defines a partial solution. An alphabet-table is defined with the help of which the words, representing the pattern are listed in a Lexicographic order. During the search for an optimal word, when a partial word is considered, first bounds are calculated and then the partial words for which the value is less than the trail value are checked for the feasibility"

Using Pattern Recognition technique reduces the dimensions requirement of the problem. For this problem to find an optimal solution **X** which is a two dimensional array the problem can be reduced to a linear form of finding an optimal word of length n. This reduction in the dimension for some problems reduces the computational work in getting an optimal

solution [Sundara Murthy [14], Vidyullata [17], Ramana and Umashankar [12]]. The present paper uses the Lexicographic Search in general and makes use of the Pattern Recognition approach.

V. PROBLEM DESCRIPTION

In this problem we have a variation of Travelling Salesman Problem called **"P-AGENTS SEASONAL JOB COMPLETION MODEL".** Let there be N (1,2,3…n) be cities and J (1,2,3…q) jobs in which **P-Agents** has to do while visiting the cities. The distance matrix d (i, j) is given in which distance is symmetric and also jobs at different cities are also given. The agent can do a job in each city of first season and second season. The restriction of the problem is the agents have to perform first season jobs at cities while moving away to the headquarter city to the cities and perform the second season jobs at the cities while return to the head quarter city in the same path .The total number of jobs by P-Agents must be **m (truncated ,i.e.m<q)** in 'P' paths. The problem is to find minimum total distance to finish **m** jobs by P-agents in P-paths subject to the above consideration. i.e. Where i, j $\in$ N; N = {1,2, . . ., n}. Let D (i, j) be the distance from i^{th} city to j^{th} city which is symmetric. For this we develop an algorithm called as Lexi-Search algorithm based on the pattern recognition Technique and it is illustrated with a suitable numerical example for two agents.

VI. MATHEMATICAL FORMULATION

Minimize (Z)   X= $\sum_{i \in N} \sum_{j \in N} D(i,j) X(i,j)$ -------------- **(1)**

Where N= (1, 2, 3…n)

Subject to the constraints

Let (1, $\alpha_{s1}, \alpha_{s2} … \alpha_{sns}$) cities in the sth path**------------- (2)**

(Where s=1,2,….p)

If X (i, j) =1

JX (J (i, 1)) =1

JX (J (i, 2)) = 1

JX (J (j, 1)) =1   ---------------------------- (3)

JX (J (j, 2)) =1

$\sum_{i=1}^{n} JX$ (i) ≥ m

X (i, j) = 0 or 1------------------------------------- (4)

Z(X) = 2α ----------- (5)

Equation (1) represents that the objective function of the problem, i.e. to find total minimum distance to connect all the cities from head quarter city. Equation (2) represents that the

total number of cities travelled by an **agent** in s^th path. Equation (3) represent that the total number of jobs done by the salesmen in two paths. Equation (4) describes that if a city *'i'* is connected to city j then X (i, j) = 1.Otherwise it will be equal to 0. Equation (5) represents the total distance travelled by the P-Agents is 2α (distance) , since the agent travelled is α (distance) while completing first season jobs and α (distance) in return while completing second season jobs(symmetric distance).

VII.   NUMERICAL ILLUSTRATION

The concepts and the algorithm developed will be illustrated by a numerical example number of cities/stations, **n** = 7, number of total jobs q=10 ,number of jobs to be perform **m** =8.Let JB={1,2,3,4,5,6,7,8,9,10}. N = {1, 2, 3, 4, 5, 6, 7} Then the cost array D is given below.

TABLE -1

D=

∞	02	08	05	06	03	07
02	∞	04	07	10	11	01
08	04	∞	09	08	10	03
05	07	09	∞	02	01	06
06	10	08	02	∞	05	09
03	11	10	01	05	∞	04
07	01	03	06	09	04	∞

In the above numerical example given in Table – 1, D (i, j) = '∞'= D (i, i), where (i=1,2,...n & j=1,2...n) these distance pairs are not relevant in the solution paths finding tours of the agent. Though all the D (i, j)'s taken as non negative integers it can be easily seen that this is not a necessary condition and the cost can be any positive quantity. The distance between cities are symmetric, i.e. D (3, 4) = (4, 3) =9, means cost of connecting the city 3 to 4 is same as city 4 to 3 is 9. Then the information about the cities is given below.

TABLE-2

NJ

CITIES	SEASON 1 JOBS(s_1)	SEASON 2 JOBS(s_2)
1	----	-----
2	7	4
3	5	2
4	9	8
5	1	10
6	2	3
7	3	6

The above table – 2 represents the array of jobs assigned to the corresponding Cities of Season **1** and **Season 2** denoted by NJ(i ,s_b) **,** (where b=1,2). The city **1** (headquarter city) has no jobs. i.e. for example NJ (2, s_1) =7, means city '2' has 7th job in season one.

VIII.   CONCEPT AND DEFINITIONS

8.1 Definition of a pattern: An indicator two-dimensional array which is associated the assignment is called a "pattern". A pattern is said to be feasible if X is solution

$$V(X) = \sum_{i \in N} \sum_{j \in N} D(i,j) X(i,j)$$

.The value 2 V(X) gives the total distance travelled by them. In the algorithm, which is developed in the sequel a search is made for a feasible pattern with the least value, each pattern of the solution X is represented by the set of ordered pairs X(i, j)=1, which understanding that the other X(i, j) 's are zeros.

8.2 Feasible Solution:

In the following figure -1, the value in star represents the Head Quarter city, the values in the ellipses represents the cities allotted to above city, the value in the pentagon shape which are at top of the each city represents in first season particular job performed at that city while moving from Head Quarter city to the cities and value in pentagon shape at the bottom of the city represents in second season particular job performed by the agent at particular city while return to the Head Quarter city from that city, the value in the rectangle shape on the both (forward and backward) connected arrows represents the distance between the corresponding cities ,which is same in forward direction and in backward direction ,i.e. distance is symmetric.

Figure-1
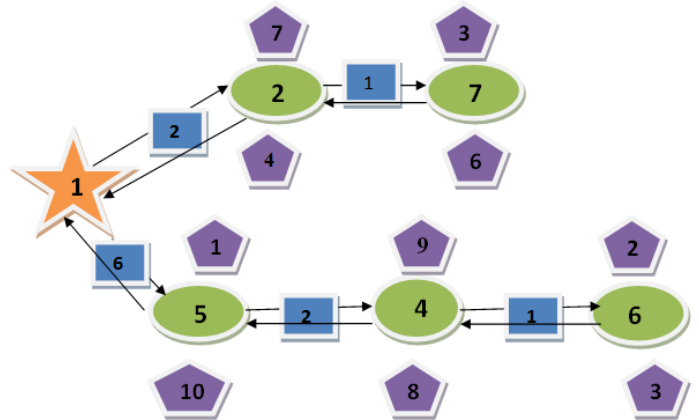
In the above Figure-1, in first path the agent starts his trip at Head Quarter city{ 1} reaches to city 2 and performs the job'7'of season "1", from city 2 he visits the city 7 and performs the jobs '3'of season "1", while return in the same path he performs job '6' of season "2" in city 7, job '4'of season "2" in city 2 and reaches to the headquarter city{1}. In second path another agent visits the city 5 from city 1 and performs the job'1'of season "1", from city 5 he visits to city 4 and performs the job'9' of season "1", from city 4 he visits city 6 and performs the job '2' in season "1",while return in the same path he performs job'3' of season "2"in city 6, job '8' of season "2" in city4 ,job '10' of season "2" in city 5 and reaches to the Head Quarter city . Hence the solution is

Z = D (1, 2) + D (2, 7) + D (1, 5) + D (5, 4) + D (4, 6)
  = 2+1+6+2+1 = 12.

Hence the above feasible solution of X pattern given in table-3, with the ordered pairs set {(1, 2), (2, 7), (1, 5), (5, 4) and (4, 6)} represents the feasible solution.

Table – 3

$$X(i,j) = \begin{bmatrix} 0 & 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

The above table -3 represents a feasible solution. The above solution X (1, 2) =1, represents that city 1 is connected to city 2. In similar way X (1, 5) represents city 1 is connected to city 5 and all the cities are connected to head quarter 1 either directly or indirectly.

IX. ALPHABET TABLE

There are n x n ordered pairs in the two-dimensional array X. For convenience these are arranged in ascending order of their corresponding cost/distance and are indexed from 1,2…. (Sundara Murthy-1979). Let SN= [1, 2, 3…] be the set of indices. Let D be the corresponding array of cost. If a, b $\in$ SN and a < b then D (a) $\leq$ D (b). Also let the arrays R, C be the array of row and column indices of the ordered pair represented by SN and CD be the array of cumulative sum of the elements of D. The arrays SN, D, CD, R, C, for the numerical example are given in the table- 4. If p $\in$ SN then (R (p), C (p)) is the ordered pair and D (a) = D(R (a), C (a)) is the value of the ordered pair and

$$D(a) = \sum_{i=1}^{a} D(i)$$

TABLE-4
Alphabet Table

SN	D	CD	R	C
01	1	1	4	6
			6	4
02	1	2	2	7
			7	1
03	2	4	1	2
			2	1
04	2	6	4	5
			5	4
05	3	9	1	6
			6	1
06	3	12	3	7
			7	3
07	4	16	2	3
			3	2
08	4	20	6	7
			7	6
09	5	25	1	4
			4	1
10	5	30	5	6
			6	5
11	6	36	1	5
			5	1
12	6	42	4	7
			7	4

13	7	49	2	4
			4	2
14	7	56	1	7
			7	1
15	8	64	1	3
			3	1
16	8	72	3	5
			5	3
17	9	81	3	4
			4	3
18	9	90	5	7
			7	5
19	10	100	2	5
			5	2
20	10	110	3	6
			6	3
21	11	121	2	6
			6	2

Let us consider 11 SN. It represents the ordered pair (R (11)), C (11)) = (1, 5) = (5,1). Then D (11) = 6 and   CD (11) = 36.

X.   DEFINITION OF AN ALPHABET - TABLE AND A WORD

Let SN = (1,2,…) be the set of indices, D be an array of corresponding costs of the ordered triples and CD be the array of cumulative sum of elements in D. Let arrays R, C be respectively, the row and column of the indices of ordered pairs. Let L_k = {a_1, a_2, - - -- - a_k}, a_i ∈ SN be an ordered sequence of k indices of SN. The pattern represented by the ordered pair whose indices are given by L_k is independent of the order of a_i in the sequence. Hence for uniqueness the indices are arranged in the increasing order such that $a_i \leq a_{i+1}$, i = 1, 2, - - - -, k-1. The set SN is defined as the "Alphabet-Table" with alphabetic order as (1, 2, - - - -, n^2) and the ordered sequence L_k is defined as a "word" of length k. A word L_k is called a "sensible word". If $a_i < a_{i+1}$, for i =1, 2, - - - -, k-1 and if this condition is not met it is called an "insensible word". A word L_k is said to be feasible if the corresponding pattern X is feasible and same is with the case of infeasible and partial feasible pattern. A Partial word L_k is said to be feasible if the block of words represented by L_k has at least one feasible word or, equivalently the partial pattern represented by L_k should not have any inconsistency.

Any of the letters in SN can occupy the first place in the partial word L_k. Our interest is only in set of words of length almost equation, since the words of length greater than **n** are necessarily infeasible, as any feasible pattern can have only **n** unit entries in it. If k < n, L_k is called a partial word and if k = n, it is a full length word or simply a word. A partial word L_k represents, a block of words with L_k as a leader i.e. as its first k letters. A leader is said to be feasible, if the block of word, defined by it has at least one feasible word.

10.1 Value of the Word:

The value of the (partial) word L_k, V (L_k) is defined recursively as V (L_k) = V (L_{k-1}) + D (a_k) with V (L_k) = 0, where D (a_k) is the cost array arranged such that D (a_k) < D (a_{k+1}). V (L_k) and V(x) the values of the pattern X will be the same. Since X is the (partial) pattern represented by L_k (Sundara Murthy – 1979).

Consider the partial word L_4 = (01, 02, 03, 04 (1))
Then V (L_4) = 1+1+2+2 = 6.

10.2 Lower bound of a partial word LB (L_k):

A lower bound LB (L_k) for the values of the block of words represented by L_k= (a_i, a2,….a_k)   can be defined as follows.
LB (I) = V (I)+CD[J + NA -I] – CD [J]
For Example: consider for the above partial word as follows
LB (4) = 6 + CD [4 + 5- 4] – CD [4]
LB (4) = 6+3 = 9

10.3.Feasibility criterion of a Partial Word:

An algorithm was developed, in order to check the feasibility of a partial word $L_{k+1} = (a_1, a_2, - - - -- a_k, a_{k+1})$ given that L_k is a feasible word. We will introduce some more notations which will be useful in the sequel.

> **IR** be an array where IR (i) = 1, i $\in$ N indicates that the sales man is visiting some city from city i Otherwise IR (i) = 0

> **IC** be an array where IC (i) = 1, i $\in$ N indicates that the sales man is coming to city i from another city, otherwise IC (i) = 0

> **SW** be an array where SW (i) = j indicates that the sales man is visiting city j from city i, Otherwise SW (i) = 0

> **L** be an array where L[i] = α_i, i $\in$ N is the letter in the ith position of a word.

The values of the arrays L, IR, IC and SW are as follows

IR (R (a$_i$)) = 1, i = 1, 2, - - - - - , k and IR (j) = 0 for other elements of j

IC (C (a$_i$)) = 1, i = 1, 2, - - - - - , k and IC (j) = 0 for other elements of j

SW(R (a$_i$)) = C (a$_i$), i = 1, 2, - - - , k and SW (j) = 0 for other elements of j

L (i) = a$_i$, i = 1, 2, - - - - -, k, and L (j) = 0, for other elements of j.

For example consider a sensible partial word $L_5 = (1, 2, 3, 4(1)$ and $11)$ which is feasible. The array L, IR, IC and SW takes the values represented in table – 5 given below.

Table – 5

	1	2	3	4	5	6	7
L	1	2	3	4(1)			
IR	1	1		1	1		
IC		1		1		1	1
SW	2	7		6	4		

The recursive algorithm for checking the feasibility of a partial word L_p is given as follows. In the algorithm first we equate IX = 0. At the end if IX = 1 then the partial word is feasible, otherwise it is infeasible. For this algorithm we have IR = R (a$_{p+1}$) and IC = C (a$_{p+1}$)

XI.   ALGORITHMS

11.1.Algorithm-1

STEP 0 :   IX = 0

STEP 1 :   IS IR = HC   IF YES {PA = PA+1} GO TO 2
                                               IF NO GO TO 3

STEP 2 :   IS PA >2   IF YES GO TO 12
                                               IF NO GOTO 4

STEP 3 :   IS IR (TR) = 1   IF YES GO TO 12
                                               IF NO GO TO 4

STEP 4 :   IS IC (TC) = 1   IF YES GO TO 12
                                               IF NO GOTO 5

STEP 5 :   W = TC   GO TO 6

STEP 6 :   IS SW (W) = 0   IF YES GO TO 9
                                               IF NO GO TO 7

STEP 7 :   IS W = TR   IF YES GO TO 12
                                               IF NO GO TO 8

STEP 8 :   S W=SW (TC)   GOTO 6
                                               IF NO GO TO 11

STEP 9 :   CJ $\geq$ m – 2 (p-1)   IF YES GO TO 10
                                               IF NO GO TO 12

STEP 10:   RJ = m-CJ
                 Z = P – PA
                 IS RJ $\leq$ 2Z   IF YES GO TO 11
                                               IF NO GO TO 12

STEP 11:   IX = 1
STEP 12   :   END.

We start with the partial word $L_1 = (a_1) = (1)$. A partial word L_k is constructed as

$L_k = L_{k-1} *$ Where * indicates chain formulation. We will calculate the values of V (L_k) and LB (L_k) simultaneously. Then two situations arises one for branching and other for continuing the search.

1. LB (L_k) < VT. Then we check whether L_k is feasible or not. If it is feasible we proceed to consider a partial word of under (k+1). Which represents a sub-block of the block of words represented by L_k? If L_k is not feasible then consider the next partial word p by taking another letter which succeeds a_k in the position. If all the words of order p are exhausted then we consider the next partial word of order (k-1).

2. LB (L_k) ≥ VT. In this case we reject the partial word L_k. We reject the block of word with L_k as leader as not having optimum feasible solution and also reject all partial words of order p that succeeds L_k.

11.2. Lexi-Search Algorithm:

STEP 0 : (initialization): The arrays SN, D, CD, R, C, N, JX, CJ,NA, NN, K and Z the values are made available and IR, IC, L, V, LB, PA,SUM1,SUM2 and SW are initialized to zero. The values I=1, J=0, P=3, m = 8, VT =999, MAX=NZ-1.

STEP1: J_1= FW	IF YES GO TO 2	
	IF NO GO TO 2A	
STEP 2: J=J +1	IF YES GO TO 21	
IS J> MAX	IF NO GO TO 3	
STEP 2A: J_1=RW		
TR = C (J)		
TC = R (J)	GO TO 4	
STEP 3: L (I) =J		
IR = R (J)	GO TO 4	
IC = C (J)		

STEP 4: V (I) = V (I-1) + D (J)   GO TO 5

STEP 5: NA(TR) = NA (TR) +1
              NA (TC) = NA (TC) +1   GO TO 6

STEP 6: IS NA (i) =1, (i= 1,2,…n)   IF YES (SUM1 = SUM1 +1) GO TO 7
                                                                          IF NO (SUM1 = SUM1) GO TO 7

STEP 7: NN = SUM1   GO TO 8

STEP 8: JB (NJ (i,1)) = JB (NJ (i,1)) +1
              JB (NJ (i,2)) = JB (NJ (i,2)) +1
              JB (NJ (j,1)) = JB(NJ (j,1)) +1
              JB (NJ (j,1)) = JB (NJ (j,1)) +1   GO TO 9

STEP 9: IS JB (JX) =1, (JX = 1,2,3….q)   IF YES (SUM2 = SUM2 +1) GO TO 10
                                                                          IF NO (SUM2 = SUM2) GO TO 10

STEP 10:	IS CJ = SUM2	GO TO 11
STEP 11:	NA = NA$_0$ +Z-1	GO TO 12
STEP 12:	IS CJ+2 (Z-1) < m	IF YES GO TO 13
		IF NO GO TO 2
STEP 13:	K = m – CJ +2(Z-1)	IF YES GO TO 15
	IS K = 0	IF NO GO TO 14
STEP 14:	IS K = EVEN	IF YES NA = NA +K/2 GO TO 15
		IF NO NA = NA +(K+1)/2 GO TO 15

STEP 15:   LB (I) = V(I)+DC[J + NA -I] – DC (J)   IF YES GO TO 21
                       IS LB (i) ≥ VT   IF NO GO TO 16
STEP 16:   (CHECK FEASIBILITY BY USING ALGORITHM)
                       IS IX=0   IF YES GO TO 17
                                                                  IF NO GO TO 24
STEP 17:   NA(TR) = NA (TR) - 1
                       NA (TC) = NA (TC) - 1   GO TO 18
STEP 18:   IS NA (i) =1, (i= 1,2,…n)   IF YES (SUM1 = SUM1 - 1) GO TO 19
                                                                  IF NO (SUM1 = SUM1) GO TO 19
STEP 19:   NN = SUM1   GO TO 20

```
STEP 20:        JB (NJ (i,1 )) = JB (NJ (i,1 )) - 1     ⎫
                JB (NJ (i,2 )) = JB (NJ (i,2 )) - 1     ⎪
                JB (NJ (j,1 )) = JB (NJ (j,1 )) - 1     ⎬
                J B(NJ (j,1 )) = JB (NJ (j,1 )) - 1     ⎪      GO TO 21
STEP 21:        IS JB (JX ) =1, (JX = 1,2,3….q)         ⎭ IF YES (SUM2 = SUM2 - 1 ) GO TO22
                                                          IF NO (SUM2 = SUM2 ) GO TO 22
STEP 22:        IS CJ = SUM2                              GO TO 2
STEP 23:        L (I) = J
                IC (TC) = 1
                SW (TR) = TC
                IS IR (TR) = HC                          IF YES ( PA = PA+1)      GOTO 24
                                                         IF NO ( IR (TR) =1)  GO TO 24
STEP 24:        I=I+1                                    GO TO 25

STEP 25:        IS I = NN – 1                            IF YES GO TO 26
                                                         IF NO GO TO 2
STEP 26:        IS PA = P                                IF YES GO TO 27
                                                         IF NO GO TO 2
STEP 27:        IS SUM2 = m                              IF YES GO TO 28
                                                         IF NO GO TO 2


STEP 28:        L (I) = J
            L (I) IS FULL LENGTH WORD AND IS FEASIBLE                        ⎫
            VT = V (I), RECORD L (I), VT                       GO TO 29      ⎬
STEP 29:        I=I-1                                                        ⎭  GO TO 30

STEP 30:        IS I=1                                    IF YES GO TO 32
                                                          IF NO GO TO   31
STEP 31:        J= L (I)
                TC = C (J)
                TR = R (J)
                IC (TC) = 0
                SW (TR) = 0                               IF YES (PA = PA-1) GO TO 17
                IS IR (TR) = HC                           IF NO (IR (TR) = 0) GO TO 17
STEP 32:        STOP
```

XII. SEARCH-TABLE

The working details of getting an optimal word using the above algorithm for the illustrative numerical example is given in the Table – 6. The columns named (1), (2), (3),…, gives the letters in the first, second, third and so on places respectively. The columns R, C gives the row, column indices of the letter. The last column gives the remarks regarding the acceptability of the partial words. In the following table A indicates ACCEPT and R indicates REJECT.

TABLE-6
Search Table

SN	1	2	3	4	5	V	LB	R	C	CJ	REM
1	1					01	06	4	6	4	A
2		2				02	09	2	7	7	A
3			3			04	09	1	2	7	A
4				4		06	09	4	5		R
5				4(1)		06	09	5	4	8	A
6					05	09	09	1	6		R
7					05(1)	09	09	6	1		R
8					06	09	09	3	7		R
9					06(1)	09	09	7	3		R

10					07	10	10	2	3		R
11					07(1)	10	10	3	2		R
12					08	10	10	6	7		R
13					08(1)	10	10	7	6		R
14					09	11	11	1	4		R
15					09(1)	11	11	4	1		R
16					10	11	11	5	6		R
17					10(1)	11	11	6	5		R
18					11	12	12VT	1	5		A
19				05		07	10	1	6		R
20				05(1)		07	10	6	1		R
21				06		07	11	3	7		R
22				06(1)		07	11	7	3	8	A
23					07	11	11	2	3		R
24					07(1)	11	11	3	2		R
26					08(1)	11	11	7	6		R
27					09	12	12	1	4		R,=VT
28				07		08	12	2	3		R,=VT
29			3(1)			04	09	2	1		R
30			4			04	10	4	5		R
31			4(1)			04	14	5	4		R,>VT
32		2(1)				02	09	7	2	7	A
33			3			04	09	1	2		R
34			3(1)			04	09	2	1		R
35			4			04	10	4	5		R
36			4(1)			04	10	5	4	8	A
37				5		07	10	1	6		R
38				5(1)		07	10	6	1		R
39				6		07	11	3	7		R
40				6(1)		07	11	7	3		R
41				7		08	12	2	3		R,>VT
42			5			05	12	1	6		R,>VT
43		3				03	08	1	2	6	A
44			4			05	08	4	5		R
45			4(1)			05	08	5	4	8	A
46				5		08	08	1	6		R
47				5(1)		08	08	6	1		R
48				6		08	08	3	7		R
49				6(1)		08	08	7	3		R
50				7		09	09	2	3		R
51				7(1)		09	09	3	2		R
52				8		09	09	6	7		R
53				8(1)		09	09	7	6		R
54				9		10	10	1	4		R
55				9(1)		10	10	4	1		R
56				10		10	10	5	6		R
57				10(1)		10	10	6	5		R
58				11		11	11VT	1	5		A
59			5			06	09	1	6		R
60			5(1)			06	09	6	1		R
61			6			06	10	3	7		R

62			6(1)			06	10	7	3		R
63			7			07	16	2	3	7	R,>VT
64		3(1)				03	08	2	1		R
65		4				03	09	4	5		R
66		4(1)				03	09	5	4	6	A
67			5			06	09	1	6		R
68			5(1)			06	09	6	1		R
69			6			06	10	3	7		R
70			6(1)			06	10	7	3		R
71			7			07	11	2	3		R,=VT
72		5				04	11	1	6		R,=VT
73	1(1)					01	06	6	4	4	A
74		2				02	09	2	7	7	A
75			3			04	09	1	2	7	A
76				4		06	09	4	5	8	A
77					5	09	09VT	1	6		A
78				4(1)		06	09	5	4		R,=VT
79			3(1)			04	09	2	1		R,=VT
80		2(1)				02	09	7	2		R,=VT
81	2					01	08	2	7	4	A
82		3				03	08	1	2	4	A
83			4			05	08	4	5	8	A
84			5			08	08	1	6		R
85			5(1)			08	08	6	1		R
86			6			08	08	3	7		R
87			6(1)			08	08	7	3		R
88			7			09	09	2	3		R,=VT
89		4(1)				05	08	5	4	8	A
90			5			08	08	1	6		R
91			5(1)			08	08	6	1		R
92			6			08	08	3	7		R
93			6(1)			08	08	7	3		R
94			7			09	09	2	3		R,=VT
95			5			06	13	1	6	5	R,>VT
96		3(1)				03	08	2	1		R
97		4				03	09	4	5	8	R,=VT
98	2(1)					01	08	7	2	4	A
99		3				03	08	1	2		R
100		3(1)				03	08	2	1		R
101		4				03	09	4	5		R,=VT
102	3					02	10	1	2		R,>VT

The above table – 6, gives optimal solution of the taken numerical example. The search table has an optimum solution VT is 09. It is in the 77th row of the search table.

At the end of the search table the optimum solution value of VT is 09 and the optimal feasible word L_5 = {1(1),2,3,4,5}.The following figure-2, represents the optimal solution to the network.

Figure-2
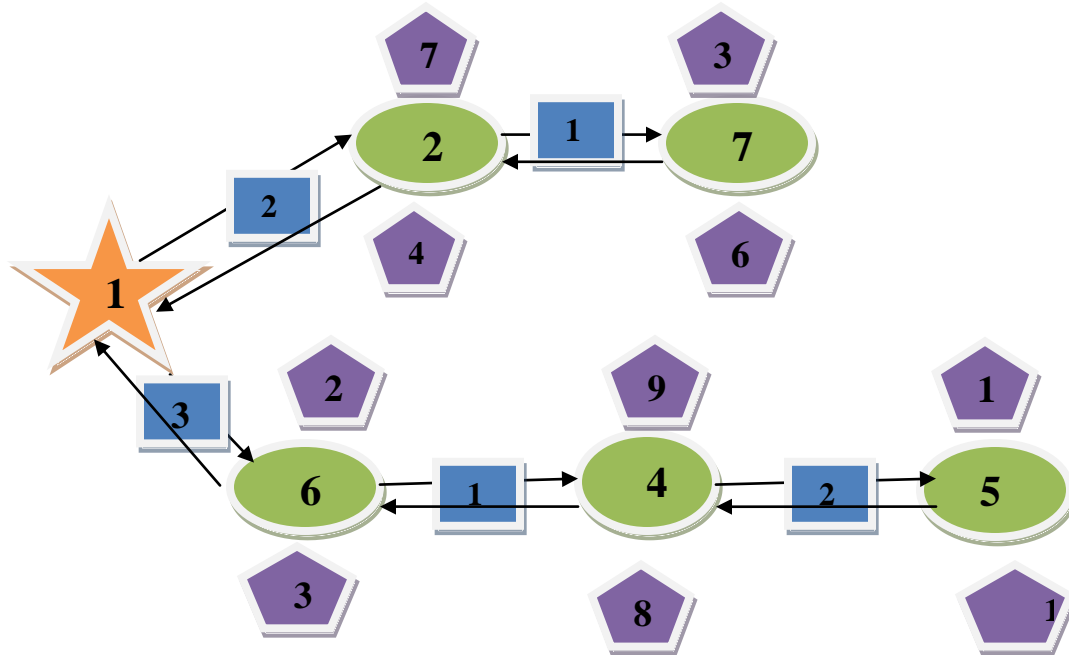
In the above Figure-2, in first path the agent starts his trip at Head Quarter city{ 1} reaches to city 2 and performs the job'7'of season "1", from city 2 he visits the city 7 and performs the jobs '3'of season "1", while return in the same path he performs job '6' of season "2" in city 7, job '4'of season "2" in city 2 and reaches to the headquarter city{1}. In second path another agent visits the city 6 from city 1 and performs the job'2'of season "1", from city 6 he visits to city 4 and performs the job'9' of season "1", from city 4 he visits city 5 and performs the job '1' in season "1",while return in the same path he performs job'10' of season "2"in city 5, job '8' of season "2" in city4 ,job '3' of season "2" in city 6 and reaches to the Head Quarter city . Hence the solution is

Z = D (1, 2) + D (2, 7) + D (1, 6) + D (6, 4) + D (4, 5)
  = 2+1+3+1+2 = 9.

XIII. CONCLUSION

In this chapter we developed a Lexi-search algorithm to solve

P-AGENTS SEASONAL JOB COMPLETION MODEL by a suitable numerical example. Lexi-search algorithm using pattern recognition technique is used to get an optimum solution. A numerical example developed to understand the concepts and the steps involved in the algorithms. Lexi – search algorithm are proved to be more efficient in many combinatorial problems. I suggest that these algorithms can perform larger size problems also.

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AUTHORS

First Author – Soma Sekhar Srinivas V.K, Dept. of Mathematics, S. V. University, Tirupati, Andhra Pradesh, India., Email:somasekharsrinivas@gmail.com

Second Author – Suresh Babu.C, Dept. of Mathematics, S. V. University, Tirupati, Andhra Pradesh, India. , Email: suresh8044@gmail.com

Third Author – Madhu Mohan Reddy. P, Dept. of Mathematics, S. V. University, Tirupati, Andhra Pradesh, India. , Email: mmrphdsv@gmail.com

Cultural Traditions and Practices of the Parents as Barriers to Girl-child Education in Zamfara State Nigeria

Ahmad Kainuwa[*], **Najeemah Binti Mohammad Yusuf** [**]

[*] M.Ed. Sociology of Education Candidate, School of Educational Studies, Universiti Sains Malaysia
[**] Deputy Dean (Student Development and JIM), School of Educational Studies, Universiti Sains Malaysia

Abstract- This conceptual paper titled the cultural traditions and practices of the parents as barriers to girl-child education in Zamfara state Nigeria, aimed at enumerating cultural activities of the parents in the study area that prevent them from sending their girl children to school. The paper reviews literature on how cultural traditions practiced by the parents affect the education of their girl children. The paper also examines the negative role of parents' cultural traditions and practice on the Educational process of their girl children. The study reveals that cultural practices serve as hindrance to girl-child education and that inaccessibility of the girl-child to education makes her vulnerable to diseases such as HIV/AIDS, early marriage, denial of rights and child labor. In addition, studies and researches from the previous works of scholars relating to the factors militating against girl-child education were also analyzed and discussed throughout the paper. The discussion in the paper is base on theoretical framework of ecological model of Bronfenbrenner's theory. This theory is appropriate for the study because it allows the reader to understand how girl-child education is seriously hampered by the cultural traditions of their parents. Finally, Suggestions for parents on how to modernize this cultural traditions and practice to help in the Educational process of their children were presented. Conclusions from the literature were drawn, and the paper concludes that Parents' cultural practice and tradition serve as barriers to girl-child education in Zamfara State Nigeria.

Index Terms- Cultural and traditional practice, girl-child, educational process, parents, Zamfara State, Nigeria.

I. INTRODUCTION

Education is the right of every girl everywhere and also the key to transforming both the life of girl and the life of her community. Girls without education are denied the opportunity to develop their full potential and to play a productive and equal role in their families, their societies, their country and their world at large. One of the most important tools available to empower women within the family and within society is education. In addition, educating girls has cascading benefits. Literate and educated women are less likely to die in childbirth; more likely to have smaller, healthier and better educated families; and better able to protect their families and themselves from HIV/AIDS, trafficking and other forms of violence (Unicef 2009). Despite all these facts, in Zamfara state girls continue to be locked out of school and locked into inequality due to cultural traditions and

practice of the parents. The cultural and societal obstacles that girls face in Zamfara state are huge. Other barriers to quality Education include poverty, poor quality education, child labor, child trafficking, HIV/AIDS, remote geographic location, inadequate infrastructure, discrimination, mother's lack of education civil inflict, natural disasters, and violence. United Nations Secretary-General Kofi Annan (2005) has clearly identified girl's education as an urgent development priority for the entire UN system where he is reported to have said that:

*"If we are to succeed in our efforts to build a healthier, more peaceful and equitable world, classrooms must be full of girls as well as boys. By educating girls, we will help raise economic productivity and reduce both maternal and infant mortality. By educating girls, we will improve nutrition, promote health, and fight HIV/AIDS. By educating girls, we will trigger a transformation of society as a whole—social, economic and political." (*Video message to the Conference on Gender Parity in Education, Washington, D.C., 2 March 2005)

II. BACKGROUND

The greatest enemy and greatest evil which keep people in darkness, bound to their traditions and superstitions is illiteracy; It also makes people resistant to change and new ideas and isolated from progress, thus unaware and incapable of meeting the demands of their changing environment and ever progressing world (Nasution in Omolewa1985). Today, girl-child education is a matter of concern for nations in the world. Girl-children are discriminated against thereby making it difficult for them to exercise their rights; they are victims of various traditional and cultural practices, they suffer degradation, they are objects of poverty, their faces are only to be seen but their voices not to be heard, they are seen as being sub-servient to their male counterparts; they are the inferior set, their place is in the kitchen. A number of negative thoughts and actions are expressed on the girl-child. To set the girl-child free from all these negative hold, there is need for her sound education. Giving her education will give her sound mind to reason, to liberate her from poverty, and develop her as well as the nation in which she lives. With education, the girl child can become a self-sufficient adult who has more decision and control over her life. Jatau in Esomonu (1999) believes that the burden of nation building rests much on women. She goes on "we need women to create a blissful home, have well-educated and well-behaved children…. it is after these that the task of nation building can be a success". This will start from the education of the girl-child. The

importance of educating the girl-child is further brought to the fore by Abacha (1997) while stating his view to support the fact that development has to be participatory and sustainable. He believed that "Progress is only feasible if we create a Nigeria made up of a united people with a united purpose… our nation needs men and women who are bold, and imaginative, dedicated and committed, people who put honor, service and patriotism above everything else. These men and women are not only needed in politics, they are also needed in business, in our traditional institutions, youth organizations, in academics and other professions".

The above statement indicated that, society should stop looking down on women and they should be seen as first-class citizen and not rated as second-class citizens. Through education the girl-child (who transforms later into a woman) will be empowered to be strong and resourceful in such a way that she is able to contribute maximally to the sustenance and development of the society in which she lives. According to Alkali (2000) cited in Adedokun & Olufunke M. (2010) if all limiting barriers against women are removed, "women can lead, lead to the battle, and if necessary fight for her society and win for her people". Educating a girl child therefore will bring about self-awareness, increased self assertiveness in the society, raising the consciousness of women to encourage their participation in national development (Awe 1992, cited in Adedokun & Olufunke M. 2010). Paying particular and close attention is therefore important, to the education of the girl-child. Finding the right solution to the issue of girl-child education will not only move the girl-child forward but pushes the nation to a greater height. Considering the virtues embedded in the issue of girl child education, the issue should be rated very high.

III. THEORETICAL PERSPECTIVES

The study is based on ecological theory of Bronfenbrenner. Unlike various development theories that place emphasis on the nature and nurture interaction in the development of children, Bronfenbrenner's ecological system theory looks at the child's environment in terms of its quality and context. According to Bronfenbrenner, the interaction within these environments becomes more complex for a child when he develops. The arising of this complexity depends on the growing and maturation of child's physical and cognitive structures. So, given that nature continues on a given path, how does the world that surrounds the child help or hinder continued development?"

The ecological model of Bronfenbrenner's theory attempts to explain the differences in individual's knowledge, development and competencies through the support, guidance and structure of the society in which they live. In this regard therefore, children's education depends largely on the support, guidance and structure of the society which has to do with cultural Traditions and practice of their parents. In many cases the education of children is linked with the cultural Tradition and practice of their parents who are said to be the microsystem according to ecological theory. Many a times cultural traditions and practice of the parents used to contradict the Western system of education as a result they may serve as barriers to its effectiveness.

IV. AIMS AND OBJECTIVES OF THE STUDY

The main aim of this study is:

1. To define the term 'Girl-child' and identify the rights of Girl-child according to the Human rights organization.

2. To identify and review existing research on cultural traditions and practice of the parents that served as barriers to girl-child education

3. To identify the current range of information and findings related to cultural traditions and practice of the parents against girl-child education.

4. To provide some recommendations on the importance of Girl-child education.

V. LITERATURE REVIEW

TRADITION, GENDA AND CULTURE BARRIERS TO GIRL CHILD EDUCATION

Zamfara state is culture enveloped and tradition friendly especially when it pertains to the female sex "women should seen not heard" which gives them a perpetual position in the kitchen. The world belongs to the men folk. These are some of the humiliating traditional sayings directed to females. Right from the onset the traditional Zamfaras's placed girls and females in a domestic servant status where they perform such duties such as farm works, fetch firewood, cook for the family and do petty trading to sustain their families and given out early in marriage, while the boy child go to school just because of the cultural traditions and practice of the parents. In agreement with the above observation, Sperling (2005) cited in Angela O. (2011) reported that rightly or wrongly impoverished parents often feel they need their girl-child" labor for additional income, just to help with the grueling requirements of life… Records have it that two thirds out of 13 million children around the globe poorest nations who don't have access to school is girls (UNICEF, 2007). Sperling (2005) also went further that 60% of girls in an estimated population of 110 million children in the developing world, where Nigeria is one will not have the opportunity of entering school while the few girls enrolled will drop-out. This emerging scene is a thing of concern. This is not only in Zamfara State of Nigeria.

A study in 1996 in Niger discovered that only 12% of girls in the rural areas were enrolled in primary school against 83% of girls' enrolment in the urban city (Phi 2005 as in Angela O. 2011). The current humiliating child-trafficking trend has a high percentage of primary school age girls. This unwelcome idea has kept many girls out of school, since their parents prefer to use them as a pledge for loan. On the other hand, once girls gain access to schools, however, they may experience both direct physical threats and more subtle assaults on their confidence, self esteem and identity (Pigozzi, 2002 in Angela O. 2011). The journey to school may be unsafe, since many girls experience harassment and physical attacks either on public transpiration in urban areas or remote part in rural areas. In some cases extreme physical assault, including rape may be perpetuated against girls at school. The threats that come in the form of unequal treatment, harassment, bullying and undervaluing girls harm them in profound and long lasting ways in terms of school attendance.

VI. WHO IS A GIRL-CHILD?

For the purpose of this paper, a girl-child can be seen as female children between the ages of 6 and 15. These categories of children are expected to have free access to the free Federal Government provided Universal Basic Education in Nigeria. Kofi Annan (2001) said in respect of Girl-Child Education that "No development strategy is better than one that involves women as central players. It has immediate benefits for nutrition, health, savings and re-investment at the family, community and ultimately, country level. In order words, educating girls is a social development policy that works. It is a long-term investment that yields on exceptionally high return".

The above statement represents a call for girl-child education. It is however, discovered that girl-child education is not easy to come by as it is usually proclaimed as many impediments stand in the way of the girl-child. The rights of the girl-children are always being denied and this denial leads to lack of access to education. Inaccessibility to education thus results in child labor, which deprives the girl-child of her childhood potentials, dignity and joy. The resultant effect is poverty and the only key to ending poverty among women-folk, as a whole is education of the girl-child because as the saying goes "catch them young" for the young girl-child will grow to full woman in later years.

VII. RIGHTS OF THE GIRL-CHILD

According to Adedokun and Mery Olufunke (2010), every individual in the society is entitled to some rights as citizens of that particular society. The same is true of the girl-child. She is entitled to a lot of human rights but because she is regarded as being weak she is vulnerable to the violations of these rights. Like any other person in the society, she likewise requires the right to enjoy and exercise these rights. Some of the rights of the girl-child as stated by The People's Movement for Human Rights Education (www.humanrights/girledu...) include the following:-

-Right to freedom from discrimination based on gender, age, race, color, language, ethnicity or the status of the girl-child's parents.-

-Right to a standard of living adequate for a child's intellectual, physical, moral and spiritual development.-

-Right to a safe and healthy environment-

-Right to equal access to food and nutrition.-

-Right to freedom from cultural practices, customs and traditions harmful to the girl-child including female genital mutilation.-

-Right to education- free and compulsory primary education and freedom from all types of discrimination at all levels of education. Linked with the above rights is the right to information about health, sexuality and reproduction, protection form physical and mental abuse.

VIII. SOCIO-CULTURAL BARRIERS

Jane Butigah Atayi (2008) observed that Parents' demand for the education of their daughters is low, reflecting both cultural norms and girls' work in and around the home. This is worsened by cultural perceptions of girls as child minders, marriage material and a burden to the family. Some parents decided in many cultures that, education is not worthwhile for their daughters who will move into their husbands' families when they marry and that the gains in productivity or income due to education will accrue to the families of the sons-in-law rather than to them. In other societies parents only educate their daughters with high bride price in mind because the more education a girl has, the higher the bride price payable. 'Literate and academically trained parents are more likely than illiterate and traditionally trained ones to enroll their daughters in school; and at the same time regions with the highest proportions of traditions and cultures and also highest proportion of illiterate adults are therefore those with the widest gender gaps.' It has been further documented that 36 percent of children whose mothers have no education are out-of-school compared to 16 percent for children of mothers with some education in Uganda (Atayi 2008). Demographic surveys across the developing world show that a significant percentage of girls get married by the age of fifteen and with very few exceptions, marriage ends their schooling. Conducting a research on disabling barriers to girl's primary education in Aura District (Uganda) Atayi further said that "Although teenage pregnancy has substantially declined from 43% in 1995 to the current level of 31%, Uganda has the highest teenage pregnancy rate in Africa south of the Sahara and these pregnant teenagers usually drop out of school either by themselves or the school forces them to, while others are forced into early marriage. This adds to the vicious cycle of maternal illiteracy – diminishing the chance of daughters' schooling". Other studies also show that maternal illiteracy is a far more significant factor than paternal illiteracy in depriving girls of schooling (Challender 2005, Chimombo 2005:133-134, UNESCO 2005b, W.B.2003).

In many countries traditional cultural practices strongly impact girls' enrolment. Where family resources are limited, families tend to place the highest priority on educating boys, recognizing them as future heads of household. Where girls are enrolled, they often face many more barriers to learning than boys do. For example, given the paucity of adequate day-care centers throughout much of the developing world and high levels of women's participation in the informal and formal labor markets, it is not uncommon for young girls to have to bring younger siblings to school with them, disrupting not only their own studies but those of other children (Leach 2003:75). Moreover, studies have revealed that on average, girls are likely to have far less time available after school to study. They typically have to assume a multitude of household chores including cooking, cleaning and even serving as a principal caregiver for younger siblings—responsibilities that boys are virtually never expected to assume (M. Ward, & Penny, A 2003). This study found that these competing demands on girls' time had translated into relatively poorer academic performance than their male counterparts, often leading to high repetition and, ultimately, higher dropout rates. In addition, socio-cultural norms promulgating early marriage and childbirth cut short if not preclude girls' education in many countries. In many countries, girls who become pregnant (out of wedlock) are not permitted to return to school although no equal sanction is borne by the fathers of such children. Considering that one in five pregnancies in Africa occurs among teenagers aged 13-19 and that more than

50 percent of girls are married before the age of 18, these norms become significant obstacles on girls' path to education.

IX. CULTURAL TRADITIONS AND PRACTICE OF THE PARENTS

In Zamfara state like many other part of the world inaccessibility, low participation, withdrawal and dropping out of girl children's from schools is attributed to many factors of cultural traditions and practices of the parents towards the education of their daughters, prominent among these factors are: socio-cultural beliefs, customs, early marriage, pregnancy, insecurity, harassment, employment in domestic markets, personal engagement, parental services and other traditions practiced by the parents; and also the female students' own decisions to drop-out of schools (UNESCO, 2002).

Another contributing factor influencing cultural traditions and practices of the parents on girl-child education is the initiation ceremonies which still mark the transition from childhood to adulthood among communities in Sub-Saharan Africa Zamfara inclusive. Evidently lot of confusion and dilemmas faced by girl-children were created by attending ceremonies more especially when the schedules of such ceremonies overlap with the school calendar and that leads to absenteeism and dropouts. Although, communities accept the girls as adults, teachers or schools continue to consider them as children. Sometimes they may be punished for not participating in some activities which adults do not normally participate in. Traditionally, initiated girls may also feel it difficult to continue schooling after passage to adult hood as the next step is expected to be marriage (UNESCO, et al, 2002).

Among the other cultural constrains on girl-child education that creates similar dilemmas to those who pass-through initiation ceremonies is Circumcision. Normally Circumcised girl-children become negative influences on their uncircumcised peers and perceive themselves as adults and as a result of this become rude to teachers and often reject schools as institutions for "children" by exhibiting abnormal behaviors of frequent absenteeism and reduced performance which leads them to drop out from schools and eventually to marry (Ghaghara, 1993). According to Njau and Wamahiu (1998) circumcision functions to enhance the social status of teenagers and acts as a mechanism for curbing female sexuality and premarital pregnancy, with the help of payment of bride price and early marriage which emphasized female virginity before marriage, these practices were perceived to increase economic returns to the family through bride wealth. Security and the needs for physical safety or protection are traditions that often demand special concern for girls' privacy and social reputation (Herz et al., 1991; Njauand Wamahiu, 1998). In cultures and traditions where female seclusion is practiced, the impact of that Low Participation of girl-child in schools tradition on girl's enrolment after puberty is substantial. Odaga and Heneveld (1991) indicate that in some rural areas of Mozambique families keep daughters out of schools after their first menstruation and initiation of rituals. In some of the countries, distance from home to school gives rise to issues of special concern for security. Adolescent girls may be victims not only of sexual harassment but also of abduction, after which they are forced to marry their abductors.

A relationship has been found in many countries between late entry of girl's to schools, frequent absenteeism and finally dropping out of school. Girls may start school at the age of 10, since the distance from school may be too great to allow small children without older siblings to walk on their own. At the age of 11 or 12 they are forced to leave school as their parents may be afraid of sexual harassment and abduction (UNESCO, 2002). Girl-child pregnancy and the incidence of dropout are closely related throughout Africa (Njau and Wamahiu, 1998). Usually unwanted, these pregnancies end the schooling of girl-child both though self-withdrawal and national pregnancy policies that ensures the expulsion of girl children from the education system with little or no chance of re-entry. Najau and Wamahiu (1998) argue that it is the societal responses to pregnancy rather than pregnancy per se that push girl-children out of school and hamper their opportunities for educational and career development. They note that in most African countries, school policies and practices are based on the mistaken assumption that the problem of premarital girl-children pregnancy is caused by the pregnants themselves, and to a lesser extent, by their parents. The tendency has been to portray them as easily susceptible to becoming pregnant while still in school and eventually dropping out. Odaga and Heneveld (1995) indicate that fear of pregnancy is another factor for parents to remove their children from schools. They refer to a study in Cameroon where Christian parents were found to marry off their daughters at puberty even if they have not finished primary school for fear of pregnancy. The health implications of teenage pregnancy are another reason for early dropouts. A study in Kenya showed that female students from secondary school who had been pregnant were twice as likely to report poor health as those with no pregnancy history (Yom-i, 1993).

In rural and poor families, the education of girls is often seen as worthy of consideration only up to marriageable levels. One study from Kenya found that, compared with boys, more girls are made to repeat so that they are at least educated enough to find a husband (Kirui, 1982). Surveys of parents of dropouts in India indicate that they withdraw daughters from school when they see education as conflicting with marriage (Nayana, 1985). Similar practices have been reported in Papua New Guinea: In the province of West Sepik, some girls as young as 9 or 10 are promised in marriage and then taken out of school to "insure their protection and to prepare for the event. Others leave their families to live with the family of their betrothed, until they are of marriageable age and this may lead the girl-child to indulge in sexual activities which will eventually course diseases like HIV/AIDS" (Yeoman, 1985). It is therefore, pertinent for the girl-child to be educated to be liberated from the hold of child-labor as well as the scourge of HIV/AIDS and other social ills as faced by the girl-child.

Cultural practices serve as hindrance to girl-child education and that inaccessibility of the girl-child to education makes her vulnerable to diseases such as HIV/AIDS, early marriage, denial of rights and child labor. In his message to, the United Nations International Literacy Day the Secretary-General Banki-moon (2011) explained with a warning that illiteracy undermines efforts to eliminate a host of social ills such as poverty and sickness and threatens the very stability of nations. He said "Illiteracy exacerbates cycles of poverty, ill-health and

deprivation. It weakens communities and undermines democratic processes through marginalization and exclusion. These and other impacts can combine to destabilize societies." The Global Campaign for Education states that seven million cases of HIV could be prevented in the next decade if every child receives an education (UNAIDS 2010).

The international community has made numerous commitments to women's literacy, getting more girls into school, and to ensuring that schools are providing empowering quality education. Yet concrete action to match these commitments and to address the linkage between access to quality education and HIV prevention has been lacking. It is clear that strengthening girls' education is inextricably linked to effective HIV prevention. Indeed, growing evidence points to the fact that education levels are often correlated with factors that substantially lower HIV risk, such as delayed sexual debut, greater HIV awareness and knowledge, and higher rates of condom use.

The Commission on the Status of Women (CSW) has highlighted these links. The agreed conclusions of the 53rd session concluded that there is a clear need to '*strengthen education…..to achieve gender equality and the empowerment of women and ensure women' and girls' rights to education at all levels and the enjoyment of the highest attainable standard of physical and mental health, including sexual and reproductive health……as well as sex education based on full and accurate information in a manner consistent with the evolving capacities of girls and boys, and with appropriate direction and guidance'*. Keeping girls, notably the most vulnerable and marginalized, in school, beyond primary, into secondary is therefore critical as well as ensuring that schools remain safe and empowering spaces for girls and women, where they can learn free from all forms of violence and discrimination. In order to reach the millions of women and girls that are out of school or have never received any formal schooling, it is equally important to diversify women's and girls' educational opportunities throughout life by ensuring their access to quality technical, vocational, literacy and life skills education and training.

To help address these gaps, UNAIDS Accelerated Agenda For Women, Girls Gender Equality and HIV supports access to comprehensive sexuality education for young people, both in school and out of school, that promotes gender equality and human rights and that equips youth with evidence-based knowledge, skills and resources necessary to enable them to make responsible choices about their social and sexual relationships.

X. FINDINGS AND DISCUSSION

The learner who is a customer in the educational industry primarily occupies a prominent place because the school exists mainly for his or her benefit (Igwe, 2002 cited in Angela O. 2011). As such the rate of girl-child enrollment becomes an issue of concern for national development and empowerment of every child. Zamfara state of Nigeria is a typical rural state with almost 50% of the population been illiterates and peasant farmers who are yet to embrace modern birth control measures hence the rapid increase in population of children with majority not having access to basic primary education (NPC 2010).

The findings of this study agree with the World Bank Review Report (1995) which indicates that developing nations have the largest number of children who don't have access to primary education. The report reviews that 72 million out of the 113 million primary schools age 50 children are estimated to be out of school by 2015. In Zamfara state, the finding of this study has revealed a very slow progress in girl-child participation over the years due to cultural traditions and practice of the parents. The enrollment has been in favor of the boys, which is a clear expression of male dominance in academic activities and a rift in the gender issue. UNESCO study (1980) aligns with this study proving that 64% of women in Africa girl-child inclusive, are illiterate and can neither read nor write. UNESCO also noted that in the mid 1980s, fewer than half of school-age girls were enrolled into primary schools. Ejembi (1994 as cited in Angela O. 2011) also discovered that 77.8% of women in Africa got married before 15years of age. This trend should be checked, particularly, in Zamfara State of Nigeria in order not to keep reducing the productive base of the society at large and Zamfara in particular.

The study has also proved that more children enroll in urban than the rural areas. As such government and stakeholders should concentrate more on education development of rural areas in order to benefit children of peasant farmers mostly found in rural areas. A boy-child has no better potential than the girl-child; as such female children should not be discriminated against or treated inferior to their male counterparts. Bridging gender gap would in no small measure increase national output. This is a major goal of (UNESCO's EDI, 2006) that many countries of the world are making commitment to ensure compliance. Following UNESCO Global Monitor (2006) which has reported that, 40% of Sub-Saharan African countries have Gross Intake Rates (GIRs) below 95%, which implies that ordinary access to primary education is still not-realistic, especially for the girl-child. Across sub-Saharan Africa, it is worthy to note that enrollment ratio of the girl child are rising progressively while gender gap is gradually closing up. Yet, countries like Nigeria and Zamfara State in particular are still battling with low enrollment ratios and inability to accommodate all children of primary school age. This assertion is supported by Daily Trust News paper report (Published on Thursday, 29 August 2013 05:00) Written by Shehu Umar, Gusau where he wrote "Zamfara State has over one million out of school children, making it the state with highest number of such children in Nigeria, Director, Junior Secondary Schools of the State Universal Basic Education Board, Alhaji Sani Mailafiya, has said". The writer who was a news man further elaborated in the following words:

"Speaking at an interactive session with stakeholders in Zamfara, Mailafiya said the number of children in school was confirmed through the state's primary education assessment committee". Presenting a paper at the event, chair-man of Kaura Namoda Local Government Area, Alhaji Lawali Liman, said out of the school age children that get access to primary schools, only 50 per cent of them complete their primary education and move to secondary schools". Additionally majority of these children are girls and this may be due to cultural tradition and practice of their parents. However this calls for efforts to expand what is on ground and pave a way for quality.

UNESCO-Global Monitor (2006) has also indicated a likely increase of school-age children by 34million (32%) over the next decade and a significant percentage of the above figure is expected to emanate from Nigeria due to its population explosion in Africa. Zamfara State is well known as a rural state of mostly peasant farmers where archaic customs and practices are still held in a very high esteem in a way that they dictate the trend of event, education is not left out. To buttress compulsory access to education of the girl-child, World Bank Review (2006) also reiterated that education at primary level is no longer considered a casual affair but rather a serious issue that emphasizes the right of every child in every country to be enrolled in primary school. With government solid support, this dream could become a reality.

XI. CONCLUSION

In this paper, an attempt has been made to examine the issues surrounding the girl-child education in Zamfara state Nigeria, more especially cultural traditions and practice of the parents in the area, the rights of the girl-child, and hindrances to girl-child education, the benefits that come to individual girl-child as well as the community and nation through the education of the girl-child. The paper also teaches us that educating the girl-child eradicates poverty, backwardness, diseases and illness in any nation and it promotes personal as well as national development. The paper concludes that Parents' cultural practice and tradition serve as barriers to girl-child education in Zamfara State Nigeria.

Recommendations

In the light of the above importance of educating the girl-child, the following recommendations were made:

-Gender balanced curriculum and education policies should be established. Such curriculum must consider the interest of the girl-child so that she is motivated to learn.

-Girl-child hawking should be stopped through public enlightenment and legislation.-

-Parents should be educated on the values of modern education to the girl-child.

-Awareness should be made to sensitize people on the fact that an end can only come to poverty cycle through educating the girl-child. The reality is that an uneducated girl that marries early also gives her child in marriage very early; so she becomes a grandmother who eventually has to fend for her grand-children who could not be adequately supported by (her daughter) their mother. Thus, the unmerciful cycle of poverty continues.

-Parents should take advantage of the UBE programme and educate their girl-children.-

Government at all levels, NGOs, media houses should be involved in awareness programme on the education of the girl-child.

-Women should be given the opportunity to formulate and help execute policies especially those relating to girls and women.

-The girl-child should be sensitized as to the importance of her being educated so as to fight for her rights.

-The government at all levels should legistlate the rights of the girl-child.

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AUTHORS

First Author – Ahmad Kainuwa, M.Ed. Sociology of Education Candidate, School of Educational Studies, Universiti Sains Malaysia, ahmadkainuwa@yahoo.com

Second Author – Najeemah Binti Mohammad Yusuf (PhD), Deputy Dean (Student Development and JIM), School of Educational Studies, Universiti Sains Malaysia, najineen@usm.my

To Study the Effect of an Intervention Programme on the Opinion of Secondary School Teachers about Disability

Dr. Sangeeta Yadav[*] **and Sunil Kumar**[**]

[*] Principal Drona College of Education, Ravi Nagar, Gurgaon
[**] Asstt. Prof. Drona College of Education, Ravi Nagar, Gurgaon

Abstract- The present study aims to find out the effect of an intervention program on the opinion of secondary school teachers about disability and various disabling conditions of Bhiwani district of Haryana. The study employed pre-test, post-test field experimental design. The data was collected using an opinnonaire. The result revealed a significant positive change in the opinion of senior secondary school teachers after they were exposed to the intervention programme. It clearly indicates a need to provide awareness and information among society about various disabling conditions and the capabilities and potentialities of the disabled to develop positive opinion about the person with disability which is necessary for their inclusion in the society.

Index Terms- Intervention Programme, Awareness, Disability

I. INTRODUCTION

All human beings are endowed with potentialities of one kind or the other, the disabled are no exception. History is replete with examples of many such persons. Asthavakra, severely orthopedically disabled seer, the embodiment of vedic knowledge; Surdas, the famous devotional poet, being totally blind; President Roosevelt, orthopedically handicapped; Stephen Hawking, the world famous scientist confined to wheel chair; Hellen Keller, the deaf-blind who is an inspiration to the disabled all over the world and many more are the shining examples of the potentialities of disabled persons.

It can aptly be said that disabled are differently able. The disabled also walk but with crutches or in wheel chair. The blind also read and write but in Braille. The deaf too speak but the language of signs .But the society places the disabled in a subordinate status and has different opinions about them which range from negative (undesirable) to positive (desirable).The concept and perception of disability is not properly understood by the society even in this century and specially in the society of a developing country like India where majority of the population still lives in villages. People perceive person with disability as being different from the non-disabled person's .Prevailing opinions and attitudes tend to derogate the capabilities of disabled persons. Such opinions are found among family members, employers, community members and disable persons themselves. These opinions and attitudes are responsible for the adjustment, emotional stability and rehabilitation of this population. According to kanan (2000) "the biggest barrier to the rehabilitation of persons with disability is the social barriers". It

is different for most ordinary people to interact on a footing of friendly behavior and equality with people having disability.

Media have great impact upon people. Mass media and visual aids can be used to bring awareness as public tends to absorb the message put forth on the screen and register the idea in their mind for a longer period. Although stray and adhoc efforts have been made from time to time in utilizing public media yet before utilizing these resources it is of greater importance to evaluate the effectiveness of these resources in creating awareness molding and changing the undesirable opinions and reinforcing positive attitude among the families parents and society as a whole.

Despite the researches carried out on the subject and the efforts undertaken by the government and other non-government organizations in creating awareness, providing right and adequate information to persons with disability, parents, families, society and the professionals about various schemes, technologies, availability of services etc., the situation is far from satisfactory. Therefore, the present investigation has been planned to be undertaken.

II. OBJECTIVE

1. To study the opinion of senior secondary school teachers about disability (physical disability, mental retardation and sensory impairments)
2. To design an intervention program to enhance the opinion of senior secondary school teachers about disability.
3. To implement the intervention program i e providing awareness and information to senior secondary school teachers about disability.
4. To study the impact of the intervention programme on the opinion of senior secondary school teachers about disability.

Hypothesis:

Teachers do not hold balanced and positive opinions towards persons with disability.

Design:

The present study employed pre test – post test field experimental design. It involves teachers of senior secondary schools of classes XI and XII, the design has used their operational stages i.e. pre-test, treatment and post-test,

Sample:

The sample for the study consisted of 48 senior secondary school teachers chosen through stratified random sampling technique from Bhiwani District of Haryana state (India).

Tools Used:

An opinionnaire was constructed by the researcher herself to study the opinion of teachers about disability.

III. PROCEDURE OF THE STUDY

The design comprises of three operational stages i.e. pre-testing and post-testing. After the subjects filled the opinionnaire for the first time an intervention program of 15 days, one hour per day was given to them. The intervention program involves interactive approach, lecture, showing video cassettes and playing audio cassettes which are developed by N.C.E.R.T Delhi. Lecture by experts, disseminating booklets and leaflets developed by the investigator and expert talks by DRC teachers followed by discussion regarding necessary information about disabled and various disabling conditions. After the intervention programme a gap of 30 days was given and then the post-test was administered. The same opinionnaire was given to the subjects so that the difference could be observed.

Statistical techniques used:

Chi-square(x^2) test for equality was applied to test the significance of opinions expressed by the respondents.

IV. RESULTS AND DISCUSSION

Results of the present study reveal that the intervention programme has been found to have a significant positive effect to change the opinion of senior secondary school teachers about disability in various aspects i e misconceptions about the disabled, education and training of the disabled, facilities provided to the disabled and miscellaneous items. **.**

V. OPINION OF THE TEACHERS BEFORE THE INTERVENTION PROGRAMME

It can be observed from Table -1 that around 50 percent of the teachers disagree to the statements – disability is a curse, disabled individuals deserve pity, the disabled are burden on family and society, children with disabilities should not be allowed to study in school with non-disabled children, the abilities of the disabled persons cannot be realized even with special training and disabled workers are mostly shirkers and unreliable. Teachers are not unanimous about the opinion that marriage can cure persons with mental deficits. Nearly 50 percent of the respondents are undecided about this statement. inferiority in the disabled persons is the outcome of behavior of family and society. They also show their consensus for the importance of separate counting of the disabled in censuses. Nearly 70 percent of the respondents are of the view that disabled children should be allowed to mix up and play with non-disabled children and parental support and involvement is important in the rehabilitation of the disabled. They also opined that the feeling of

Table -1
CALCULATION OF CHI SQUARE (X'2) WITH REGARD TO
THE OPINION OF TEACHERS IN PRE-TEST
REGARDING DISABILITIES (N =48)

Statements	Agree	Disagree	Undecided	X'2	Level of significance
1 Disability is a curse.	10	22	16	4.5	Not sig.
2 Disabled individuals deserve pity.	10	23	15	5.37	Not sig.
3 The disabled are burden on family and society.	11	23	14	4.57	Not sig.
4 Disabled persons can never work/function like non-disabled.	10	20	18	6.37	Not sig.
5 Disabled individuals can never obtain high positions.	7	18	23	8.37	Not sig.
6 All the disabled children are deficient in intelligence.	9	20	19	4.63	Not sig.

7	Marriage can cure persons with mental deficits.	16	10	22	4.50	Not sig.
8	Children with disabilities should not be allowed to study in school with non-disabled children.	16	25	7	10.1	.01
9	The abilities of the disabled persons cannot be realized ever with special training.	8	28	12	14	.01
10	It is wastage of time and money to educate children with disabilities.	22	15	11	3.8	Not sig.
11	It is wastage of time and money to give vocational training to the disabled persons.	12	23	13	4.63	Not sig.
12	Disabled workers are mostly shirkers and unreliable.	10	15	23	5.38	Not sig.
13	There is no need of special training for the parents of the disabled	6	26	16	12.5	.01
14	It is in just to provide financial help to the disabled by the government.	8	2	18	6.5	.05
15	It is unfair to give reservation to the disabled in government jobs.	7	29	12	16.6	.01
16	It is not proper to give relaxation in the age to the disabled in government jobs.	12	16	20	2	Not sig.
17	Disabled children should not be allowed to mix up and play with non-disabled children.	10	28	10	13.5	.01
18	There is no need of parental support and involvement in rehabilitation of the disabled.	11	23	14	4.88	Not sig.
19	The feeling of inferiority in disabled persons is not the outcome of the behavior of family and society.	12	25	11	7.63	.05
20	There is no need for separate counting of the disabled in the census.	10	23	15	5.37	Not sig.

Table -2

CALCULATION OF CHI SQUARE (X'2) WITH REGARD TO THE
OPINION OF TEACHERS IN POST-TEST
REGARDING DISABILITIES (N =48)

	Statements	Agree	Disagree	Undecided	X'2	Level of significance
1	Disability is a curse.	6	33	9	27.4	.01
2	Disabled individuals deserve pity.	12	30	6	19.5	.01
3	The disabled are burden on family and society.	12	28	8	14	.01
4	Disabled persons can never work/function like non-disabled.	7	37	4	41.6	.01
5	Disabled individuals can never obtain high positions.	14	29	5	18.4	.01
6	All the disabled children are deficient in intelligence.	7	25	16	10.1	.01
7	Marriage can cure persons with mental deficits.	6	38	4	45.5	.01
8	Children with disabilities should not be allowed to study in school with non-disabled children.	17	20	3	11.6	.01
9	The abilities of the disabled persons cannot be realized ever with special training.	6	36	6	37.5	.01
10	It is wastage of time and money to educate children with disabilities.	46	22	10	4.5	Not sig.
11	It is wastage of time and money to give vocational training to the disabled persons.	18	23	7	8.3	.05
12	Disabled workers are mostly shirkers and unreliable.	10	27	11	11.4	.01
13	There is no need of special training for the parents of the disabled	11	22	15	3.8	Not sig.
14	It is injust to provide financial help to the disabled by the government.	5	41	2	58.9	.01

15	It is unfair to give reservation to the disabled in government jobs.	3	36	4	38	.01
16	It is not proper to give relaxation in the age to the disabled in government jobs.	3	40	5	54.1	.01
17	Disabled children should not be allowed to mix up and play with non-disabled children.	8	34	6	30.5	.01
18	There is no need of parental support and involvement in rehabilitation of the disabled.	4	38	6	45.5	.01
19	The feeling of inferiority in disabled persons is not the outcome of the behavior of family and society.	4	36	8	38	.01
20	There is no need for separate counting of the disabled in the census.	6	35	7	33.9	.01

It can be deserved from table-2 that the chi-square values in majority of the items are found to be significant at 0.01 level of significance after the treatment. It indicates that the difference in 'agree', 'disagree' and 'undecided' responses is not by chance, it reveals that there is positive change in the opinion of the teachers after they were exposed to the intervention program. Table-2 shows that higher majority of the teachers are of the opinion that disability is not a curse, they do not deserve pity and they are not burden on family and society. Majority of the respondents show their censuses that disabled can attain higher positions and the respondents also opined that all the disabled children are not deficient in intelligence. A higher majority of the respondents are of the opinion that marriage cannot cure persons with mental retardation. The opinion of teachers is divided on the items that it is wastage of time and money to educate children with disabilities and there is no need of special training for the parents of the disabled. Higher majority of the respondents opined that disabled persons are not shirkers and unreliable.

It can be interpreted to mean through findings of the present study that the intervention programme is found to be effective in changing the opinions of secondary school teachers in positive direction towards disabled.

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AUTHORS

First Author – Dr. Sangeeta Yadav, Principal Drona College of Education, Ravi Nagar, Gurgaon

Second Author – Sunil Kumar, Asstt. Prof. Drona College of Education, Ravi Nagar, Gurgaon

Determination of Compromise Solutions for Linear Steady State Regulator with Vector Valued Performance Index

Rehna Nalakath[1] *, M P Nandakumar[2]

[1, 2] Department of Electrical Engineering, National Institute of Technology Calicut, INDIA
* Corresponding Author: e-mail: rehnanasir@gmail.com, Tel +91-9895616933, Fax. +91-495-2286301

  Abstract- The use of vector valued performance index as a performance measure in the design of optimal control systems has invited much attention from researchers in the field of control engineering. The problem is of practical significance as the system presents an optimal solution for multiple criteria optimal control problems. A general performance index is defined in the form of a norm which can be expressed as the sum of pth power of deviations of the different performance index elements from their optimal values considering individual performance measures separately. The norm is minimized in k dimensional performance index space to obtain a set of non inferior systems corresponding to a class of compromise solutions. The paper presents a solution method for determining a class of compromise solutions for the standard linear quadratic steady state regulator problem optimizing k performance indices simultaneously. Selection of a single system out of the class of systems obtained is made by an appropriate choice of the parameter p based on the specified application.

  Index Terms- Optimal Control, Compromise Solutions, Multi Objective Optimal Control, Vector Valued Performance Index.

I. INTRODUCTION

One of the most important directions in research in the field of control theory is the development of methods for analyzing the quality of control processes. The fact is that contemporary progress in science and technology very sharply presents scientists and engineers with the problem of creating even more perfect automatic control systems. In addition to ensuring stability the requirement is to create higher quality systems ranked based on the various performance indices of quality.

  Optimal control theory involves the design of controllers that can satisfy some control objective while simultaneously minimizing certain performance measure. A sufficient condition to solve an optimal control problem is to solve the Hamilton-Jacobi-Bellman (HJB) equation. For the special case of linear time-invariant systems, the HJB equation reduces to an algebraic Riccati equation (ARE) [1, 2]. Optimal control design using single or scalar performance index is an established area in control engineering research. However, current requirement for control systems can no longer be satisfied by using single objective function and therefore multi-objective optimal control appears as the logical future trend.
  The always increasing quality requirements for new products and consequently the natural advance in control system design have led to the introduction of more than one design criterion which requires more sophisticated techniques like multiple objective optimizations [3]. A multi objective optimization problem requiring simultaneous optimization of a collection of functions each of which measures a definite aspect of the system performance is addressed. The objective functions normally define mathematical description of design specifications which are in conflict with each other. Recently the problem of vector valued criteria has become a central part of control theory. Great attention is given to the design and construction of modern control systems

by taking into account different aspects of system performance to be optimized by employing appropriate control measures [4].

The paper is organized as follows. Section II gives a brief overview of the research in this field and the common methods followed for solving multi criteria optimal control problems. Mathematical preliminaries for the optimal controller design for a linear steady state regulator problem with *k* performance indices is provided in Section III. A numerical example of the problem is presented and solved using Matlab in Section IV. Section V is devoted to draw conclusions from this work.

II.   LITERATURE REVIEW AND SOLUTION METHODS

The problem of vector valued optimal control was first presented by Lotfi Zadeh in 1963 where he addressed the problem of designing control systems which are optimal relative to several performance indices. The paper though not providing a rigorous mathematical solution to multi objective optimization, paves a founding stone for the concept of optimality and non-scalar valued performance criteria. The paper proposes definitions for optimality and non-inferiority in the context of multi criteria optimal control system design. According to Zadeh, a system S_0 in the constraint set C is non-inferior in C if the intersection of C and a subclass of S consisting of all systems which are superior to or better than S_0 is an empty set. Also a system S_0 in the constraint set C is optimal in C if C is contained in a subclass of S consisting of all systems which are inferior to or equal to S_0 [5].

The largest collection of works in vector valued optimization is devoted to the method of determination of set of un-improvable points which are also called Pareto Optimal solutions in group decision problems. The methods adopted so far for solving optimal control problems with vector valued performance index can be summarized as follows [6-8].

A. *Optimization of a hierarchical sequence of performance indices:*

The method is based on addressing the performance measures specified for the optimal control problem in the order of preference for a particular application. If the performance indices arranged in hierarchical order are represented as $J_1(x), J_2(x)... J_i(x)$ and the solution is determined starting with the scalar performance measure of highest preference. The optimization of the performance measure listed as second in the hierarchical order is then done relative to the solution of the first optimization problem.

A major drawback of this method is that optimization with respect to first performance measure which is of highest preference leads to a unique optimal solution and the problem then reduces to optimization relative to the first performance measure only. The solution hence will be a subclass of the unique solution obtained in the first step.

B. *Determination of a set of unimprovable points:*

A point $x^0 \in x$ is called unimprovable in x relative to J(x), if among all $x \in x$ there does not exist a point x* such that $J_\alpha(x^*) \le J_\alpha(x^0)$, $\alpha = 1, 2, k$ with one of the inequalities being strict. [5] The problem of determination of unimprovable points is proposed as minimization of a linear form of the components of the vector J(x) with constant weighing coefficients. It can be shown that the set of unimprovable points are obtained by minimizing the expression $J = \sum_{i=1}^{k} C_i \, J_i(u)$ where $C_i > 0$ is the positive weighing constant and u is the control vector and u $\in$ U is the set of admissible controls.

C. Methods for determining solution based on one form of compromise or another:

This method is based on the assumption that the choice of a solution in the multi criteria control problem is confined to the determination of a set of compromise solutions from which a unique optimal solution is chosen based on some heuristic considerations. One such technique employed ensures that the relative decrease in one of several criteria should not exceed the relative increase in the remaining criteria.

Another approach is to determine an ideal point (utopian point) where all the performance measures have their optimal values and then a norm is introduced in the criteria space. The compromise solution obtained in this method is a Pareto – Optimal solution and ensures the closest approach of the criteria to their optimal values [6].

The problem of computing compromise solutions by simultaneously optimizing the design parameters is presented in [9] as an application of compromise solutions obtained. In this paper the compromise solutions are obtained by simultaneously optimizing a design parameter ζ which appears in the state feedback path as an element of the feedback gain matrix.

III. COMPROMISE SOLUTION FOR LINEAR STEADY STATE REGULATOR

The steady state regulator problem with a vector valued performance index is considered. The performance index elements considered are quadratic performance measures with terminal time $t_f = \infty$. Let the dynamic system considered be of the form

$$\dot{x} = Ax + Bu \qquad (3.1)$$

Where x is the state vector, u is the control vector, A is the nXn constant state matrix, and B is nXm constant control matrix. The initial conditions $x(0) = x_0$.

Also consider the cost function of the form

$$J(x) = \int_0^\infty \left[x^T Q x + u^T R u \right] dt \qquad (3.2)$$

where $Q \in R^{nXn}$, $R \in R^{nXm}$

Q and R are positive definite state and control weighting matrices respectively. The optimal feedback control problem in case of single scalar performance index is to find the admissible control u^* so that the cost function $J(x)$ is minimized. This is obtained by solving the algebraic Riccati equation in (3.3) where P is the Riccati matrix to be solved.

$$PA + Q - PBR^{-1}B^T P + A^T P = 0 \qquad (3.3)$$

The problem presented in this paper is to minimize the vector valued performance index given in equation (3.4) expressed in the form of pth power of the sum of deviations of the individual performance measures from their optimal values. [8]

$$J(u, p) =$$
$$\left[\{ J_1(u) - J_{10}(u) \} + \{ J_2(u) - J_{20}(u) \} + \Lambda \ \{ J_k(u) - J_{k0}(u) \} \right]^p \qquad (3.4)$$
where $1 \le p < \infty$

The quadratic performance elements $J_i(u)$ have the form

$$J_i(u) = \int_0^\infty (X^T Q_i X + u^T R_i u) \, dt, \qquad (3.5)$$

$$i = 1,2,....k$$

$J_{i0}(u)$ are the optimal values of the individual performance measures obtained by solving the k individual optimization problems.

The vector valued performance index in equation (3.4) is expressed as a linear combination of the performance index elements.

$$J(u, p) = \left[\sum_{i=1}^k \{J_i(u) - J_{i0}(u)\}^p \right] \qquad (3.6)$$

Equation (3.6) can be rewritten as

$$J(u, p) = \left[\sum_{i=1}^k \{J_i(u) - J_{i0}(u)\}^{p-1} \{J_i(u) - J_{i0}(u)\} \right] (3.7)$$

A set of positive quantities C_i are defined such that

$$C_i = \{J_i(u) - J_{i0}(u)\}^{p-1}, \quad i = 1,2,....k \qquad (3.8)$$

The performance index J can be now viewed as a function of u and C_i given in equation (3.9).

$$J(u, C) = \sum_{i=1}^k C_i \{J_i(u) - J_{i0}(u)\} \qquad (3.9)$$

$$C = [C_1, C_2, C_3 ......C_k]$$

For a set of values of C_i, the above expression is equivalent to minimization of $J(u, C) = \sum_{i=1}^k C_i J_i(u)$

It is convenient to normalize the weighting constants such that $\sum_{i=1}^k C_i = 1; \ C_i > 0$

The set of positive quantities C_i are modified as

$$C_i = \frac{\{J_i(u) - J_{i0}(u)\}^{p-1}}{\sum_{j=1}^k \{J_j(u) - J_{j0}(u)\}^{p-1}} \qquad (3.10)$$

The steady state regulator problem addressed here is an ordinary control problem with vector valued performance index. The solution of the regulator problem is obtained by solving the algebraic Riccati equation given in (3.3) where P, Q, R are replaced by equations (3.11-3.13) respectively and P is the Riccati matrix to be solved.

$$P = C_1 P_1 + C_2 P_2 + \Lambda + C_k P_k \qquad (3.11)$$

$$Q = C_1 Q_1 + C_2 Q_2 + \Lambda + C_k Q_k \qquad (3.12)$$

$$R = C_1 R_1 + C_2 R_2 + \Lambda + C_k R_k \qquad (3.13)$$

Substituting equations (3.11-3.13) in equation (3.3) and differentiating the expression partially with respect to C_1 yields

$$A^T P_1 + P_1 A - PBR^{-1}B^T P_1 + PB\left(\frac{\partial R^{-1}}{\partial C_1}\right)B^T P +$$

$$P_1 BR^{-1}B^T P + Q_1 = 0 \qquad (3.14)$$

$$\frac{\partial R^{-1}}{\partial C_1} = \frac{\partial\left(R^{-1}RR^{-1}\right)}{\partial C_1} = -R^{-1}R_1 R^{-1} \qquad (3.15)$$

$$Since \quad \frac{\partial R^{-1}}{\partial C_1} = R^{-1}R\frac{\partial R^{-1}}{\partial C_1} + R^{-1}\frac{\partial R}{\partial C_1}R^{-1} + \frac{\partial R^{-1}}{\partial C_1}RR^{-1}$$

$$and \quad \frac{\partial R}{\partial C_1} = R$$

Substituting equation (3.15) in equation (3.14) gives

$$A^T P_1 + P_1 A - PBR^{-1}B^T P_1 + PB\left(-R^{-1}R_1 R^{-1}\right)B^T P +$$

$$P_1 BR^{-1}B^T P + Q_1 = 0 \qquad (3.16)$$

$$\left[A - BR^{-1}B^T P\right]^T P_1 + P_1\left[A - BR^{-1}B^T P\right]$$

$$- PBR^{-1}R_1 R^{-1}B^T P + Q_1 = 0 \qquad (3.17)$$

The same procedure is repeated for the 'k' performance measures to yield the k equations given in equation (3.18)

$$\left[A - BR^{-1}B^T P\right]^T P_2 + P_2\left[A - BR^{-1}B^T P\right]$$

$$- PBR^{-1}R_2 R^{-1}B^T P + Q_2 = 0$$

$$\bullet$$
$$\bullet \qquad (3.18)$$

$$\left[A - BR^{-1}B^T P\right]^T P_k + P_k\left[A - BR^{-1}B^T P\right]$$

$$- PBR^{-1}R_k R^{-1}B^T P + Q_k = 0$$

The k matrix equations are solved to get the matrices P_1, P_2, P_k. Using these matrices the performance index elements are computed using equation (3.18).

$$J_k(u) = x_0^T P_k x_0 \qquad (3.19)$$

IV.   NUMERICAL EXAMPLE

Consider the second order linear steady state regulator represented by the following equations.

$$\dot{x}_1 = x_2$$

$$\dot{x}_2 = -x_1 - 2x_2 + u$$

Let the initial conditions be $x_1(0) = -1, x_2(0) = 1$

Let the performance index considered be of the form $J(x,u) = \int_0^\infty [x^T Q x + u^T R u] dt$

The problem is to minimize the vector valued performance index given as J_1 and J_2 for $1 \le p < \infty$.
$$J(u, p) = [\{J_1(u) - J_{10}(u)\} + \{J_2(u) - J_{20}(u)\}]^p$$

Where the individual performance indices are $J_1(x,u) = \int_0^\infty [5x_1^2 + 0.01u^2] dt$
$$J_2(x,u) = \int_0^\infty [x_2^2 + 0.01u^2] dt$$

The individual optimisation problems are solved and the Riccati matrix P and performance index are obtained as follows

$$P_{10} = \begin{bmatrix} 1.5107 & 0.2138 \\ 0.2138 & 0.0484 \end{bmatrix}$$

$$P_{20} = \begin{bmatrix} 0.0820 & 0.0000 \\ 0.0000 & 0.0820 \end{bmatrix}$$

$$J_{10} = 1.1314 ; J_{20} = 0.1640$$

The iterative procedure for the computation of weighing constant C_i is started with an initial guess of C_1, $C_2 = 0.5$ and p=1. The matrices Q and R takes the values

$$Q = C_1 Q_1 + C_2 Q_2 = \begin{bmatrix} 5C_1 & 0 \\ 0 & C_2 \end{bmatrix}$$

$$R = C_1 R_1 + C_2 R_2 = [0.01(C_1 + C_2)]$$

Using these matrices the combined algebraic Riccati equation given in equation (3.3) is solved by Eigen vector method and the combined Ricatti matrix P is obtained as follows.

$$P = \begin{bmatrix} 2.8586 & 0.2969 \\ 0.2969 & 0.1430 \end{bmatrix}$$

With the value of matrix P and substituting in equations (3.16, 3.17) the individual algebraic Riccati equations are solved to obtain P_1 and P_2 as follows.

$$P_1 = \begin{bmatrix} 1.8548 & 0.2273 \\ 0.2273 & 0.0528 \end{bmatrix}$$

$$P_2 = \begin{bmatrix} 1.0039 & 0.0695 \\ 0.0695 & 0.0902 \end{bmatrix}$$

$$J_1 = 1.4529 ; J_2 = 0.9550$$

The calculations are carried out for values of p from 1 to 10 using Matlab and the results are tabulated below in Table 1.

Table 1. Compromise solutions

p	C1	C2	J1	J2
	1	0	1.1314	1.919
	0	1	5.0514	0.1640
1	0.5	0.5	1.4529	0.9550
2	0.4124	0.5876	1.5996	0.8326
3	0.3904	0.6096	1.6431	0.8034
4	0.3806	0.6194	1.6640	0.7901
5	0.3751	0.6249	1.6762	0.7829
6	0.3715	0.6285	1.6843	0.7781
7	0.3690	0.6310	1.6900	0.7748
8	0.3672	0.6328	1.6942	0.7723
9	0.3658	0.6342	1.6975	0.7704
10	0.3646	0.6354	1.7001	0.7689
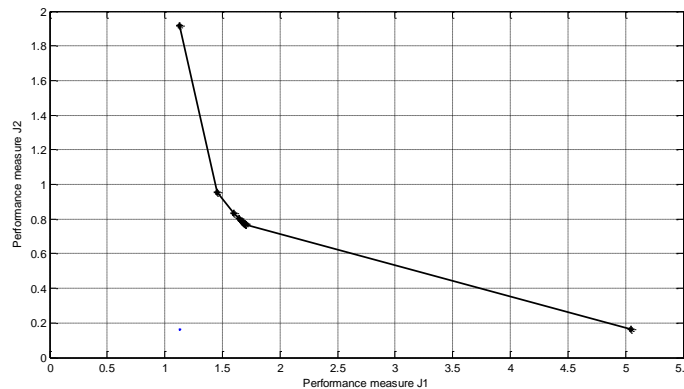
Figure 1. Compromise Solutions

V.   CONCLUSIONS

The paper presents a method for finding out compromise solutions for vector valued performance criteria. The method is based on the minimization of a specific norm out of a set of norms in the *k* dimensional performance index space. This is equivalent to minimization of a linear combination of *k* performance measures with constant weighing coefficients which is evaluated using an iterative procedure. The choice of the parameter p is made so as to meet a particular design specification for a specified application. The solution method presented is flexible since the choice of parameter *p* can be done depending on the application.

The linear steady state regulator problem with two performance indices is considered in the numerical example. The compromise solutions are obtained and tabulated for values of p varying from 1 to 10.Each point in the two dimensional performance index space is a solution for the problem based on one form of compromise or the other. The curve in the above figure is the locus of non inferior solutions which forms the boundary of the region of admissible controls. The method can be applied to practical systems to obtain solution for multiple criteria optimal control problems.

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AUTHORS

Rehna Nalakath received B Tech from NSS College of Engineering, Palakkad, India and M. Tech. from National Institute of Technology Calicut, India in 2003. She is a faculty in the Department of Electrical & Electronics Engineering, MES College of Engineering, Kuttippuram, India. Presently she is on leave and pursuing Ph.D at National Institute of Technology Calicut. Her research interests include control system design, non linear system analysis, and optimal control.

Dr. M P Nandakumar is Professor in the Department of Electrical Engineering, National Institute of Technology Calicut, India. He has more than 30 years of experience in teaching and research. His current area of research includes Multi-criteria Optimal Control, Non linear system analysis and control, Applications of Neural Networks, and Non-traditional Optimization and Simulation, GA and Fuzzy techniques in control problems. He has published many papers in refereed international journals and national and international conferences.

Correspondence Author – Rehna Nalakath, rehnanasir@gmail.com, nandu@nitc.ac.in, Contact number : 91 9895616933.

Testicular Tumor with Axillary and Supraclavicular Mass –A Rare Case Report

Sanjay Singh chandel[1], Rajesh Singh Baghel[2], A K Nigam[1], K K Singh[3]

[1] Department of Radiotherapy & Oncology, G. R. Medical College, Gwalior (MP), India.
[2] Department of Radiology, G. R. Medical College, Gwalior (MP), India.
[3] Department of Radiotherapy & Oncology, RMC, PIMS, LONI, MS, India..

Abstract- We report a case of testicular tumor which is presented with axillary and supraclavicular mass, after confirmation of diagnosis bilateral orchiectomy followed by adjuvant chemotherapy with VIP regimen and radiotherapy to Para aortic region. Patient is asymptomatic now and on regular follow-up and completed 4 years of follow-up with no complications.

Index Terms- Testicular Tumor, Axillary Mass, Chemotherapy

I. INTRODUCTION

Supraclavicular lymph node metastasis from infradiaphragmatic malignancies generally indicates widespread disease that lost the chance of surgical treatment for cure, but testicular carcinoma represents an exception to this generalization.[1] Testicular carcinoma (seminomatous and nonseminomatous tumors) is the most common malignancy in men between 20-30 years of age. [2, 3] Cryptoorchidism, Klinefelter's syndrome and chromosomal abnormality in 1 and 12 are predisposing factors. Signs and symptoms are painless testicular mass, abdominal pain and mass, neck mass and gyanecomastia. Although the disease usually presents as a testicular mass or enlargement, abdominal, thoracic or cervical masses indicating metastatic disease may be noted during the follow-up. [1-3] Neck metastasis in the patients with testis cancer is an infrequent but, well established phenomenon and the incidence of neck metastasis in testicular carcinoma has been reported to be 4-5 %.[4-7] High inguinal orchidectomy is diagnostic as well as therapeutics procedure. Histopathologically it is divided mainly into seminomatous and nonseminomatous group. Management of testicular tumor depends upon stage and histopathology. In early stage seminomatous tumor either surveillance or radiotherapy or chemotherapy depending upon risk factors while in advanced stage and non seminomatous group chemotherapy is preferred treatment option. While in selected case retroperitoneal lymph node dissection (RPLND) or surveillance is optional. Testicular tumors are one of tumor which is considered as curable tumor.

II. CASE REPORT

30 years old gentleman presented in OPD with chief complained of swelling in left axilla since 5 months and swelling over left supraclavicular fossa since 2 months duration, no other significant complains, symptoms are progressive in nature. On examination his vitals was stable with intact higher mental functions. Local examinations of left axilla a 6×7 cm^2 single swelling with central ulceration and discharge present. Left supraclavicular fossa shows 3×4 cm^2 lymphadenopathy present, No other lymphadenopathy seen. Left testicular swelling was seen which non tender and loss of sensation. His other systems were normal.

His routine blood count, liver function tests, renal function tests and Chest X-ray PA view were within normal limits. USG abdomen and pelvis shows of multiple Para-aortic lymphadenopathies with largest size 3.4×4.2 cm^2 and rest things within normal limit. USG scrotal shows left testicular mass, suggestive of testicular tumor. Biopsy report done from axillary mass showed of metastatic carcinoma. Tumor marker AFP & B-HCG were significantly elevated. With this information high inguinal Orchidectomy was done under spinal anesthesia. Histopathology report showed mixed germ cell tumor. He was planned for chemotherapy using VIP regimen, in form of injection Ifosfamide 1.2gm/m^2, injection Cisplatin 20mg/m^2 and injection Etoposide 100mg/m^2 Day1 to Day5 repeated every three weekly. The course of chemotherapy was uneventful. After completion of 4 cycle of chemotherapy there were complete regression of axilla and supraclavicular mass but Para-aortic mass was partial regress, plan to continue two more cycle of chemotherapy followed by local radiotherapy at Para-aortic region. A dose of 36Gy in 18 fractions over 4weeks was delivered using two fields technique through Co-60 machine. After completion of treatment patient was advised for regular follow-up. In each follow-up complete physical examination and tumor marker every 3 monthly to be done. He completed 4years of follow-up.

III. DISCUSSION

Testicular tumor is one of the tumors, which is curable. It requires careful patient's evaluation, good planning and team approach in managements of patient.

Supraclavicular masses are the most common presenting features of malignant diseases with no detectable primaries, and they generally indicate widespread diseases which is not amenable to surgical resection for cure. Testicular carcinoma represents an exception to this generalization when metastasizes to the neck, as it usually spreads through lymphatic pathways. [1-3] initially, testicular carcinoma involves the retroperitoneal lymph nodes. The metastatic disease then spreads to the junction of internal jugular and subclavian veins via thoracic duct. From that location it may spread to cervical lymphatics. Testicular carcinoma which metastasizes to the neck most commonly presents as a Virchow's node.[3] Therefore, a young man

presenting with a supraclavicular mass, especially on the left side, should be suspected for testis cancer.

Testicular tumors are 96 % malignant and these are subdivided into seminomatous and nonseminomatous testicular carcinoma. Nonseminomatous testicular carcinomas are initially staged by physical examination, measurement of serologic tumor markers and computerized tomography scanning. [2, 5] Majority of the cases of nonseminomatous testicular carcinoma are diagnosed at early stage. An evidence of metastasis above the diaphragm, usually in the thorax, indicates advanced disease which is relatively rare and has poor prognosis. [2, 5] Nonseminomatous testicular carcinomas are treated by chemotherapy subsequent to orchiectomy. Aggressive chemotherapy can cause a histologic transformation leading the conversion of this lesion to a teratoma with scar and necrosis. Most likely, the chemotherapeutics selectively destroy the carcinomatous component leaving teratomatous remnants behind. In the majority of the cases, residual disease histologically consists of these teratomatous elements. Although teratoma is a nonmetastasizing form of testicular carcinoma, there is always some risk of eventual reversion of teratoma to its malignant counterpart. Therefore, surgical resection of the post-chemotherapy residual disease is recommended to control the disease and to avoid fatal complications due to progressive local growth. [4, 5]

Surgery (Orchidectomy) and chemotherapy were the mainstays of treatment, but radiotherapy is treatment of choice in early stage seminomatous tumors. Nowadays role of radiotherapy in testicular tumor is limited due to availability of chemotherapy which gives equal results to radiotherapy while on radiotherapy long term morbidity is high. Bleomycin, Etoposide and Cisplatinum is drug of choice for testicular tumor.

Nowadays, newer treatment modalities like 3D Conformal Radiotherapy and Intensity modulated radiation therapy (IMRT) dramatically reduce dose to non-target tissues like kidney, spinal cord, small bowel etc when radiotherapy is given to para-aortic region.

We reported a case which is unique in presentation because it presented with axilla mass which is very rare presentation of testicular tumour. (As shown: Figure No.1 & 2 showing mass in axilla & supraclavicular before chemotherapy and Figure No.3 & 4 showing mass in axilla & supraclavicular after chemotherapy).

Figure 1

Figure 2

Figure 3

Figure 4

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AUTHORS

First Author – Sanjay Singh Chandel, MD,PDCR., Department of radiotherapy & Oncology, G R Medical college, Gwalior MP, India, 474009, dr.sanjaychandel@gmail.com.
Second Author – Rajesh Singh Baghel, MD,Department of Radiology, G. R. Medical College, Gwalior MP, India. 474009
Third Author – A. K. Nigam, MD, Department of radiotherapy & Oncology, G R Medical college, Gwalior MP, India, 474009
Fourth Author – K K Singh, MD, Department of Radiotherapy & Oncology, RMC, PIMS, LONI, MS, India. 413737

Correspondence Author – Dr. Sanjay Singh Chandel, MD, PDCR, Assistant professor, Department of radiotherapy & Oncology, G R Medical College, Gwalior MP, India, 474009, dr.sanjaychandel@gmail.com., +917389350645

A Study of Leadership Quality in Teaching Profession

Dr.Suman Dalal*, Ms.Sarla Rani**

* Associate Professor,Dean,Faculty of Education,BPSMV,Khanpur Kalan
** Assistant Professor, BPSMV,Khanpur Kalan

Abstract- The importance of leadership cannot be overstated in an environment where the goal is that every student will achieve at high levels. In effective educational environment, leadership capacity is developed and supported at every level. Teacher's development is another aspect of leadership. The Leadership strategy is a powerful way to help administrators and teachers embed new skills and strategies in their daily work. In building a "good school" the single most important factor is effective leadership. In the present study researchers want to find out factors which improve and affect leadership quality in secondary school teachers, and improvement in secondary schools by good leadership.

Index Terms- Leadership, Teaching Profession

I. INTRODUCTION

Leadership has been described as "a process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task". The basic nature and quality of Leadership is Effective personality, Ideal character, Professional and Academic knowledge, Toleration and adjustment, Knowledge of Institutional planning, and unprejudiced attitude Expertness in human relationship, ability of speech and writing, ability of responsibility and Initiation, Self confidence and cooperation. The different associations roots of the educational leadership i. e. the Minister of Education, Vice-Chancellors of universities, heads institutions, administrators, principals of secondary and primary schools, supervisors and of course teachers and students who are responsible for a good and efficient system of education and institutional development. A report from McKinsey and Company (Barber et al, 2010) points out that not only the role of school leadership is important, it is becoming more critical as the international trend towards devolution of school management to the school level, and the evidence that this is increasingly more important to the success of the system, it becomes widely accepted. In addition, schools in themselves are becoming more complex, with effective leadership required to ensure young people acquire the skills and knowledge needed in the 21st Century.

A recent RAND Corporation report found that nearly 60% of a school's *impact on student achievement is attributable to leadership and teacher* effectiveness, with principals accounting for 25% of a school's total impact on achievement. Furthermore the report found that, while effective teachers have a profound effect on student outcomes, this effect soon fades when the student moves on to another teacher, unless the new teacher is equally effective (New Leaders for New Schools, 2009). In order to have high-quality learning every year, whole schools must be

high functioning, and this means they must be led by effective principals.

Leadership

Leadership is an activity of influencing people to strive willingly for group objectives and influence people to fellow in the achievement of a common goal. Leadership in school is the process of enlisting and guiding the talents and energies of teachers, pupils and parents towards achieving common educational aims. School leaders are responsible for educational programs and learning outcomes, the management and professional development of their staff, school finance and property and the relationships between the school and its community. Educational leadership has been studied primarily from the perspective of what teachers need to do to be more like positional leaders. Classroom-based, student-focused leadership must be legitimized as central to teacher professional identity and foundational to the development of strong schools.

Teaching Profession

The business of teacher is to help students to achieve higher standards of knowledge, ability, skills and moral character. If teachers do their work well, then their work is of great value to others, not simply at a particular time but in future also. Teacher is a valuable resource to communities worldwide, nationwide, and community-wide. Teaching has great potential for many individuals to leave a mark on society and benefit their lives and self-worth. Teachers have excellent resources, skills and tools to achieve their goals and to reach out to numerous students in their careers. Teachers are not only workers but are also members of the profession. Their occupation renders definite and essential services to society. Teaching is a very professional career where an individual is held accountable through a series of tests, assessments and tools to gauge the achievement of students and their learning. Teaching is such a rewarding and challenging career and a partnership between schools, community, and parents to help children succeed in their academic careers by overcoming personal, academic, social and emotional challenges to ensure success.

Need of the Study

Teachers have various levels of school leadership qualities. Some are learned and some are inherent part of their personality. Great teachers possess a combination of leadership qualities that are respected by the students, parents, peers and the community. They can accomplish important tasks and do wonders in their profession and the people they touch through it. Research demonstrates that the most important school-based factors influencing student achievement is the quality of a school's workforce—the teachers and leaders who are responsible for

setting high expectations and delivering top quality instruction. Teachers and school leaders are fundamental for closing the achievement gap and for turning around low-performing schools. Further, investments in the educator workforce comprise the largest share of education budgets. Three fourth of educational money is invested in human capital. Improving the return on those investments is critical for improving achievement overall. Teachers work most closely with students, yet it is still invisible in many studies of school organizations and school reform in spite of the rhetoric about the essential role of their leadership. The influence of teachers' race, gender, and class on their own and others' perceptions of their leadership capacity is not well-understood. Until teachers' beliefs about the primacy of teaching within teacher leadership are respected and clearly portrayed, a key dimension of school reform will continue to be overlooked.

Today's school leaders are responsible for demonstrating bottom-line results for all students, and teachers are under increasing pressure to demonstrate results within their classrooms. However, research indicates that teachers and principals do not feel well prepared or sufficiently supported for the work they do. Surveys find that teachers and principals feel their preparation programs left them unprepared for the real challenges they face; professional development is inadequate; time and support for collaboration with their peers is lacking; and career advancement opportunities are limited. They understand educational ambiance because they are accomplished teachers themselves. We need candidates who can both inspire and manage and who understand how education policy and curriculum change impact their people. Great school leaders empower both their teachers and their students. So, there is a need to find out qualities of Leadership in respect of secondary schools because it is important for educational development, social change and Continuous progress in educational standards. The present paper ponders mainly on the features which contribute to the improvement of leadership in secondary schools. It also gives attention to factors which affect leadership in secondary schools. Moreover, it lays emphasis on improvement in secondary schools by good leadership.

II. OBJECTIVES OF THE STUDY

1. To find out the factors improving Leadership in the secondary school teachers.

2. To find out the factors effecting Leadership in the secondary school teachers.

3. To find out the improvement in Institution by good leadership in the secondary school teachers.

III. METHODOLOGY

Methodology is the sheet anchor of any research. The decision about the method to be employed however depends upon nature of problem selected and the kind of data necessary for its solution. Normative Survey Method was applied in this study.

Sample

Sample is an essential part of the scientific procedures. A sample is a small proportion of the population selected for observation and analysis. It is not feasible to contact each and every element of the population. The investigator has to select some individuals who would represent the whole population and this representative proportion of the population is called sample. In this study, the sample was selected randomly. A sample of 100 secondary school teachers from Sonipat district was selected for systematic survey in the present study.

Tool Used

For the purpose of scoring each question had to answered with a 'yes' or 'no'. Each 'yes' was given one point and so was the case with each 'no' with respect to a particular question and then the 'yes' and 'no' percentage were calculated

IV. DATA COLLECTION

To collect the data about Leadership Qualities required in Teaching Profession a questionnaire was prepared and administered personally by the investigators to the sample selected for study. The important instructions were stated on the front page of questionnaire. The questionnaire was administered to a sample of 100 secondary school teachers, systematically selected from the different schools of Sonipat district. For data collection, selected sample was personally contacted and the purpose of the study was explained. The teachers were told that they should not leave any question unattempted. The teachers were given free time to think over and write their answer in the presence of investigator. After this, the respondents were given the questionnaire to be filled by them. The teachers were assured that their responses will be kept confidential and will be used for the research purpose only. After this the respondents were given the questionnaire to be filled in. All questionnaires were returned after completion.

V. ANALYSIS AND INTERPRETATION OF DATA

Analysis of data had been done by counting the total number of responses regarding to each statement. The percentage of 'yes' and 'no' was analyzed separately and statements were interpreted according to response, one by one. The analysis and interpretation of data of school teachers are presented below:

Objective1: To find out the factors improving Leadership in the secondary school teachers.

Table-1

Sr.No.	Factors Improving Leadership	%
1.	Good Behavior	78
2.	Good Planner	75
3.	High Education	73
4.	Communication Skill	71
5.	Positive Attitude	71
6.	Confidence	68
7.	Effective Personality	67
8.	Ideal Character	63
9.	Sense of Humor	63
10.	Resourcefulness	53

Interpretation:

The results of **Table -1** shows that more than 70% teachers agree that good behavior, good planning, high education, communication skill, and positive attitude are most important factors for improvement of leadership quality in the secondary school teachers. Confidence, effective personality, ideal character, and sense of humor are also important factors whereas Resourcefulness is least important factor for improvement of leadership quality in the secondary school teachers.

Objective 2: To find out the factors affecting Leadership in the secondary school teachers.

Table-2

Sr.No.	Leadership Affected by Factors	%
1.	Institutional Jealousy	70
2.	Flexibility in Behavior	63
3.	Heredity	53

Interpretation:

The results of **Table -2** shows that teachers agree that institutional jealousy is the most affecting factor, flexibility in behavior is the mediocre affecting factor, and heredity is the least affecting factor in leadership quality of secondary school teachers.

Objective 3: To find out the improvement by good leadership in the secondary schools.

Table-3

Sr.No.	Improvement in Institution by Good Leadership	%
1.	Social Equality & Impartiality	73
2.	Rule &Regulation	71
3.	Good Physical & Psychological Environment	71
4.	Helping Attitude	63
5.	Feeling of Co-operation	62
6.	Problem Solving Ability	47
7.	Facility of Research	42

Interpretation:

The results of **Table -3** shows that more than 70% teachers agree that good leadership is highly responsible for improvement of social equality & impartiality, rule & regulation, and physical & psychological environment of secondary   schools. Good leadership is also important for improvement of helping attitude and feeling of co-operation but less important for problem solving ability and facility of research in secondary schools

VI.   CONCLUSION

The most outstanding characteristics of any research are that it brings certain outcome and implication. Results of the present study have vital implications in relation to characteristics of leaders, factors affecting leadership and improvement in institution by good leadership. As we need good leaders in every sphere of life i.e. family, school, industry, and nation. The destiny of a nation, family, industry, school and class depends upon a wise and effective leader. It is in the hands of the leaders to raise the commanding arena to a first rate under their worthy leadership or they may lead it to disaster. The present paper concentrates mainly on the characteristics and factors which contribute to the improvement of leadership as effective personality, education, good planning, self independence**,** balanced nature**,** communication skill **,** resourcefulness**,** positive attitude **,** ideal character **,** and good behavior. It also concentrates on factors which affect leadership as institutional jealousy, flexibility in behavior, and heredity. Besides this, it throws light on improvement in institution by good leadership as social equality & impartiality, rule & regulation, good physical & psychological environment, helping attitude, feeling of co-operation, problem solving ability, and facility of research.

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AUTHORS

First Author – Dr.Suman Dalal, Associate
Professor,Dean,Faculty of Education,BPSMV,Khanpur Kalan
Second Author – Ms.Sarla Rani ,Assistant Professor,
BPSMV,Khanpur Kalan

Dye-Sensitized Solid State Solar Cells Sensitized with Natural Pigment Extracted from the Grapes

G.G.G.M.N.Hemamali[*], G.R.A.Kumara[**]

[*] Postgraduate Institute of Science, University of Peradeniya, Peradeniya,Sri Lanka.
[**] Postgraduate Institute of Science, University of Peradeniya, Peradeniya,Sri Lanka.

Abstract- The solar energy is an abundant, continuous and clean source of energy that can be used to produce electricity using many different photovoltaic designs. Dye sensitized solar cells based on TiO2 have drawn attention worldwide due to their low cost and easy preparation techniques compared to conventional silicon based photovoltaic devices. The objective of this work was to develop dye-sensitized solid-state solar cell (DSSC), in which the liquid electrolyte, commonly applied in photoelectrochemical cells, is replaced by CuSCN and compared the performance of the solar cells with anthocyanin extracted from grapes.

Highly porous, TiO2 films have been prepared, on fluorine doped tin oxide (FTO) glass substrate, using P25 nm TiO2 particles in a TiO2 colloidal suspension. These films were used to construct FTO/TiO2/Natural Dye/CuSCN/Pt/FTO, DSSCs with natural anthocyanin sensitizer extracted from grapes and CuSCN as the hole conductor. The cells show open circuit voltage (Voc) of 0.449V, short-circuit current density (Jsc) of 1.91 mA cm-2 and 0.50 fill factor (FF) with an overall efficiency (η) of 0.43 % .

Index Terms- Dye Sensitized Solid State Solar Cells; Anthocyanin; Grapes; natural dyes; electrolyte.

I. INTRODUCTION

Silicon based solar cells were the most popular before the emerging of dye-sensitized solar cells. These solid-state junction devices have dominated photovoltaic industry. Since Grätzel et al. developed dye-sensitized solar cells (DSCs), a new type of solar cells, in 1991 [1], these have attracted considerable attention due to their environmental friendliness and low cost of production. A DSSC is composed of a nanocrystalline porous semiconductor (TiO2) electrode-absorbed dye, an electrolyte (p-type semiconductor) and a counter electrode. In DSSCs, the dye as a sensitizer plays a key role in absorbing sunlight and transforming solar energy into electric energy. Numerous metal complexes and organic dyes have been synthesized and utilized as sensitizers. By far, the highest efficiency of DSCs sensitized by Ru-containing compounds absorbed on nanocrystalline TiO2 reached 11–12% [2,3]. However, noble metals limited in amount, and costly in production. On the other hand, organic dyes are not only cheaper but have also been reported to reach an efficiency as high as 9.8% [4]. However, organic dyes have often presented problems as well, such as complicated synthetic routes and low yields. Nonetheless, the natural dyes found in flowers, leaves and fruits can be extracted by simple procedures. Due to their cost

efficiency, non-toxicity, and complete biodegradation, natural dyes have been a popular subject of research. Thus-far, several natural dyes have been utilized as sensitizers in DSCs such as anthocyanin, carotene, tannin and chlorophyll [5-11].

For ideal performance and excellent efficiency, electrolyte should have high ionic conductivity so that it can transfer oxidized/reduced species to respective electrodes efficiently and should prevents back electrode reactions completely. Polymeric electrolyte is an ideal choice used in lithium ion batteries, supercapacitors, photoelectrochromic display devices and solar cells [12-14]. Organic liquid electrolytes DSC have attractive features of high energy conversion efficiency and low production cost [15]. However, presence of traditional organic liquid electrolytes in such cells has some problems such as a less long-term stability and a need for airtight sealing. One of the major problems of such DSC is the electrolyte loss caused by the leakage and volatility of the electrolyte solution that lowers the durability of the cell. Solid-state dye-sensitized solar cell (DSSC) did not need hermetic sealing, but energy conversion efficiency of them decreased in comparison to those of dye-sensitized solar cell with traditional organic liquid electrolytes. Various approaches to these problems have been tried so far.

In this research, dye-sensitized solid-state solar cell, in which the liquid electrolyte, commonly applied in photoelectrochemical cells, was replaced by CuSCN as the hole conductor and compared the performance of the solar cells with anthocyanin extracted from grapes. This extracted dye was characterized by UV–vis absorption spectra. The photoelectrochemical properties and photovoltaic properties of the DSSCs using these extracts as sensitizers were studied.

II. EXPERIMENT

Solid state dye-sensitized solar cell devices was prepared, using natural dyes as photosensitizers, sandwiched with nanocrystalline semiconductor oxide of TiO2 deposited and FTO coated glass as working electrode and Pt coated glass as counter electrodes respectively.

A. *Preparation of Natural Dye Sensitizers*

The anthocyanin based natural dye was extracted from black Grapes using 25% acetic acid. Skin of the Grapes were taken off and boiled with acetic acid and the filter solution was an anthocyanin solution.

B. *Preparation of TiO2 Electrode (Photoanode)*

The photoanode is prepared by adsorbing a dye on a porous titanium dioxide, TiO2 layer deposited on FTO (Fluorine-doped SnO2) conducting glass. The semiconductor paste was prepared to fabricate TiO2 layer, by the following procedure. First Titanium tetraisopropoxide (5.00ml), Glacial Acetic Acid (5.50ml), and Iso-propyl Alchohol (20.00ml) were poured in to a ceramic motor and grind well to disperse all reagents in the medium. Then water (5.00ml) was added to the solution mixture. In this step a gelatinous form was occurred. P25 Degussa TiO_2 powder (0.650 g) was added to the mixture while grind the gelatinous solution to obtain a thicker solution of TiO_2.

The prepared paste was coated on an FTO glass by using cooking method with an approximate thickness of 10-12 micrometre and the area of the cell was 1cm2. Then the coated plate was annealed at 500^oC for 30 min.

C. Preparation of Solid State Electrolyte

Structure modified CuSCN was prepared by using THT and dissolving in prophylsulphide to use as a better hole conductor. This solution was allowed to crystallize. Then the crystals were filtered out and mother liquor was used to fabricate in photo electrode.

D. Assembly of DSSC or Grätzel Solar Cell

The TiO_2 coated glass plate was soaked in natural dye for 24 hrs in a dark and sealed place. Then glass plate was washed using acetonitrile and dried in air for few minutes. CuSCN was deposited on the pigment-coated electrodes as described below.

First the dye coated plate was placed on a hotplate under 110^0C temperature. Then the solution (mother liquor) was lightly spread over the dyed surface using a glass dropper. This procedure was repeated until CuSCN surface gets filled just above the level of TiO_2. After depositing the CuSCN, the electrical contact was made by applying graphite powder onto the CuSCN surface. Then I-V measurements were carried out by applying a platinum coated glass plate on top of the CuSCN film.

III. RESULTS AND DISCUSSION

A. Absorption of natural dyes

To understand the potency of selected natural dye as a sensitizer, UV-vis absorption spectra was observed. Fig. 1 shows UV–vis absorption spectra of the dye (diluted solution) extracted with acetic acid from Grapes, exhibit an absorption peak at around 520 nm. This absorption ascribes to their identical components, namely, anthocyanin, a group of natural phenolic compounds. The chemical adsorption of these dyes is generally accepted to occur because of the condensation of alcoholic-bound protons with the hydroxyl groups on the surface of nanostructured TiO_2.
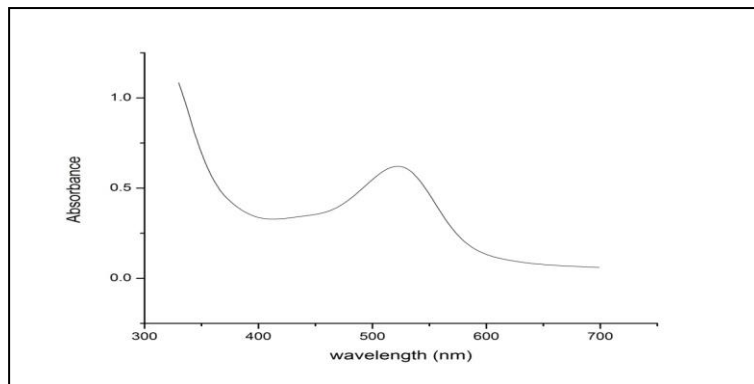
Figure 1 . UV-vis absorption spectra of anthocyanin extraceted from grapes.

B. Photoelectrochemical properties of DSCs sensitized with natural dyes

Photovoltaic tests of DSSCs using this natural dye as a sensitizer was performed by measuring the current–voltage (I–V) curves under irradiation with white light (100 mW cm−2) from AM 1.5 solar simulator with solid electrolyte. The performance of natural dye as sensitizer in DSSCs was evaluated by short circuit current (Jsc), open circuit voltage (Voc), fill factor (FF), and energy conversion efficiency (η). The photoelectrochemical parameters of the DSSCs sensitized with natural dye are listed in Table 1.

Table 1. Photovoltaic performances of the cell

Dye source	Electrolyte	J_{sc} / mA cm^{-2}	V_{oc} / V	Fill Factor	Efficiency %
Black Grapes	CuSCN	1.91	0.449	0.50	0.43

Figure 2 shows the Variation of current-voltage curve of anthocyanin extracted from grapes based DSSCs. Experiment was carried out less than 1 sun illumination, (100 mW/cm2, and air mass 1.5) with solid state electrolyte.
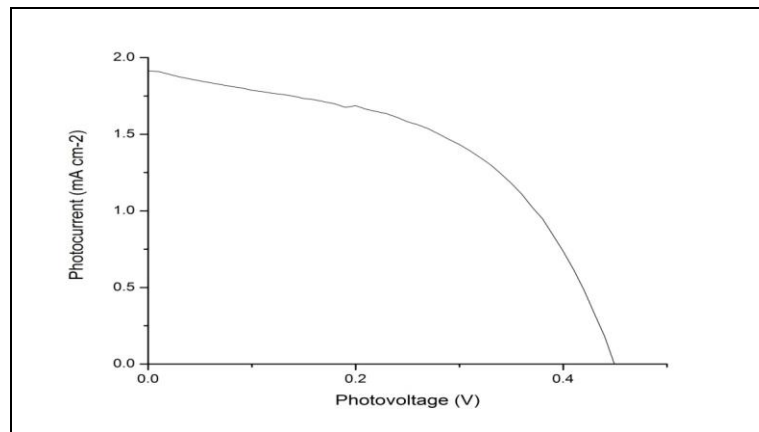
Figure 2. I-V characteristic curve of the cell

IV. CONCLUSION

In this work we have reported an investigation on anthocyanin extracted from grapes as natural photosensitizer and CuSCN as the solid electrolyte, studying its sensitization and Photoelectrochemical activities. The raw pigments simply extracted in acidic conditions from grapes achieved solar energy conversion efficiency of 0.43 %, which is the highest obtained among all sensitized cells. Natural dye based cells appear to be limited by low Voc and a large decrease in photocurrent, probably due to dye degradation. Finding different additives for improving Voc might result in larger conversion efficiencies. Although the efficiencies obtained with these natural dyes are still below the current requirements for large scale practical application, the results are encouraging and may boost additional studies oriented to the search of new natural sensitizers and to the optimization of solar cell components compatible with such dye.

ACKNOWLEDGMENT

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AUTHORS

First Author – G.G.G.M.N.Hemamali, B.Sc(special) in Physics, M.Sc, Postgraduate Institute of science and nhemamali@gmail.com .

Second Author – G.R.A.kumara, PhD, Postgraduate Institute of Science and grakumara2000@yahoo.com

Correspondence Author – G.G.G.M.N.Hemamali, nhemamali@gmail.com , nadeera@aea.gov.lk ,

Creating Adaptive Feedback designed for Improving Data Entry Accuracy

P.Jaya prakash, B.Venkateswarlu, S.Abdul Jeelan

Assistant Professors, SITAMS, Chittoor,Andhra Pradesh-india

Abstract- Data quality is a critical problem in modern databases. Data-entry forms present the first and arguably best opportunity for detecting and mitigating errors, but there has been little research into automatic methods for improving data quality at entry time. In this paper, we propose USHER, an end-to-end system for form design, entry, and data quality assurance. Using previous form submissions, USHER learns a probabilistic model over the questions of the form. USHER then applies this model at every step of the data-entry process to improve data quality. Before entry, it induces a form layout that captures the most important data values of a form instance as quickly as possible and reduces the complexity of error-prone questions. During entry, it dynamically adapts the form to the values being entered by providing real-time interface feedback, reasking questions with dubious responses, and simplifying questions by reformulating them. After entry, it revisits question responses that it deems likely to have been entered incorrectly by reasking the question or a reformulation thereof. We evaluate these components of USHER using two real-world data sets. Our results demonstrate that USHER can improve data quality considerably at a reduced cost when compared to current practice.

Index Terms- Data quality, data entry, form design, adaptive form.

I. INTRODUCTION

Organizations and individuals routinely make important decisions based on inaccurate data stored in supposedly authoritative databases. Data errors in some domains, such as medicine, may have particularly severe consequences. These errors can arise at a variety of points in the life cycle of data, from data entry, through storage, integration, and cleaning, all the way to analysis and decision making [1].While each step presents an opportunity to address data quality, entry time offers the earliest opportunity to catch and correct errors. The database community has focused on data cleaning once data have been collected into a database, and has paid relatively little attention to data quality at collection time [1], [2]. Current best practices for quality during data entry come from the field of survey methodology, which offers principles that include manual question orderings and input constraints, and double entry of paper forms [3].Although this has long been the de facto quality assurance standard in data collection and transformation, we believe this area merits reconsideration. For both paper forms and direct electronic entry, we posit that a data-driven and more computationally sophisticated approach can significantly.

Outperform these decades-old static methods in both accuracy and efficiency of data entry.

The problem of data quality is magnified in low-resource data collection settings. Recently, the World Health Organization likened the lack of quality health information in developing regions to a "gathering storm," saying, "[to] make people count, we first need to be able to count people"[4]. Indeed, many health organizations, particularly those operating with limited resources in developing regions, struggle with collecting high-quality data. Why is data collection so challenging? First, many organizations lack expertise in paper and electronic form design: designers approach question and answer choice selection with a defensive, catchall mind-set, adding answer choices and questions that may not be necessary; furthermore, they engage in ad hoc mapping of required data fields to data entry widgets by intuition [5], [6], often ignoring or specifying ill-fitting constraints. Second, double entry is too costly. In some cases this means it is simply not performed, resulting in poor data quality. In other cases, particularly when double entry is mandated by third parties, it results in delays and other unin tended negative consequences. We observed this scenario in an HIV/AIDS program in Tanzania, where time-consuming double entry was imposed upon a busy local clinic. The effort required to do the double entry meant that the transcription was postponed for months and handled in batch. Although the data eventually percolated up to national and international agencies, in the interim the local clinic was operating as usual via paper forms, unable to benefit from an electronic view of the data latent in their organization. Finally, many organizations in developing regions are beginning to use mobile devices like smartphones for data collection; for instance, community health workers are doing direct digital data entry in remote locations. Electronic data-entry devices offer different affordances than those of paper, displacing the role of traditional form design and double entry [5]. We often found that there were no data quality checks at all in aïvely implemented mobile interfaces, compounding the fact that mobile data-entry quality is 10 times worse than dictation to a human operator [7].

To address this spectrum of data quality challenges, we have developed USHER, an end-to-end system that can improve data quality and efficiency at the point of entry by learning probabilistic models from existing data, which stochastically relate the questions of a data-entry form. These models form a principled foundation on which we develop information-theoretic algorithms for form design, dynamic form adaptation during entry, and answer verification:

1. Since form layout and question selection is often adhoc, USHER optimizes question ordering according to a probabilistic objective function that aims to maximize the information content of form answers as early as possible—we call this the greedy

information gain principle. Applied before entry, the model generates a static but entropy-optimal ordering, which focus on important questions first; during entry, it can be used to dynamically pick the next best question, based on answers so far—appropriate in scenarios where question ordering can be flexible between instances.

2. Applying its probabilistic model during data entry, USHER can evaluate the conditional distribution of answers to a form question, and make it easier for likely answers to be entered—we call this the appropriate entry friction principle. For difficult-toanswer questions, such as those with many extraneous choices, USHER can opportunistically reformulate them to be easier and more congruous with the available information. In this way, USHER effectively allows for a principled, controlled trade-off between data quality and form filling effort and time.

3. Finally, the stochastic model is consulted to predict which responses may be erroneous, so as to reask those questions in order to verify their correctness—we call this the contextualized error likelihood principle.We consider reasking questions both during the data-entry process (integrated reasking) and after data entry has been finished (post hoc reasking). In both cases, intelligent question reasking approximates the benefits of double entry at a fraction of the cost.

In addition, we may extend USHER's appropriate entry friction approach to provide a framework for reasoning about feedback mechanisms for the data-entry user interface.During data entry, using the likelihood of unanswered fields given entered answers, and following the intuition that multivariate outliers are values warranting reexamination by the data-entry worker, USHER can guide the user with much more specific and context-aware feedback. In Section 9, we offer initial thoughts on design patterns for USHER-inspired dynamic data-entry interfaces.

The contributions of this paper are fourfold:

1. We describe the design of USHER's core: probabilistic models for arbitrary data-entry forms.

2. We describe USHER's application of these models to provide guidance along each step of the data-entry lifecycle: reordering questions for greedy information gain, reformulating answers for appropriate entry friction, and reasking questions according to contextualized error likelihood.

3. We present experiments showing that USHER has the potential to improve data quality at reduced cost. We study two representative data sets: direct electronic entry of survey results about political opinion and transcription of paper-based patient intake forms from an HIV/AIDS clinic in Tanzania.

4. Extending our ideas on form dynamics, we propose new user-interface principles for providing contextualized, intuitive feedback based on the likelihood of data as they are entered. This provides a foundation for incorporating data cleaning mechanisms directly in the entry process.

II.   RELATED WORK

Our work builds upon several areas of related work. We provide an overview in this section.

2.1. Data Cleaning

In the database literature, data quality has typically been addressed under the rubric of data cleaning [1], [2]. Our work connects most directly to data cleaning via multivariate outlier detection; it is based in part on interface ideas first proposed by Hellerstein [8]. By the time such retrospective data cleaning is done, the physical source of the data is typically unavailable—thus, errors often become too difficult or time-consuming to be rectified. USHER addresses this issue by applying statistical data quality insights at the time of data entry. Thus, it can catch errors when they are made and when ground-truth values may still be available for verification.

2.2. User Interfaces

Past research on improving data entry is mostly focused on adapting the data-entry interface for user efficiency improvements. Several such projects have used learning techniques to automatically fill or predict a top-k set of likely values [9], [10], [11], [12], [13], [14], [15]. For example, Ali and Meek [9] predicted values for combo-boxes in web forms and measured improvements in the speed of entry, Ecopod [15] generated type-ahead suggestions that were improved by geographic information, and Hermens and Schlimmer [10] automatically filled leave of absence forms using decision trees and measured predictive accuracy and time savings. In these approaches, learning techniques are used to predict form values based on past data, and each measures the time savings of particular data-entry mechanisms and/or the proportion of values their model was able to correctly predict. USHER's focus is on improving data quality, and its probabilistic formalism is based on learning relationships within the underlying data that guide the user toward correct entries. In addition to predicting question values, we develop and exploit probabilistic models of user error, and target a broader set of interface adaptations for improving data quality, including question reordering, reformulation, and reasking, and widget customizations that provide feedback to the user based on the likelihood of their entries. Some of the enhancements we make for data quality could also be applied to improve the speed of entry.

2.3. Clinical Trials

Data quality assurance is a prominent topic in the science of clinical trials, where the practice of double entry has been questioned and dissected, but nonetheless remains the gold standard [16], [17]. In particular, Kleinman takes a probabilistic approach toward choosing which forms to reenter based on the individual performance of data-entry staff [18]. This cross-form validation has the same goal as our approach of reducing the need for complete double entry, but does so at a much coarser level of granularity. It requires historical performance records for each data-entry worker, and does not offer dynamic reconfirmation of individual questions. In contrast, USHER's cross-question validation adapts to the actual data being entered in light of previous form submissions, and allows for a principled assessment of the trade-off between cost (of reconfirming more questions) versus quality (as predicted by the probabilistic model).

2.4. Survey Design

The survey design literature includes extensive work on form design techniques that can improve data quality [3], [19]. This literature advocates the use of manually specified constraints on response values. These constraints may be univariate (e.g., a maximum value for an age question) or multivariate (e.g., disallowing gender to be male and pregnant to be yes). Some constraints may also be "soft" and only serve as warnings regarding unlikely combinations (e.g., age being 60 and pregnant being yes).

The manual specification of such constraints requires a domain expert, which can be prohibitive in many scenarios. By relying on prior data, USHER learns many of these same constraints without requiring their explicit specification.When these constraints are violated during entry,USHER can then flag the relevant questions, or target them for reasking.

However, USHER does not preclude the manual specification of constraints. This is critical, because previous research into the psychological phenomena of survey filling has yielded common constraints not inherently learnable from prior data [3]. This work provides heuristics such as "groups of topically related questions should often be placed together" and "questions about race should appear at the end of a survey." USHER complements these humanspecified constraints, accommodating them while leveraging any remaining flexibility to optimize question ordering in a data-driven manner.

III. SYSTEM

USHER builds a probabilistic model for an arbitrary dataentry form in two steps: first, by learning the relationships between form questions via structure learning, resulting in a Bayesian network; and second, by estimating the parameters of that Bayesian network, which then allows us to generate predictions and error probabilities for the form.

After the model is built, USHER uses it to automatically order a form's questions for greedy information gain. Section 5 describes both static and dynamic algorithms that employ criteria based on the magnitude of statistical information gain that is expected in answering a question, given the answers that have been provided so far. This is a key idea in our approach. By front-loading predictive potential, we increase the models' capacity in several ways. First, from an information-theoretic perspective, we improve our ability to do multivariate prediction and outlier detection for subsequent questions. As we discuss in more detail in Sections 7 and 9, this predictive ability can be applied by reformulating error-prone form questions, parameterizing data-entry widgets (type-ahead suggestions and default values), assessing answers (outlier flags), and performing in-flight reasking (also known as cross validation in survey design parlance). Second, from a psychological perspective, frontloading information gain also addresses the human issues of user fatigue and limited attention span, which can result in increasing error rates over time and unanswered questions at the end of the form.

Our approach is driven by the same intuition underlying the practice of curbstoning, which was related to us in discussion with survey design experts [6]. Curbstoning is a way in which an unscrupulous door-to-door surveyor shirks work: he or she asks an interviewee only a few important questions, and then uses those responses to complete the remainder of a form while sitting on the curb outside the home. The constructive insight here is that a well-chosen subset of questions can often enable an experienced agent to intuitively predict the remaining answers. USHER's question ordering algorithms formalize this intuition via the principle of greedy information gain, and use them (scrupulously) to improve data entry.

USHER's learning algorithm relies on training data. In practice, a data-entry backlog can serve as this training set. In the absence of sufficient training data, USHER can bootstrap itself on a "uniform prior," generating a form based on the assumption that all inputs are equally likely; this is no worse than standard practice. Subsequently, a training set can gradually be constructed by iteratively capturing data from designers and potential users in "learning runs." It is a common approach to first fit to the available data, and then evolve a model as new data become available. This process of semiautomated form design can help institutionalize new forms before they are deployed in production.

USHER adapts to a form and data set by crafting a custom model. Of course, as in many learning systems, the model learned may not translate across contexts. We do not claim that each learned model would or should fully generalize to different environments. Instead, each contextspecific model is used to ensure data quality for a particular situation, where we expect relatively consistent patterns in input data characteristics. In the remainder of this section, we illustrate USHER's functionality with examples. Further details, particularly regarding the probabilistic model, follow in the ensuing sections.

3.1. Examples

We present two running examples. First, the patient comes from paper patient-registration forms transcribed by data-entry workers at an HIV/AIDS program in Tanzania.1 Second, the survey data set comes from a phone survey of
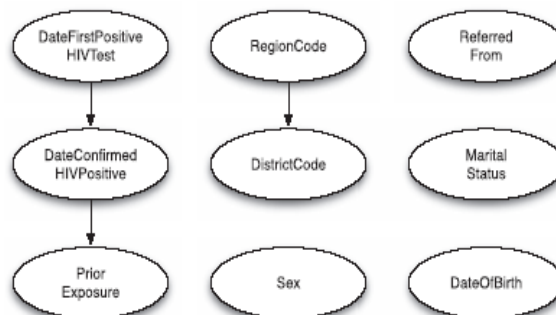
Fig.1. *Bayesian network for the patient data set,showing Automatically inferred probabilistic relationships Between form questions.*

political opinion in the San Francisco Bay Area, entered by survey professionals directly into an electronic form.

In each example, a form designer begins by creating a simple specification of form questions and their prompts,response data types, and constraints. The training data set is made up of prior form responses. Using the learning algorithms we present in Section 4, USHER builds a Bayesian network of probabilistic relationships from the data, as shown in Figs. 1 and 2. In this graph, an edge captures a close stochastic dependency between

two random variables (i.e.,form questions). Two questions with no path between them in the graph are probabilistically independent. Fig. 2 illustrates a denser graph, demonstrating that political survey responses tend to be highly correlated. Note that a standard joint distribution would show correlations among all pairs of questions; the sparsity of these examples reflects conditional independence patterns learned from the data.Encoding independence in a Bayesian network is a standard method in machine learning that clarifies the underlying structure, mitigates data overfitting, and improves the efficiency of probabilistic inference.

The learned structure is subject to manual control: a designer can override any learned correlations that are believed to be spurious or that make the form more difficult to administer.

For the patient data set,USHER generated
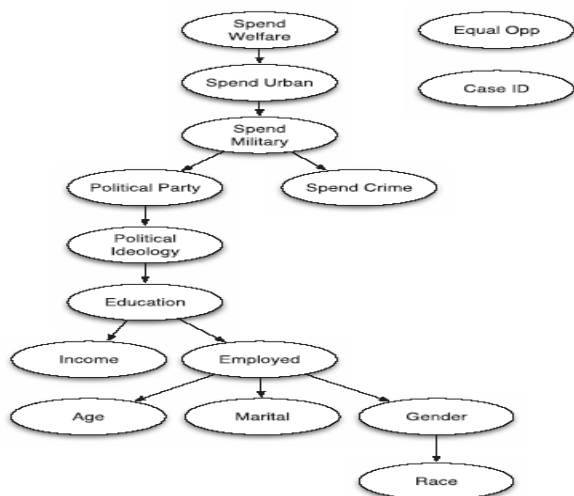
Fig.2. *Bayesian network for the survey data set.*

static ordering shown in Fig. 3. We can see in Fig. 3 that the structure learner predicted RegionCode to be correlated with DistrictCode. Our data set is collected mostly from clinics in a single region of Tanzania, so RegionCode provides little information. It is not surprising then, thatUSHER's suggested ordering has DistrictCode early and RegionCode last—once we observe DistrictCode, RegionCode has very little additional expected conditional information gain. When it is time to input the RegionCode, if the user selects an incorrect value, the model can be more certain that it is unlikely. If the user stops early and does not fill in RegionCode, the model can infer the likely value with higher confidence. In general, static question orderings are appropriate as an offline process for paper forms where there is latitude for (re)ordering questions, within designer-specified constraints.

During data entry, USHER uses the probabilistic machinery to drive dynamic updates to the form structure. One type of update is the dynamic selection of the best next question to ask among questions yet to be answered. This can be appropriate in several situations, including surveys that do not expect users to finish all questions, or direct-entry interfaces (e.g., mobile phones) where one question is asked at a time. We note that it is still important to respect the form designer's a priori specified question-grouping and –ordering constraints when a form is dynamically updated.

USHER is also used during data entry to provide dynamic feedback, by calculating the conditional distribution for the question in focus and using it to influence the way the question is presented. We tackle this via two techniques: question reformulation and widget decoration. For the former, we could, for example, choose to reformulate the question about RegionCode into a binary yes/no
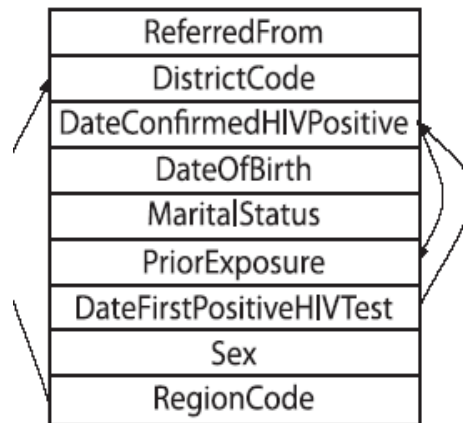
Fig. 3. *Example question layout generated by our ordering algorithm. The arrows reflect the probabilistic dependencies from Fig. 1.*

question based on the answer to DistrictCode, since DistrictCode is such a strong predictor of RegionCode. As we discuss in Section 7, the reduced selection space for responses in turn reduces the chances of a data-entry worker selecting an incorrect response. For the latter, possibilities include using a "split" drop-down menu for RegionCode that features the most likely answers "above the line," and after entry, coloring the chosen answer red if it is a conditional outlier. We discuss in Section 9 the design space and potential impact of data-entry feedback that is more specific and context-aware.

As a form is being filled, USHER calculates contextualized error probabilities for each question. These values are used for reasking questions in two ways: during primary form entry and for reconfirming answers after an initial pass. For each form question, USHER predicts how likely the response provided is erroneous, by examining whether it is likely to be a multivariate outlier, i.e., that it is unlikely with respect to the responses for other fields. In other words, an error probability is conditioned on all answered values provided by the data-entry worker so far

3.2.Implementation
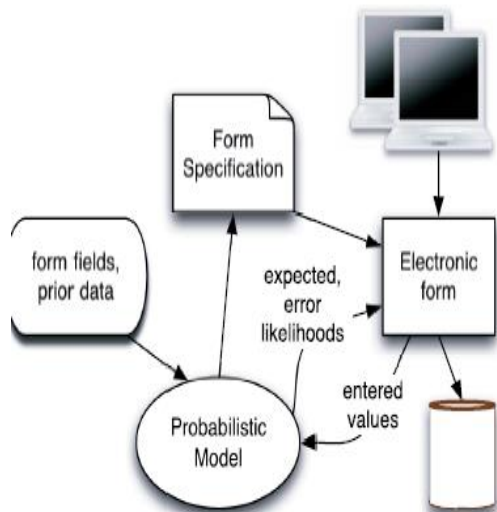
We have implemented USHER as a web application (Fig. 4). The UI loads a simple form specification file containing form question details and the location of the training data set. Form question details include question name, prompt, data type,widget type, and constraints. The server instantiates a model for each form. The system passes information about question responses to the model as they are filled in; in exchange, the model returns redictions and error probabilities.Models are created from the form specification, the training data set, and a graph of learned structural relationships.We perform structure learning offline with BANJO [20], an open source Java package for structure learning of Bayesian networks. Our graphical model is implemented in two variants: the first model used for ordering is based on a modified version of JavaBayes [21], an open source Java software for ayesian inference. Because JavaBayes only supports discrete probability variables, we implemented the error prediction version of our model using Infer.NET [22], a Microsoft .NET Framework toolkit for Bayesian inference.

IV.   LEARNING A MODEL FOR DATA ENTRY

The core of the USHER system is its probabilistic model of the data, represented as a Bayesian network over form questions. This network captures relationships between a form's question elements in a stochastic manner. In particular, given input values for some subset of the questions of a particular form instance, the model can infer probability distributions over values of that instance's remaining unanswered questions. In this section, we show how standard machine learning techniques can be used to induce this model from previous form entries.

We will use $F=\{F1, . . . ; Fn\}$ to denote a set of random variables representing the values of n questions comprising a data-entry form. We assume that each question response takes on a finite set of discrete values; continuous values are discretized by dividing the data range into intervals and assigning each interval one value.2 To learn the probabilistic model, we assume access to prior entries for the same form.

USHER first builds a Bayesian network over the form questions, which will allow it to compute probability distributions over arbitrary subsets G _ F of form question random variables, given already entered question responses G` = g` for that instance, i.e., P(G|G`=g`).Constructing this network requires two steps: first, the induction of the graph structure of the network, which encodes the conditional independencies between the question random variables F; and second, the estimation of the resulting network's parameters.

The naive approach to structure selection would be to assume complete dependence of each question on every other question. However, this would blow up the number of free parameters in our model, leading to both poor generalization performance of our predictions and prohibitively slow model queries. Instead, we learn the structure using the prior form submissions in the database. USHER searches through the space of possible structures using simulated annealing, and chooses the best structure according to the Bayesian Dirichlet Equivalence criterion [23]. This criterion optimizes for a trade-off between model expressiveness (using a richer dependency structure) and model parsimony (using a smaller number of parameters), thus identifying only the prominent, recurring probabilistic dependencies.Fig. 1 and 2 show automatically learned structures For two data domains.

V.   DISCUSSION AND FUTURE WORK

In this paper, we have shown that a probabilistic approach can be used to design intelligent data-entry forms that promote high data quality. USHER leverages data-driven insights to automate multiple steps in the data-entry pipeline. Before entry, we find an ordering of form fields that promotes rapid information capture, driven by a greedy information gain principle, and can statically reformulate questions to promote more accurate responses. During entry, we dynamically adapt the form based on entered values, facilitating reasking, reformulation, and real-time interface feedback in the sprit of providing appropriate entry friction. After entry, we automatically identify possibly erroneous inputs, guided by contextualized error likelihoods, and reask those questions, possibly reformulated, to verify their correctness. Our simulated empirical evaluations demonstrate the data quality benefits of each of these components: question ordering, reformulation and reasking.The USHER system we have presented is a cohesive synthesis of several disparate approaches to improving data quality for data entry. The three major components of the system—ordering, reasking, and reformulation—can all be applied under various guises before, during, and after data entry. This suggests a principled road map for future research in data entry. For example, one combination we have not explored here is reasking before entry. At first glance this may appear strange, but in fact that is essentially the role that cross-validation questions in paper forms serve, as preemptive reformulated reasked questions. Translating such static cross-validation questions to dynamic forms is a potential direction of future work. Another major piece of future work alluded to in Section 9 is to study how our probabilistic model can inform effective adaptations of the user interface during data entry. We intend to answer this problem in greater depth through user studies and field deployments of our system. We can also extend this work by enriching the underlying probabilistic formalism. Our current

probabilistic approach assumes that every question is discrete and takes on a series of unrelated values. Relaxing these assumptions would make for a potentially more accurate predictive model for many domains. Additionally, we would want to consider models that reflect temporal changes in the underlying data. Our present error model makes strong assumptions both about how errors are distributed and what errors look like. On that front, an interesting line of future work would be to learn a model of data-entry errors and adapt our system to catch them. Finally, we are in the process of measuring the practical impact of our system, by piloting USHER with our field partners, the United Nations Development Program's Millennium Villages Project [34] in Uganda, and a community health care program in Tanzania. These organizations' data quality concerns were the original motivation for this work and thus serve as an important litmus test for our system.

ACKNOWLEDGMENTS

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AUTHORS

First Author – P.Jaya prakash, Assistant Professors, SITAMS, Chittoor,Andhra Pradesh-india
Second Author – B.Venkateswarlu, Assistant Professors, SITAMS, Chittoor,Andhra Pradesh-india
Third Author – S.Abdul Jeelan, Assistant Professors, SITAMS, Chittoor,Andhra Pradesh-india

Brain Glass Technology

Hussein Kothari, VivekchandKharwar, VipinSuthar, Mukesh Patel

V.E.S Institute of Technology, Approved by AICTE & Affiliated to Mumbai University, Hashu Advani Memorial Complex, Collector colony, Chembur-400074

Abstract- The aim of this research was to explore the possible integration of Google Glass with Brain Mapping technology towards the development of enhanced version of Google Glass that can directly mapping the brain impulses and execute commands of users.

It refers to technologies like Brain Mapping, EEG and the Google Glass Device.

I. INTRODUCTION

Brain-grass enable users to control devices with electroencephalographic (EEG) activity from the scalp or with single-neuron activity from within the brain.We demonstrate here for the first time that electrocorticographic (ECOG) activity recorded from the surface of the brain can enable users to control a one-dimensional computer cursor rapidly and accurately.

Through the use of ECOG ,google-glass a wearable computer with an optical head-mounted display (OHMD) displays information in a smartphone-like hands-free format that can communicate with the Internet via signals sent by ECOG.

II. COMPONENTS IN USE

Brain–computer interfaces (BCIs) convert brain signals into outputs that communicate a user's intent. Because this new communication channel does not depend on peripheralnerves and muscles, it can be used by people with severe motor disabilities. BCIs can allow patients who are totally paralyzed (or 'locked in') by **amyotrophic lateral sclerosis(ALS)**, brainstem stroke or other neuromuscular diseasesto express their wishes to the outside world. However, practical applications of BCI technology to the needs of all people impeded by the limitations and requirements of current BCI methodologies.

BCIs can use non-invasive or invasive methods. Noninvasive BCIs use electroencephalographic activity (EEG)recorded from the scalp. They are convenient and safe but they have relatively low spatial resolution, are susceptible to artifacts such as electromyographic(EMG) signals, and often require extensive user training.

Invasive BCIs use single-neuron activity recorded within the brain. While they have higher spatial resolutionand might provide control signals with many degrees of freedom, BCIs that depend on electrodes within cortex facesubstantial problems in achieving and maintaining stable long-term recordings.

III. BRAIN CURVES ANALYSIS

The below figure depicts the various convex and concave regions from where the electrods can be placed to monitor the impulses during thinking process of Human.These records will help to identify the objective thinked by Human.

Then use ECOG to convert that singnals to computer data that analyse it to a meaningfull word in human readable.
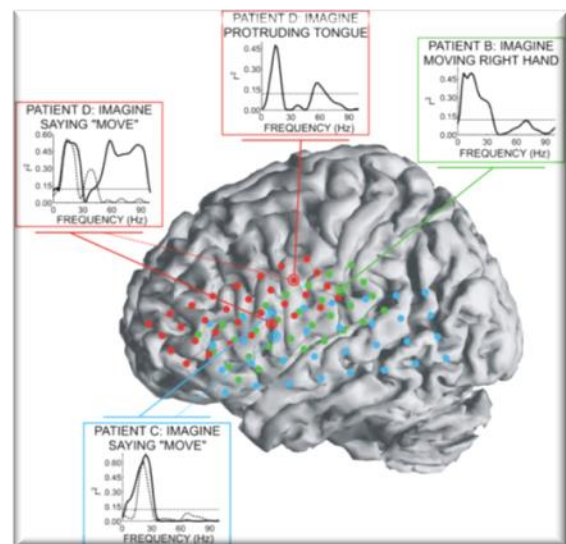
View to Brain -glass
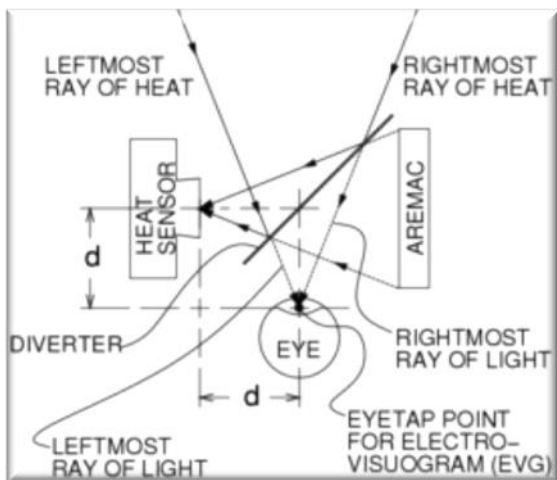
IV. EYE LENCE ALALYSIS

The above figure gives the idea of Human eye vision and the glass used to display the Picture/images to the user.

The above figure's working is control by google glass a device developed by Google.

Google glass:

Google Glass is an attempt to free data from desktop computers and portable devices like phones and tablets, and place it right in front of your eyes.

Essentially, Google Glass is a camera, display, touchpad, battery and microphone built into spectacle frames so that you can perch a display in your field of vision, film, take pictures, search and translate on the go.

The principle is one that has been around for years in science fiction, and more recently it's become a slightly clunky reality. In fact, the "heads-up display" putting data in your field of vision became a reality as early as 1900 when the reflector sight was invented.

Google Glass uses display technology instead to put data in front (or at least, to the upper right) of your vision courtesy of a prism screen. This is designed to be easily seen without obstructing your view. According to Google the display is "the equivalent of a 25-inch high definition screen from eight feet The embedded camera obviously does not need a viewfinder because it is simply recording your first-person perspective, allowing you to take snaps or footage of what you are actually seeing.

Any function that requires you to look at a screen could be put in front of you.

Controlling this data is the next neat trick. With a microphone and touchpad on one arm of the frame, you can select what you want to do with a brief gesture or by talking to the device, and Google Glass will interpret your commands.

Google Glass can also provide sound, with bone-induction technology confirmed. This vibrates your skull to create sound, which is both more grisly sounding and much less cumbersome than traditional headphones.

way". There's no official word on native resolution, but 640 x 360 has been widely mooted.
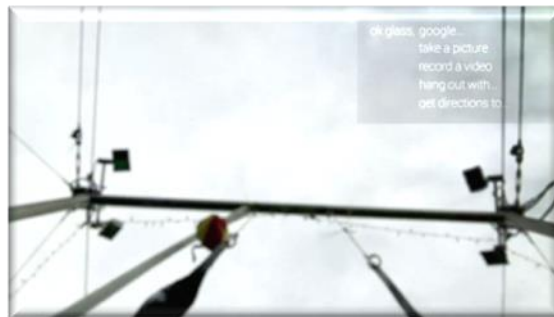
Overlaying data into your vision has obvious benefits; many of which are already functional in Google Glass. Directions become more intuitive (although it sounds like there is no GPS on board so you will have to pair it with your phone), you can view real-time translations or transcriptions of what is being said, and you can scroll through and reply to messages - all on the fly.

What can Google Glass do?

As well as Google's own list of features, the early apps for Google Glass provide a neat glimpse into the potential of the headset.

As well as photos and film - which require no explanation - you can use the Google hangout software to video conference with your friends and show them what you're looking at.

You'll also be able to use Google Maps to get directions, although with GPS absent from the spec list, you'll need to tether Glass to your phone.

To do that, Google offers the MyGlass app. This pairs your headset with an Android phone. As well as sharing GPS data, this means messages can be received, viewed on the display, and answered using the microphone and Google's voice-to-text functionality.

Google has given its Glass project a big boost
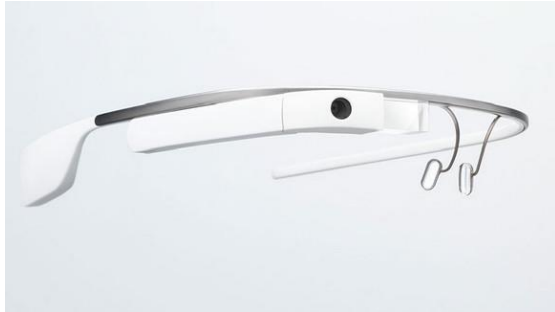
by

That functionality will also bring the ability to translate the words being spoken to you into your own language on the display. Obviously you'll need a WiFi connection or a hefty data plan if you're in another country, but it's certainly a neat trick if it works.

Third parties are also already developing some rather cool/scary apps for Google Glass - including one that allows you to identify your friends in a crowd, and another that allows you to dictate an email.

The New York Times app gives an idea how news will be displayed when it's asked for: a headline, byline, appropriate image and number of hours since the article was published are displayed.

V. OUR IDEA

Our idea is to transfer the records/data recorded by ECOG to embed into the Google glass's chip to get the command from the brain and not from the voice command which google glass provide till now.

VI. CONCULSIONS

To design a device that can be handle by the as per thinking of the person and not as per voice command.

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AUTHORS

First Author – Hussein Kothari, V.E.S Institute of Technology, Approved by AICTE & Affiliated to Mumbai University, Hashu Advani Memorial Complex, Collector colony, Chembur-400074, Email: mailtohusseink@gmail.com

Second Author – VivekchandKharwar, V.E.S Institute of Technology, Approved by AICTE & Affiliated to Mumbai University, Hashu Advani Memorial Complex, Collector colony, Chembur-400074, Email: vivekchandkharwar@gmail.com

Third Author – VipinSuthar, V.E.S Institute of Technology, Approved by AICTE & Affiliated to Mumbai University, Hashu Advani Memorial Complex, Collector colony, Chembur-400074

Fourth Author – Mukesh Patel, V.E.S Institute of Technology, Approved by AICTE & Affiliated to Mumbai University, Hashu Advani Memorial Complex, Collector colony, Chembur-400074

Pulmonary Nocardiosis in Immunocompetent Patients: A Report of Four Cases from a Tertiary Care Centre

Barnini Banerjee

Department Of Microbiology, Kasturba Medical College, Manipal

Abstract- Pulmonary nocardiosis (PN) is an infrequent and severe infection due to *Nocardia spp*. It is more common in immunosuppressed individual. The aim of this study was to evaluate the clinical features, evolution and prognosis of PN in immuno-competent hosts. The study group comprised 4 consecutive immuno-competent patients with pulmonary nocardiosis acquired in a community setting, diagnosed and followed in a tertiary care hospital.

Chronic obstructive pulmonary disease (COPD) and pulmonary tuberculosis were the underlying diseases. Two patients had received anti-tubercular treatment before isolation of *Nocardia spp*. Clinical course was chronic and diagnosis was delayed 2 weeks or more in two out of four patients. Lobar or multilobar condensation was the most frequent radiographic pattern. The disease remained localized in the lung in all the four cases, with a trend toward chronicity in one with bronchiectasis.

The following conclusions were reached : (1) In our geographical setting *Nocardia* presents as a subacute or chronic pulmonary infection, mainly outside the hospital. (2) Pulmonary nocardiosis is difficult to diagnose, diagnosis is frequently delayed and a high level of suspicion is, thus, required in patients with underlying diseases e.g. COPD, pulmonary tuberculosis. (3) Diagnosis requires a high clinical suspicion, and can be made on the basis of a microbiological investigation of sputum or bronchoalveolar lavage. (4) The treatment of choice for this infection includes cotrimoxazole but some *Nocardia spp*. may show resistance to this drug.

Index Terms- A Nocardia spp., Immuno-competent, Pulmonary tuberculosis, COPD

I. INTRODUCTION

Nocardiosis is a localised or disseminated infection caused by *Nocardia spp*. Common sites of dissemination include the lungs, skin, brain and musculoskeletal system.[1] *Nocardia* spp. are branching, beaded, filamentous aerobic gram-positive bacteria and are weakly acid fast. In humans, *N.asteroids* complex is the predominant pathogen, but there are several other species, including: *N.brasilienis* and *N.otitidiscaviarum.* Pulmonary infection is usually produced by *N.asteroides*(85%), whereas *N.brasilieni s*causes cutaneous and subcutaneous abscesses[2] .

Pulmonary nocardiosis (PN) is an infrequent but severe infection that commonly presents as a subacute or chronic suppurative disease.[3]It is characterised by positive respiratory symptoms, radiographic infiltrates and positive cultures from respiratory samples.(6) Soil is a natural habitat of *Nocardia,*.

Man acquires infection by inhalation of the bacteria from contaminated soil. Person-to-person transmission is rare[5].

Nocardia infections are common in COPD or immunosuppressed patients.[6]Immunosuppressive conditions commonly associated are chronic steroid use, solid-organ transplantation, lymphoreticular malignancy, chronic granulomatous disease (CGD), or human immunodeficiency virus (HIV) infection.[7]

Cotrimoxazole alone is highly effective against majority of isolates of *Nocardia spp* .but sometimes combination antimicrobial therapy with amikacin, imipenam or ceftriaxone is required for critical patients therapy with Nocardial infection.[8]

II. CASE REPORT

Patients and methods

The study group comprised 4 patients with pulmonary nocardiosis acquired in a community setting, diagnosed and followed in a tertiary care hospital. The following data were collected: predisposing factors; clinical manifestations; radiographic findings; bacteriological reports; treatment; outcome of illness; duration of infection from the onset of symptoms to diagnosis.

Characteristics and clinical features of the patients

Four patients (3 males, 1 female) were diagnosed with Nocardial infection with a mean age of 56 yrs. The clinical manifestations in the four patients were: cough, purulent expectoration, fever and dyspnoea. The following underlying diseases were present in the four patients: Chronic obstructive pulmonary disease (COPD) (2) and pulmonary tuberculosis (2). Two patients were on anti-tubercular treatment and diagnosis was delayed 2 weeks or more in those two patients.

Radiographic patterns

Lobar and multilobar condensation was seen in the above cases.

Microbiological identification

In four patients, *Nocardia spp*. was also isolated in sputum. Microbiological identification was attained by direct microscopic observation of preparations with Gram and Kinyoun's acid fast staining. All specimens were cultured on blood agar and chocolate agar plates aerobically at 37°С. They were also cultured in duplicate slopes of Lowenstein - Jensen (LJ) medium. The slopes were incubated at 36°C for 3 weeks. Gram stained sputum smear revealed beaded and branched gram positive filaments (FIG-1). Smears stained for acid fast organisms using 1

% sulphuric acid as decolorizing agent revealed thin acid fast beaded and branched structures (FIG-2). Culture showed Colonies with features of *Nocardia* species after 48 hours in chocolate and blood agar. The growth on LJ medium appeared as moist and glaborous (FIG-3). The growth was confirmed by presence of gram positive and acid fast thin beaded and branching filaments.
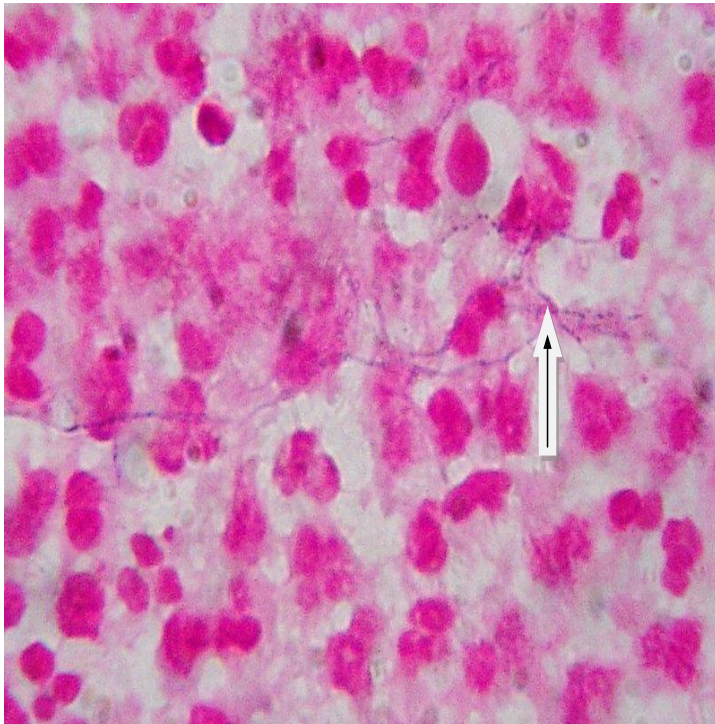
FIG1: Gram positive branching filamentous bacilli (Gram stain x100)
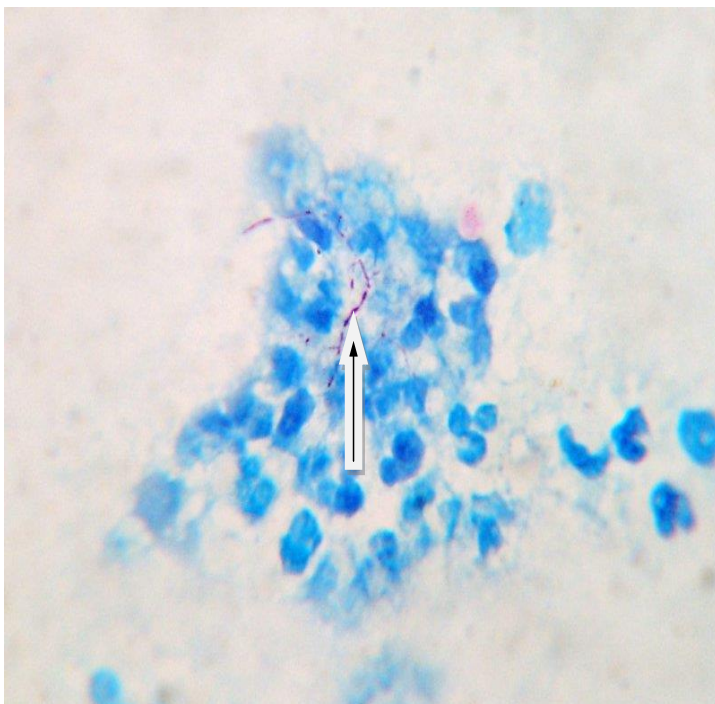
FIG2: Acid fast branching filamentous structure (Kinyoun's acid fast staining x 100)

FIG 3: Growth of *Nocardia spp*. in LJ medium.

Clinical outcome:

Resolution of the disease was defined as eradication of *Nocardia* spp., together with clinical and radiological improvement. The disease remained localized in the lung in all the four cases, with a trend toward chronicity in one with bronchiectasis. All the patients showed symptomatic improvement within a week but complete radiological resolution took 1-3 months.

III.   DISCUSSION

Pulmonary nocardiosis is a sub-acute or chronic infection caused by aerobic actinomycetes of genus Nocardia. Nocardia infections are rare among normal population, most infections occur in immuno-compromised patients.They behave as an opportunist microorganism in an immune-compromised host.[9,10] Among the Nocardia spp. *Nocardia asteroids* is a saprophyte of skin and respiratory tract. Most of the time respiratory colonization occur when the individual has underlying obstructive pulmonary disease and treated with corticosteroid therapy. In the absence of corticosteroid therapy infection is very rare.[11] It can affect immunocompetent host by impairing bronchial defences by damaging ciliated epithelial cells especially in COPD and bronchiectasis patients.[12] In the present series it was found that underlying COPD were present in two patients. They were never prescribed oral or inhaled corticosteroid therapy. Similar to other studies, clinical findings were nonspecific.[11] As both clinically and radiologically it mimics and sometimes coexist with pulmonary tuberculosis.[1] In

the present study, 2 cases were diagnosed as tuberculosis before the isolation of *Nocardia spp* .and were started with anti-tubercular therapy (ATT). One among them developed chronic course later. With antimicrobial treatment disease remain localized in the lung and complete resolution occurred gradually in 3 patients within 1 month. But one patient developed chronicity (bronchiectasis) inspite of therapy. The reason could be the *Nocardia spp*. isolated in this patient was resistant to cotrimoxazole or may be diagnosis was delayed.

IV. CONCLUSIONS

1) The cases are unique as pulmonary Nocardiosis were seen in immunocompetent hosts acquired in a community setting. 2) Pulmonary nocardiosis is difficult to diagnose, diagnosis is frequently delayed and a high level of suspicion is, thus, required in patients with COPD or chronic tubercular therapy. Because most of the time Nocardia co-infection never suspected once pulmonary tuberculosis is diagnosed. High index of suspicion arise when patient fail to respond after completing anti-tubercular chemotherapy. 3) As it is difficult to diagnose clinically and radiologially, clinicians should take help from microbiologists to include specific stains and cultures to investigate the presence of *Nocardia spp*. 4) Though the treatment of choice for localised infection in immune-competent host is cotrimoxazole but some *Nocardia spp*. shows resistant to it, so antimicrobial susceptibility is required, which is not done in our study.

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AUTHORS

First Author – Barnini Banerjee, M.D. Microbiology, Assistant Professor, Department of Microbiology, Kasturba Medical College, Manipal.

Correspondence Author – Dr. Barnini Banerjee, M.D. Microbiology, Assistant Professor, Department of Microbiology, Kasturba Medical College, Manipal- 576104, Karnataka. E-mail address: barnini8@gmail.com, Contact no. 9916618746

The Glycemic Index of Partially Refined Yellow Sugar and Plantation White Sugar: A comparative Study

AmrutaNaik[1*], PallaviAnsulkar[2], Dr. AbhayChowdhary[3]

   Abstract- The Glycemic index (GI) is a measure of the effects of carbohydrates in food on blood sugar levels. It estimates how much each gram of available carbohydrate (total carbohydrate minus fiber) in a food raises a person's blood glucose level following consumption of the food, relative to consumption of glucose. Cane sugar requires further processing to provide the free-flowing white table sugar required by the consumer. The completely refined white sugar product is now over 99.9% sucrose and for all practical purposes contains no nutritional elements such as vitamins, minerals, proteins or fibers. Refined sugar is lethal when ingested by humans because it provides only that which nutritionists describe as "empty" or "naked" calories. It lacks the natural minerals which are present in the sugar beet or cane. The main objective of this study was to estimate and compare the GI values of the Partially Refined Yellow Sugar and PlantationWhite Sugar. *In - vivo* study was conducted by using Male wistar rats as a model and blood glucose analysis was done on semiautoanalyser by GOD – POD method. In this study, it was observed that the GI value of the Partially Refined Yellow Sugar was 84% and GI value of the PlantationWhite Sugar was 100%. From this we concluded that Partially Refined Yellow Sugar has low GI value as compared to the PlantationWhite Sugar and thus it can be used for the preparation of food items for the diabetic patients and for the weight loss program.

   Key words- Glycemic Index, Partially Refined Yellow Sugar, Plantation White Sugar, Glucose

I. INTRODUCTION

   The Glycemic index (GI) is an indicator for the classification of carbohydrate containing food based on their blood-glucose-raising potential. It is defined as 'the incremental area under the glucose response curve to a test food providing a fixed amount of carbohydrate, relative to the response to a standard control food (glucose or white bread) providing the same amount of carbohydrate' (Jenkins et al. 1981). The concept was developed by Dr. David J. Jenkins and colleagues (1980–1981) to find out which food was best for people with diabetes (Jenkins et al, 1981). Foods with a high GI produce a higher peak and greater overall blood glucose response than those with a low GI, which release glucose into the blood at a slower rate. A low-GI food is defined as having a GI of ≤55, and a high-GI food has a GI of P≥70.(Aston, 2006) A lower glycemic index suggests slower rates of digestion and absorption of the foods' carbohydrates and may also indicate greater extraction from the liver and periphery of the products of carbohydrate digestion (Jenkins et al, 1981). A lower Glycemic response usually equates to a lower insulin demand but not always, and may improve long-term blood glucose control (Jenkins et al, 2008) and blood lipids too. *The GI is a ranking of carbohydrates on a scale from 0 to 100 according to the extent to which they raise blood sugar levels after eating. Foods with a high GI are those which are rapidly digested and absorbed and results in marked fluctuations in blood sugar levels. Low-GI foods, by virtue of their slow digestion and absorption, produce gradual rises in blood sugar and insulin levels, and have proven benefits for health. Low GI diets have been shown to improve both glucose and lipid levels in people with diabetes (type 1 and type 2). They have benefits for weight control because they help control appetite and delay hunger. Low GI diets also reduce insulin levels and insulin resistance in the body (Bjorck and Ehmstal, 2003).*
   Sugar was first manufactured from sugar cane in India, and its manufacture has spread from there throughout the world. Chemically, sugar is the polysaccharide sucrose, which can be hydrolyzed in acidic solution (i.e. below pH 7) to form the monosaccharides glucose and fructose. It is in the sugar mills that the raw sugar is separated from the plant and shipped to a refinery. Refined sugar has been depleted of its life forces, vitamins and minerals. What is left consists of pure, refined carbohydrates. The body cannot utilize this refined starch and carbohydrate unless the depleted proteins, vitamins and minerals are present. Nature supplies these elements in each plant in quantities sufficient to metabolize the carbohydrate in that particular plant. There is no excess for other added carbohydrates. Incomplete carbohydrate metabolism results in the formation of 'toxic metabolite' such as pyruvic acid and abnormal sugars containing five carbon atoms. Pyruvic acid accumulates in the brain and nervous system and the abnormal sugars in the red blood cells. These toxic metabolites interfere with the respiration of the cells. They cannot get sufficient oxygen to survive and function normally. In time, some of the cells die. This interferes with the function of a part of the body and is the beginning of degenerative disease."(Duffy, 1975). Sugar taken every day produces a continuously over acid condition, and more and more minerals are required from deep in the body in the attempt to rectify the imbalance. Finally, in order to protect the blood, so much calcium is taken from the bones and teeth that decay and general weakening begin. Excess sugar eventually affects every organ in the body. Initially, it is stored in the liver in the form of glucose (glycogen). Since the liver's capacity is limited, a daily intake of refined sugar (above the required amount of natural sugar) soon makes the liver expand like a balloon. When the liver is filled to its maximum capacity, the excess glycogen is returned to the blood in the form of fatty acids. These are taken to every part of the body and stored in the most inactive areas: the belly, the buttocks, the breasts and the thighs. Excessive sugar has a strong adverse effect on the

functioning of the brain. The key to orderly brain function is glutamic acid, a vital compound found in many vegetables. The vitamin B plays a major role in dividing glutamic acid into antagonistic-complementary compounds which produce a "proceed" or "control" response in the brain. Vitamin B is also manufactured by symbiotic bacteria which live in our intestines. When refined sugar is taken daily, these bacteria wither and die, and our stock of B vitamins gets very low. Too much sugar makes one sleepy; our ability to calculate and remember is lost.(Brand-Miller et al, 1995). Refined white sugar is void of nutrition because it is bleached and over processed. However Raw Sugar is not bleached or heated and contains all the nutrition. *Cane sugar* is rich in a variety of minerals and vitamins, including calcium, magnesium and riboflavin (vitamin B2). It also has a high potassium content, which makes it a natural laxative good for digestion. Cane sugar juice has been found to be beneficial in preventing and treating sore throats, colds and flu. It also improves kidney function by clearing the urinary flow and is believed to be a good treatment for fevers, as it boosts the body's protein levels. Increasingly, studies suggest that its alkaline nature can make it a key product in the fight against cancer, particularly the prostate and breast varieties. (Brand-Miller et al, 1995).

It is observed from various studies as mentioned above that certain raw sugars have an advantage over processed sugars in terms of benefit to the body. Thus, this Study was an attempt to compare the Glycemic indices of Partially Refined Yellow Sugar and Plantation White Sugar.

II. MATERIAL AND METHODS

Partially Refined Yellow Sugar [Ys] and Plantation White Sugar [Ws] were procured from Parle products Pvt. Ltd, Mumbai. Model of this study i.e. Male wistar rats (260-280 gm) were procured from Bharat serum Ltd., Mumbai. The animals were kept at room temperature (25°C - 27°C) at 75-80 % humidity and were acclimatized for a week.

After the period of acclimatization, animals were distributed into three groups i.e. Partially Refined Yellow Sugar (n=6), Plantation White Sugar(n=6) and standard (n=6). Each animal was given an oral dosage of 0.2 gm of Sugar sample / standard. Blood collection was done by Retro-orbital puncture at the specific time intervals i.e. Fasting blood sample (0 min), and further blood samples at 15, 30, 45, 60, 90 and 120 minutes after dosing. Blood glucose levels were estimated with a Semi-automated analyzer by GOD-POD method. Anhydrous glucose was used as a Standard.

The Glycemic index of a sample was calculated by dividing Area under the Curve (AUC) of the sample by the Area under the Curve (AUC) of the standard and multiplied by 100.
Area Under the Curve (AUC):

$$\text{AUC} = \sum_{n}^{x=1} A_x$$

Where;

Times t_0, t_1, ... t_n (0, 15 ... 120 min, respectively),
The blood glucose concentrations are G_0, G_1, ... G_n, respectively.

A_x = AUC for the xth time interval (x^{th} time interval is the interval between times $t_{(x-1)}$ and t_x)

III. RESULTS
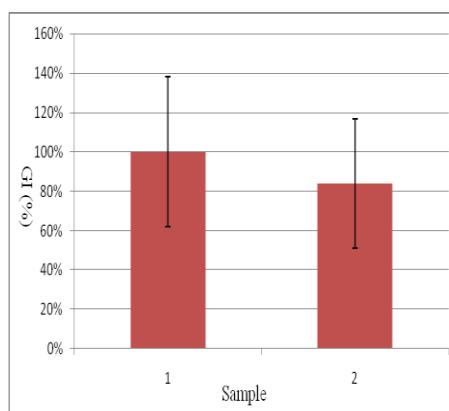
Figure 1: Glycemic index (%) of 1: Plantation White Sugar [Ws]; 2: Partially Refined Yellow Sugar [Ys].

As shown in Fig-1 Glycemic index of Partially Refined Yellow Sugar is 20% less than that of Plantation White Sugar. Consistently low GI value of Partially Refined Yellow Sugar as compared to Plantation White Sugar in all animals indicates slow absorption and digestion of Ys as compared to Ws.

IV.   DISCUSSION AND CONCLUSION

The white crystalline substance we know of as sugar is an anomalous substance produced by industrial processes (mostly from sugar cane or sugar beets) by refining it down to pure sucrose, after stripping away all the vitamins, minerals, proteins, enzymes and other beneficial nutrients. It quickly passes through the stomach wall causing blood sugar levels to rise, and then drop rapidly. First, the blood sugar level increases rapidly and causes the pancreas to secrete insulin to compensate for the excess blood sugar. Afterward, the blood sugar level drops below normal. This state has been coined the sugar blues. The downside of the sugar blues is a state of depression, lethargy and irritability. Sugar is pure chemical and through refining has been stripped of all the natural food nutrition it originally had in the plant itself. Similarly, sugar is first pressed as a juice from the cane (or beet) and refined into molasses. Then it is refined into brown sugar, and finally into strange white crystals $C_{12}H_{22}O$, which is an alien chemical to the human system. A second reason why sugar harms is its addictiveness. Starting with sugar in the baby formula, people not only develop a strong taste for sugar but an insatiable craving that never recedes. A third reason is the slow and insidious damage caused by sugar. (Sugar: the sweetest poison*Helen Cannington*). One of the best sources of natural sugar is found in raw fruits and vegetables. These sugars are bound up with essential vitamins, minerals, fiber, oils and enzymes which are present in whole plant foods. These aid in the metabolic process necessary for digestion of the sugars. In addition, the sugars in natural whole foods arrive in the body diluted in a large volume of water to assist in its metabolism. The glycaemic index (GI) concept was originally introduced as a means of classifying different sources of carbohydrate (CHO) and CHO-rich foods in the diet, according to their effect on postprandial glycaemia (Jenkins et al. 1981). It was assumed to apply to foods that primarily deliver available CHO such as potatoes, rice, cereals, etc. usually having an energy content of 80% from CHO. The usual 50 g CHO test load has traditionally referred to available CHO providing sugars for absorption from the small intestine at a certain rate. As such, low-GI CHO were classified as those that are digested and absorbed slowly and lead to a low glycaemic response, whereas high-GI CHO are rapidly digested and absorbed and show a high glycaemic response. It has been proposed that the glycaemic index of foods can influence body-weight control (Acheson, 2004) Short-term studies suggest that low-glycaemic index carbohydrates and fiber intake could delay hunger and decrease subsequent energy intake compared with high-glycaemic index foods (Roberts, 2003). Since its development in 1981, the GI has had a pivotal role in highlighting the variation in physiological responses associated with different carbohydrate containing foods (Jenkins et al. 1981). This ranking of foods by the glycaemic responses elicited when equi-carbohydrate portions are consumed has provided a unique, and at times controversial, perspective on the issue of carbohydrate quality (Wolever, 1997; Bellisle, 2001).

In our study we compared the GI of raw and processed sugars to compare which of them had the most digestive outcome on consumption. We found out the GI of Raw sugar was lower than the GI for Plantation Sugar. Similar outcomes were reported in other studies. From a health standpoint low GI foods are at an advantage because of their beneficial effect on insulin sensitivity. Low-GI diets have been successfully applied as a dietary therapy in diabetes mellitus and other conditions exhibiting derangements in carbohydrate and lipid metabolism (Brand-Miller, 1994). In these studies, the major dietary alterations were to the starch-containing foods, with the substitution of slowly digested low-GI products, such as pasta, wholegrain cereal and legumes, for rapidly digested high-GI products, such as bread, breakfast cereals and potatoes. It has been proved, however, that - sugar is a major factor in dental decay; sugar in a person's diet does cause overweight; removal of sugar from diets has cured symptoms of crippling, worldwide diseases such as diabetes, cancer and heart illnesses. Sir Frederick Banting, the co discoverer of insulin, noticed in 1929 in Panama that, among sugar plantation owners who ate large amounts of their refined stuff, diabetes was common. Among native cane-cutters, who only got to chew the raw cane, he saw no diabetes. GI has been shown to be positively associated with the prevalence of the metabolic syndrome and insulin resistance in a cross -sectional study of 2834 subjects from the Framingham Offspring cohort (McKeown et al, 2004). Odds of having metabolic syndrome were reported to be 41% higher in the highest quintile of dietary GI compared with the lowest quintile (median GI values 84 and 72 respectively), and insulin resistance was found to be increased across quintiles (p < 0.001) (Aston 2006). Weight loss is an additional potential mechanism by which low-GI diets may contribute to reduced risk of metabolic syndrome. Induction of a rapid initial weight loss with low-carbohydrate diet may be partly explained by a reduction in overall caloric intake, which may be the result of a great limitation of food choices by the requirements of minimizing carbohydrates intake (Brehm et al, 2003; Sondike et al, 2003)], to the initial increase in circulating â-hydroxybutyrate, which may suppress appetite (Meckling et al, 2002) and to the satiating effect of low-carbohydrates diets containing relatively high amounts of protein (Johnston et al, 2004; Layman et al, 2003).

The rate of glucose entry into blood and the duration of the elevated blood glucose is known to induce many hormonal and metabolic changes that may affect health and disease parameters. In this respect, low-GI foods were often found to induce benefits on risk factors for certain chronic diseases. Because of these observations it was proposed that GI data for foods could be used to make priorities for food selection within food groups. This study was an attempt to demonstrate the effectiveness of raw sugar on the digestion of a mammal (i.e. Wistar Rat) and observe the response of the animal in terms of the Glycemic Index as compared to Plantation or Processed Sugar. The conclusion obtained was that raw sugar had a low GI which makes it favorable for use in everyday meals as compared to processed sugar.

APPENDIX

GI	:	Glycemic Index
Ys	:	Partially Refined Yellow Sugar
Ws	:	Plantation White Sugar
Min	:	Minutes
No.	:	Number
%	:	Percent
AUC	:	Area under curve
Gm	:	Grams

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AUTHORS

First Author – Ms. Amruta Naik, , M.Sc., Haffkine Institute, Parel, Mumbai – 400 012, Maharashtra, India. 7.amruta@gmail.com

Second Author – Mrs. Pallavi Ansulkar, M.Sc., Haffkine Institute, Parel, Mumbai – 400 012, Maharashtra, India. pvansulkar@gmail.com

Third Author – Dr. AbhayChowdhary, MD, DHA, DM,FIMSA; Haffkine Institute, Parel, Mumbai – 400 012, Maharashtra, India. abhaychowdhary@yahoo.com

Correspondence Author – Ms. Amruta Naik, 7.amruta@gmail.com, Phone: +91 9819916974.

Suitability of Dyes from Mulberry and Coffee Leaves on Silk Fabrics using Eco-Friendly Mordants

Loum Janani*, Drajoru Winifred**

* Department of Textile and Ginning Engineering, Busitema University
** Department of Textile and Ginning Engineering, Busitema University

Abstract- Natural dyes from leaves of mulberry and coffee was extracted by aqueous method and used for dyeing silk using different mordants. The selected eco-friendly mordants used include; iron water, ash water, cow dung and lemon juice. Silk yarn which was not bleached was knitter into small fabrics (8 x 10 cm). The knitted fabric pieces were degummed and bleached by soaking in ash water for 24 hours and heating in a solution containing hydrogen peroxide respectively. Sodium bi-carbonate was used as a catalyst, powder detergent and sodium silicate were used as stabilizing agents. Post-mordanting method was used during the dyeing of the pretreated silk fabrics.

It is evident that natural dyes from the leaves of coffee and mulberry can effectively be used for dyeing silk fabrics. This is because good color shades were recorded which varied with the mordant used. More importantly the dyes registered suitable color fastness to washing, heat and light in the range of grades (3) to (4/5) for wash and heat fastness and grade of (4) and (5) for light fastness. The mordant that exhibited the best fastness characteristic is iron water with fastness grades of (4) to (4/5) for wash and heat fastness and grades of (4) and (5) for light fastness. The fastness property of ash water follows that of iron water in the range of (3/4) to (4) for wash and heat with light fastness in range of (4) to (5). Cow dung and lemon juice had inferior fastness property in the range of (3/4) and (3) however the light fastness recorded is between (4) and (5). Iron water and ash water also registered visibly more intense colors on silk fabrics therefore most mordants for dyeing of silk fabrics using these dyes.

Index Terms- color fastness, eco-friendly, mordants, , post-mordanting,.

I. INTRODUCTION

Natural dyes comprise colorants that are obtained from animal, minerals and vegetable matter without and chemical processing. A renewed international interest has arisen in natural dyes due to increased awareness of the environmental and health hazard associated with the synthesis, processing and use of synthetic dyes. Natural dyes derived from plants have recently gained economic advantage over synthetic dyes because of their non-toxic and biodegradable nature (Bhuyan and Saikia, 2008; Samanta and Agarwal, 2009). However, studies have shown that certain natural dyes may have detectable mutagenic effects e.g. elderberry color and safflower yellow; others like carmine, can cause asthma by continuous inhalation, but it can be said that most of the natural dyes are safe and some even have curative effect e.g. curcumin in turmeric has antibacterial properties (Han and Yang, 2005; Hill, 1997).

The problem associated with the use of natural dyes is the, poor color fastness, lack of reproducibility and lack of brilliance in color produced. They therefore need chemical species called mordants for binding the dye to fabrics to improve color fastness. Mordants help in binding of dyes to fabric by forming a chemical bridge from dye to fiber thus improving the staining ability of a dye with increasing its fastness properties (Padma, 2000).

In Uganda, silk farming also known as Sericulture is a practice commonly embraced by the local farmers in the Central, Western and Eastern parts of the country. Silk is a natural protein fiber produced by silk worms. The silk is produced by feeding of silk worms on mulberry leaves to produce cocoons and the cocoons are eventually processed into the silk threads which are a source of high quality textile fiber. In the agronomic practice of mulberry cultivation, there is extensive pruning of side stems and old leaves. As far as silk marketing is concerned, the methods of value addition to silk threads and its products include; twisting, doubling, sizing, singeing, bleaching, dyeing, weaving, knitting, finishing (Kasozi, 2011). The cultivation of coffee is a practice carried out in all parts of the country contributing around 50% of Uganda's export earnings (Seaman *et al.,* 2004). Careful and regular pruning of coffee trees is one of the most important practices aimed at maintaining the tree in a young and productive condition. Pruning of coffee plant involves the removal of; the Suckers, secondary branches and weak branches (Ibero Uganda Ltd, 2005). In both plants, this practice yields a large quantity of leaves which are not gainfully utilized by farmers.

This study harnessed the abundant leaves from the pruning of these plants as a source of natural dyes for silk fabrics coloration with the use of available eco-friendly mordants for the purpose of value addition on silk yarn.

II. MATERIALS AND METHODS

Materials

The fresh aged leaves of 'Thailand' mulberry (500 g) were randomly picked from the mulberry gardens in Kawanda, whereas coffee leaves chosen were the 'Robusta' type; being the most commonly grown type in Uganda. Just like the mulberry leaves, (500 g) of the aged fresh leaves of coffee were also randomly picked for dye extraction, all these were handled in the Busitema University Textile Laboratory. Silk yarn (not degummed) was bought from Kawanda research station. Distilled water was used for dye extractions. Mordants; wood ash and iron nail for processing ash water and iron water respectively.

Standard grey scale and standard dyed wool were used for matching degree of fading.

Solutions preparation

Ash water was prepared by putting wood ash powder (250 g) into a clay pot and distilled water (5000 cm^3) added to it and made to stand for three weeks. The mixture was decanted and filtered. The filtrate is the ash water used for silk degumming and a mordant in dyeing.

Iron water was made by soaking rusted iron nails (250 g) in distilled water (500mls) and made to stand for one week. The nails were removed and the liquor filtered.

Lemon juice was produced from fresh lemon fruits bought from Tororo town market. These fruits were squeezed and juice (200 cm^3) screened with a kitchen strainer to separate the seeds from the juice. The liquid was diluted with distilled water to (500 cm^3).

Fresh cow-dung (250 g) was collected from the grazing field near Busitema University campus. Distilled water (500 cm^3) was added and the mixture stirred. The mixture was filtered and the filtrate stocked for use.

The bleaching solution (2000 cm^3) was prepared by mixing sodium bicarbonate (500 g), dilute hydrogen peroxide solution (250 cm^3, pH 8) and sodium silicate (1 g) in distilled water.

Degumming and bleaching of silk fabrics

Degumming was done by soaking the hand knitted silk fabrics in ash water for 24 hours. The fabrics were later removed and rinsed with distilled water and dried at room temperature thereafter.

Bleaching was done by oxidation using an oxidizing bleaching agent. Fabrics (500 g) were soaked in a solution of detergent *omo* (250 gpl) for 30 minutes removed and rinsed twice with distilled water at room temperature. The fabrics were then placed in the bleaching solution and heated to a temperature of (60^{0}C) for (90) minutes. During this process, the fabrics were agitated by stirring continuously. They were removed from bleaching bath and washed with soap and distilled water at 30^{0}C, rinsed repeatedly and air dried.

Extraction of dyes

Fresh mulberry and coffee leaves (500 g) were separately weighed and washed. Aqueous extraction method as described by Deo and Roshan (2004) with slight modifications was used. Fresh mulberry and coffee leaves (500 g) each were washed. The leaves were then placed in a steel pan containing distilled water (750 cm^3) and heated to a temperature of 60^{0}C for 60 minutes. The leaves were removed and the liquor filtered and used immediately for dyeing the fabrics. This was done separately for both the mulberry and coffee leaves.

Dyeing of silk fabrics

Dyeing was done according to the method described by Katty (1997) with slight modifications. Pieces of degummed and bleached silk fabrics measuring (8x5 cm) were soaked in distilled water and transferred to dye bath liquor (700 cm^3) and the mixture heated gradually to 60^{0}C while stirring for 30 minutes. The fabrics were removed from the dye bath and immediately soaked in solution of a mordant. Different fabrics were soaked

separately in; iron water, ash water and cow dung solution each made to stand for 15 minutes. A ratio of 35 g of fabrics to 100 cm^3 of a mordant solution was used in all cases.

Evaluation of color fastness

The wash fastness was done according to standard method as described by Foulds (1995). A slight modification was made by using knitted fabrics of (4x3 cm). The wash fastness rating was assessed using standard grey scale as per ISO-05-A02 (loss of shade depth). The heat fastness was conducted by pressing the fabric with a hot iron plate at 90 ^{0}C for 30 seconds on patterned dyed and un-dyed silk fabrics. The color change and degree of staining were later observed and assessed on a scale of (1-8).
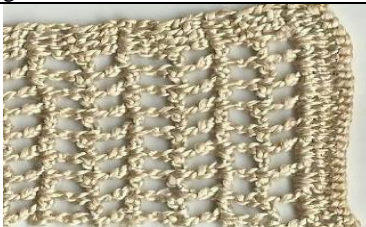
Light fastness was determined according to the standard method describe by Trotman (1993) with slight modifications by using knitted fabrics of dimensions 4x3 cm. The exposure to light per day was 8 hours for a total of 20 days. The change in color shades were evaluated against standard blue dyed wool in the range of 1 to 8.

III. RESULTS AND DISCUSSION

Color shades developed on silk fabrics on application of the dyes

Dyes from the leaves of coffee and mulberry plants produced colors on cotton fabrics without the application of any mordant in the dyeing process. Coffee and mulberry leaves gave yellow green and buff brown colors respectively as shown in **Table 1**. below.
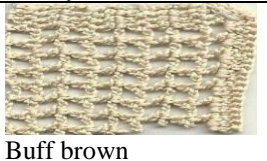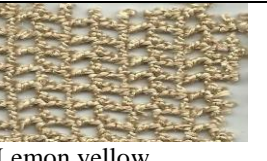
Table 1. Colors produced on cotton fabrics on application of mulberry and coffee dyes without mordants.

Plant used	Color shade produced
Coffee leaves	yellow green
Mulberry leaves	Buff brown

Colors of multiple shades were produced on the application of dyes from coffee and mulberry leaves on cotton fabrics with the use of mordants. The variation in shades was with respect to the applied mordants as shown in **Table 2**. below. Iron water produced colors of deeper shades than the other mordants for dyes from both plants namely; grey and olive green for coffee and mulberry respectively. Ash water produced a brilliant tawny brown with coffee leaves and buff brown with mulberry leaves. The lightest shades were produced from the use of lemon juice

mordant, this may be a result of the bleaching property of citric acid which is a component of lemon juice. For dyes from both plants, cow dung produce yellow shades viz; arylide yellow and lemon yellow for coffee and mulberry in that respect.

Table 2. Color produced on cotton fabrics from mulberry and coffee dyes with different mordants

Plant used	Mordant used and color produced			
	Iron water	Ash water	Cow dung	Lemon juice
Coffee leaves	grey	Tawny brown	Arylide yellow	Buff
Mulberry leaves	Olive green	Buff brown	Lemon yellow	Khaki

Color fastness of shades produced on silk fabrics

The fastness was determined with respect to washing, heat and light. As can be noticed in table 3 below, iron water mordant gave a very good wash fastness of (4), a good heat fastness of (3/4) and a good light fastness of (5). Ash water recorded a good wash and heat fastness of (3/4) and an average light fastness of (4). A weak was and heat fastness of (3) was recorded for both lemon juice and cow dung with cow dung exhibiting a good light fastness of (5) better than that for lemon juice of with moderate light fastness of (4). Generally for dyes from coffee leaves, iron water gave the best fastness followed by ash water; they also exhibited deeper shades on silk fabrics. Cow dung and lemon juice gave inferior fastness results in comparison to iron water and ash water.

Table 3. The color fastness of coffee and mulberry dyes on silk fabrics

Plant used	Mordant used	Fastness grade		
		Wash	Heat	Light
Coffee	Iron water	4	¾	5
	Ash water	3/4	¾	4
	Cow-dung	3	3	5
	Lemon juice	3	3	4
Mulberry	Iron water	4/5	4	5
	Ash water	4	4	4
	Cow-dung	¾	3	4
	Lemon juice	¾	3	4

In the case of dyes from mulberry leaves, iron water registered an excellent wash fastness of grade (4/5), a very good heat fastness of (4) and a good light fastness of grade (5). With ash water, very good wash and heat fastness of grade (4) were recorded and a moderate light fastness of (4). Cow dung and lemon juice registered equal grades of fastness in all cases where a good wash fastness of (3/4), moderate heat fastness of (3) and moderate fastness of light (4) were recorded. From these results, iron water exhibited the most superior fastness properties followed by ash water. Cow dung and lemon juice registered less desirable fastness properties with relatively deeper color shades.

IV. CONCLUSIONS

From the study, it is evident that natural dyes from the leaves of coffee and mulberry can effectively be used for dyeing silk fabrics. This is because good color shades were recorded which varied with the mordant used. More importantly the dyes registered suitable color fastness to washing, heat and light in the range of grades (3) to (4/5) for wash and heat fastness and grade of (4) and (5) for light fastness. The mordant that exhibited the best fastness characteristic is iron water with fastness grades of (4) to (4/5) for wash and heat fastness and grades of (4) and (5) for light fastness. The fastness property of ash water follows that of iron water in the range of (3/4) to (4). Cow dung and lemon juice had inferior fastness property in the range of (3/4) and (3) however the light fastness recorded is between (4) and (5). Iron water and ash water registered good color fastness and they also exhibited visibly intense color shades on silk fabrics therefore most suitable mordants for dyeing of silk fabrics using natural these dyes.

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AUTHORS

First Author – Loum Janani, MSc. Chemistry, BSc. Industrial Chemistry, Dip. Education. Department of Textile and Ginning Engineering, Busitema University. Email. Loumjanani75@gmail.
Second Author – Drajoru Winifred, BSc. Textile Engineering.

Correspondence Author – Loum Janani, Email. Loumjanani75@gmail.com, lojani75@yahoo.co.uk

DINKs (Dual Income No Kids) Preferences and Condominium Choice Behavior

Kanika Klainatorn* Supeecha Panichpathom, Ph.D.** Atcharawan Ngarmyarn, Ph.D. *** Yawaman Metapirak****

*Graduate student in Real Estate Business, Thammasat Business School, Thammasat University, Thailand.
** Department of Management Information Systems, Thammasat Business School, Thammasat University, Thailand.
*** Department of Real Estate Business, Thammasat Business School, Thammasat University, Thailand.
**** Department of Real Estate Business, Thammasat Business School, Thammasat University, Thailand.

Abstract- The sector for condominiums in Thailand has rapidly increased concurrently with the rising of demand in this market. This research aims to identify DINKs preferences in order to enable the better overview of condominium choice behavior. Distance, Price, Unit Size, and Design are the basic factors for condominium preferences. However, this research using conjoint analysis to investigate other factors which may affect the preference of condominium choice for DINKs. The final attributes are Most Wanted Space Allocation, Fixture and Furniture, Most Wanted Public Space/ Facilities, Most Wanted Extra Services and Retail Space. This suggest the construct of innovative products that will be different from the existing supply, but will also be an advantage for DINKs family to gratify their condominium choice.

Index Terms- Dinks, Dual income no kids, DINK's preference, Condominium Choice

V.   INTRODUCTION

The fundamental growth of registered condominium sector over the number of housing manifestly shows the changing in trend and lifestyle of livings in Bangkok City. Newly completed condominiums in the Bangkok metropolitan areas, especially along the mass transits, reveal the people's lifestyle toward city oriented that response to their essential elements. Lifestyle of the 21st century has changed not only due to the social circumstances, but also due to rapid changes of overall social environment. Dual Income no Kids, known as DINKS, become a popular lifestyle that plays an explicit role in transformation of condominium choice of behavior. With the influences of city oriented lifestyle, the consumption patterns have been affected as shown in the statistical information of Bangkok's Condominium projects launched in the market during the first quarter of this year.

Even though the supply of condominiums has increased, there are still vacant units left in the market of supply. With the surplus of condominium, the marketing strategy needs to distinguish the uniqueness to be able to attract the buyers. People simultaneously seek for the residential that balancing their life quality in which compensating work and leisure (Dortmund, 2010). Therefore, the residential near workplace or located in Bangkok's inner-city area is preferable. With the typical family size that has decrease recently; the demands are focus more on 1 or 2 bedroom unit type. Most of condominiums in the same range also provide similar facilities. Swimming pool and fitness becomes the common facility that almost all condominiums have to provide. When look closely in each condominium, we can see that new functions have been included to make them more unique and be the main selling point, such as yoga, library or even game room. With the high competition of rising of upcoming condominium projects and the existing ones, new implementations need to be applied to suit with the changing of lifestyle nowadays.

The number of family size in Bangkok alone has gradually decreased from 2.60 in the year of 2005 to 2.37 in 2009. (REIC, 2010) Number of DINK in Thailand has grown to 3,611.1 families in year 2009. Previous researches have mainly shown the attributes that apply generally for all buyers. The developers should elaborately examine the new lifestyle and their preferences in order to provide the suitable products for the market demand. Conjoint analysis is used in this research as a tool to identify the relevant attributes that will meet the buyer's trade-off, particularly for subjective demand, DINKS. This research tries to show other significant preference that will impact the condominium choice behavior such as Most Wanted Space Allocation, Fixture and Furniture, Most Wanted Public Space/ Facilities, Most Wanted Extra Services and Retail Space.

VI.   RESERCH ELABORATIONS

Dual Income No Kids (DINKS) refer to any couple that has two incomes and no children. Either one partner has two incomes, or they both have a single income. The aim for this research is to identify DINKs preferences in order to enable the better overview of condominium choice behavior. Distance, Price, Unit Size, and Design are the basic factors for condominium preferences. However, this research tries to analyze other factors which may affect the preference of condominium choice for the particular target group, DINK. The factors to be analyzed by conjoint model and determined the significant due to the buyer's purchase decision. Most Wanted Space Allocation, Fixture and Furniture, Most Wanted Public Space / Facilities, Most Wanted Extra Services and Retail Space are main preferences that this research focuses on. This research can be achieved by doing the followings:

- To understand the behavior of DINKS for condominium choice behavior
- To study factors that will have influences on DINKS preferences and lifestyle which affect the choice for condominium
- To find the combinations of attributes that meet with DINKS preference

To determine the extent to which Distance, Price, Unit Size, and Design affect changing patterns in living and well-being as well as recommend potential strategies to improve the delivery outcome products.

VII.   METHODOLOGY

The method of this research will be through conjoint analysis in order to achieve the objectives and the expected outcome. The finding of preferences for this research was conducted several times due to limited information of specific preferences of this particular target group.

According to literature review, the minimum number to conduct the conjoint analysis is 80. (Akaah and Korgaonkar 1988) Therefore, this research will use the minimum number of 80 sample size to run the analysis. To construct the appropriate framework, the main conjoint analysis phases are pointed out together with the most commonly used alternative approaches: 1.) Choosing attributes to be investigated, 2.) Choosing the data gathering method, 3.) Composing the concept cards, 4.) Choosing the presentation format of product attributes, 5.) Assigning a measurement scale, 6.) Data gathering, and 7.) Modeling the preferences.

In data gathering phase, each subject is asked to rank a set of concept cards based on buying preferences. Every card describes an existing or hypothetical product in terms of a bundle of product attributes. One hundred samplings will be selected for this purpose. Therefore, there are the totals of 54 possible product combinations in a full-factorial design to be evaluated in the next step. However, the results of the preliminary factors that affect preferences are the basic factors that already have been studied in most of the research. Usually the factors that influence residential choice are age, gender, income, education, tenure of residence, and tenure of job. (Hill, 2005) The researcher decided to construct the deeper interview to identify the characteristic of the Dual Income No Kids to really identify the real factors. Twelve participants were interview for the preliminary attributes since there direct studies that support the Dual Income No Kids preferences for choosing condominiums. After attributes were selected prior to their choice, participates ranked the attributes according to what they most preferred. Considering the result, the possible attributes and levels are selected to run the full concept card approach. The final attributes are space allocation, furniture, facilities, extra services and retail space. Each attributes has two to three levels to minimize the number of combinations. Therefore, there are the totals of 72 possible product combinations in a full-factorial design to be evaluated. (3 x 2 x 3 x 2 x 2)

Table 3.1: Attributes and Levels

Attributes	Level 1	Level 2	Level 3
Most Wanted Space Allocation	Living Room	Bedroom	Bathroom
Fixture and Furniture	Fully Furnished	Partly Furnished	
Most Wanted Public Space / Facilities	Fitness	Business Corner	Green Space
Most Wanted Extra Services	Laundry Service	Cleaning Service	
Retail Space	Yes	No	

Orthogonal design was used to minimize the number to card combination in order for the participants to be able to rate the cards they preferred. There are total of 20 combinations, which include 16 numbers of card combinations, 2 holdouts and 2 simulations. These 20 combinations are being generated using the fractional factorial design (Addelman, 1962; Hair et all., 1998).

VIII.   FINDING AND RESULTS

The sample was obtained through convenience sampling method. Eighty participants focusing only couples who stay in Bangkok have been asked to participate in this research. The results were analyzed divided into two main parts: Analyze general information of the respondents and conjoint analysis to study the preferences of choosing condominium.

4.1 Analyze general information of the respondents

Descriptive statistics are used to analyze the general information of the respondents. Of the 80 respondents, the majority were female with the total number of 49 participants (61.3%) and male with the total number of 31 participants (38.8%). The average age of the respondents are ranged from the age of 25 to 35 years old. As shown in the table below, most respondents are usually 30 to 35 years old total to 26 respondents (32.5%). There are 25 respondents with the age range from 25 to 29 years old (31.3%). Furthermore, 20 respondents with the age range from 36 to 40 years old (25.0%) and 9 respondents who age are more than 40 years old (11.3%). From the data, it shows that none of the respondents are under graduate. Most of the respondents finished master degree. There are total of 45 respondents with the education of master degree (56.3%). Then, there are 34 respondents finished up to bachelor degree (42.3%). However, from the total of 80 respondents, there is only one that finished up to doctoral degree (1.3%).

Since respondents for this research have to be those who belong to Dual Income No Kid category, the results are screen before analyze. The statuses of the respondents, therefore, limit to living together, married without kids, and married and don't want kids. Of the total respondents, 61 respondents are married without kids (76.3%). There are 11 respondents, which are married and don't want kids (11.0%). Only 8 respondents are living together without marriage (10.0%). From the number of percentage shown in the result, somehow it reflects the culture of Thai people that they still have to marry before living together even though the living style has changed in recent years. Income data is based only for individual, not the family income. However, from the data collected, it can reflect on the ability of each individual to buy condominium with the price of middle segment. There are 27 respondents with the income ranging from 25,001 to 40,000 baht (27.0%). Eighteen respondents with the income ranging from 55,001 to 70,000 baht (22.5%).Fourteen respondents with the income ranging from 40,001 to 55,000 baht. There are also respondents with the income ranging 85,001 to 100,000 baht and earn more than 100,000 making the total of 17 respondents (21.3%). However, there is only 4 respondents that earn below 25,000 baht (5.0%). The results have clearly shown that most number of respondents own either condominium or single house. However, the results have shown that most of the respondents own a single house residential with the total number of 40 respondents (50%). 20 respondents have own a condominium (25%). The rest of the respondents own townhouse, semi-detached, apartment, or other.

4.2 Conjoint analysis to study the preferences of choosing condominium

The researcher used rating for this research. Each combination has the same main reference, which is it is the condominium that locates in the CBD area. With the provided information that it is a one-bedroom unit type ranging from 5 to 7 million bath. The total size of the unit is 55 square meter with a living room and dining area of approximately 15 square meter. However each combination is different and the attributes to be considered are: 1.) Space Allocation: Bedroom, Living Room, or Bathroom, 2.) Fully furnished or partly furnished, 3.) Most wanted extra facilities: Fitness, Green Space or Business Corner, 4.) Most wanted extra services: Laundry Service or Cleaning Service, and 5.) Prefer retail space or none.

The respondents are then asked to rate which combination do they most preferred. All items were measured with a Likert scale (1 = least favor and 10 = most favor). The result of the importance values has corresponded with the result from the interview that people give importance for the space allocation. As shown in the table below, the most important is space allocation with the values of 41.445. People also look at the facility provided, which the value of importance is equal to 24.995. The important value of service is 23.776. Next is retail with the importance values of 10.512. The least that people give important upon is weather the room is furnished or partly furnished with the importance value of 10.273.

Table 4.1: Importance Values

Space	41.445
Facility	24.995
Service	12.776
Retail	10.512
Fur	10.273

Averaged Importance Score

Table 4.2: Correlationsa

	Value	Sig.
Pearson's R	.696	.001
Kendall's tau	.550	.001
Kendall's tau for Holdouts	1.000	.

Regression analysis was used to analyze the data of conjoint analysis. The mathematical expression of the model is as follow: Y = 6.049 + .300 (space1) + .308(space2-.608(space3) -.367 (fac1) + .085 (fac2) + .282 (fac3) + .083 (service1) -.083 (sevice2) -.045 (retail1) + .045 (retail2) -.097 (fur1) + .097 (fur2)

= Constant	
(space1)	= Living space as the most wanted space allocation
(space2)	= Bedroom space as the most wanted space allocation
(space3)	= Bathroom space as the most wanted space allocation
(fac1)	= Business corner as the most preferred extra facility
(fac2)	= Fitness as the most preferred extra facility
(fac3)	= Green area as the most preferred extra facility
(service1)	= Laundry as the most preferred extra service
(service2)	= Cleaning as the most preferred extra service
(retail1)	= Want retail space in the condominium
(retail2)	= Do not want retail space in the condominium
(fur1)	= Prefer room to be fully furnished
(fur2)	=Prefer room to be partly furnished

Table 4.3: Utilities

		Utility Estimate	Std. Error
Space	Living	.300	.245
	Bedroom	.308	.288
	Bath	-.608	.288
Facility	Business	-.367	.245
	Fitness	.085	.288
	Green	.282	.288
Service	Laundry	.083	.184
	Cleaning	-.083	.184
Retail	yes	-.045	.184
	no	.045	.184
Fur	yes	-.097	.184
	no	.097	.184
(Constant)		6.049	.203

The equation has shown that if the preference is living space as the most wanted space allocation, bedroom space as the most wanted space allocation, fitness as the most preferred extra facility, green area as the most preferred extra facility, laundry as the most preferred extra service, do not want retail space in the condominium, and prefer room to be partly furnished, the constants will increase by .300, .308, .085, .282, .083, .045, and .097 accordingly. In contrary, bathroom space as the most wanted space allocation, business corner as the most preferred extra facility, cleaning as the most preferred extra service, want retail space in the condominium, and prefer room to be fully furnished will cause the constant to decease -.608, -.367, -.083, -.045 and -.097accordingly.

For the most prefer preference, the highest utility will be the Bedroom space as the most wanted space allocation. Therefore, with the combination of Bedroom space as the most wanted space allocation, Green area as the most preferred extra facility, Laundry as the most preferred extra service, Do not want retail space in the condominium and Prefer room to be partly furnished will make the most preferred preference since this combination will increase the constant.

Each combination is then being compute with the total utilities value. The combination with the most constant value is the combination of:

1) Bedroom space as the most wanted space allocation, partly furnished, green area as the most preferred extra facility, laundry as the most preferred extra service, and do not want retail space in the condominium

2) Living space as the most wanted space allocation, partly furnished, green area as the most preferred extra facility, laundry as the most preferred extra service, and do not want retail space in the condominium

3) Bedroom space as the most wanted space allocation, partly furnished, green area as the most preferred extra facility, laundry as the most preferred extra service, and want retail space in the condominium

On the other hand, there is only one least prefer combination with the lowest total utilities is the combination of as follow:

1) Bathroom space as the most wanted space allocation, partly furnished, business corner as the most preferred extra facility, cleaning as the most preferred extra service, and want retail space in the condominium

IX. CONCLUSION AND RECOMMENDATION

Analyze and understand all the provided review comments thoroughly. Now make the required amendments in your paper. If you are not confident about any review comment, then don't forget to get clarity about that comment. And in some cases there could be chances where your paper receives number of critical remarks. In that cases don't get disheartened and try to improvise the maximum.

5.1 Conclusion

The result of the utility value has clearly reflected on the characteristic and preference of the respondent, Dual Income No Kid. From the top three most preferred combinations, all three of them have shown that the common preference is the room unit that is partly furnished. The preliminary interview of each DINKs, most of them preferred their room to be partly furnished since they want to do their own decoration. With reference to their income, most of them earn 25,001 - 40,000 bath people. Also, 21.3% of the total respondents have high income that they earn more than 85,000. The result shows that they have the capability in spending.

Another distinctive characteristic of condominium that DINKs want is the condominium that has laundry service as extra services that provide conveniences for them. It can be further explain that DINK wants conveniences and they are usually both working couple who do not have time for running personal clearance. Laundry service that they expected somehow equals to the one provided in the hotel, a drop and pick up laundry services or sends to the room. The utility value of laundry service of .083 also displays the positive preference.

The other utility that reflects on the characteristic of DINK is the retail space within condominium. DINKs are usually the type of people that like convenience. However, from the result, it has proven they also want privacy. Depth interview has made a clear picture that DINKs don't like retail space due to privacy and also it would take up the parking spaces, which is also another secondary preference that they prefer when choosing the condominium.

5.2 Recommendation

Once the preference is being finalized, there should be a deeper study of each attributes and levels. These preferences are not only useful in applying for the new upcoming project, but also in renovating the old condominium or service apartment.

From the previous discussion that there are still condominium projects with the low selling percentage, the developer could analyze further the preference and may adapt the additional services or facilities in order to increase the sellable of their project. This will also help in applying the preferences to suit with the right market segmentation to increase the selling percentage of the condominium once the project is launch.

With the high competition in this condominium market, new strategies, design and facilities need to be provided to make the project more convincing. Also developer should specify the right target in order to increase their sells and be competitive. This target group, DINKs, is the new market segment that is very convincing since they have the power in spending. This research can help in creating new facilities or space allocation that will be different from current market and providing something new and unique condominium in the future.

5.3 Research Limitation

The limitation that is expected in this research is the number of samples. Since there are several classifications of DINKS, this research limited to the family, either marries or stay together, that decided not to have kid. Due to specific target group as respondents for this research, it was hard to find the number of Dual Income no Kids to analyze the findings. The general data in the questionnaire is use to eliminate the specific group. Also due to limited time and budget, the researcher has limited channel in finding Dual Income No Kid through various channels.

Other limitation is that this research is conducted in Bangkok and concentrated in the city area. With the culture influences in Thailand, Dual Income No Kids are not revealing unlike other countries that they are open to couples that stay together without marriage. Questionnaire has to be carefully design

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AUTHORS

[*] Kanika Klainatorn, graduate student in Real Estate Business, Thammasat Business School,
Thammasat University, Thailand. (email: nikatine@gmail.com)

[**] Supeecha Panichpathom, Ph.D., Department of Management Information Systems, Thammasat Business School,
Thammasat University, Thailand. (email: spanitdmc52@gmail.com)

[***] Atcharawan Ngarmyarn, Ph.D., Department of Real Estate Business, Thammasat Business School,
Thammasat University, Thailand. (email: a_ngarmyarn@yahoo.com)

[****]Yawaman Metapirak, Department of Real Estate Business, Thammasat Business School,
Thammasat University, Thailand. (email: yawaman@hotmail.com)

Physico-chemical Analysis of GudBahri River Water of Wukro, Eastern Tigrai, Ethiopia

Mehari Muuz Weldemariam

Department of Chemistry, College of Natural and Computational Sciences, Mekelle University, P.O.Box: 231, Mekelle, Ethiopia

Abstract- The water quality of GudBahri River, an important domestic and potable water source of Wukro, has been assessed. Water samples were collected from the river along different points and analyzed for various physio-chemical quality parameters during winter. Effects of industrial wastes, municipality sewage and agricultural runoff on the river water were investigated. The study was conducted between the Kaziha and Shigar-arho including Adi-akawn. The study involved determination of physical and chemical parameters of surface water at twelve different points. The mean values of Water Temperature, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Total Solids (TS), Turbidity, Dissolved Oxygen (DO), Bio-chemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), pH, Electric Conductivity (EC), Salinity and Chloride content were 26.03^0C, 1233.33 mg/L, 470.17 mg/L, 1703.50 mg/L, 9.60 NTU, 7.89 mg/L, 3.88 mg/L, 7.27 mg/L, 7.90, 672.83µs/cm, 0.33 g/L, 77.5 mg/L, respectively.

Index Terms- Physico-chemical, GudBahri River, pollution, water quality, Ethiopia.

I. INTRODUCTION

Water is essential for the survival of all forms of life. Though 80% of earth's surface is covered by water, the fresh water supply has increasingly become a limiting factor because of various reasons. The expansion of industrialization and exploding population are the major once. Acute short fall of heavy rains, poor water shed management, abundant use of water for household and agricultural purposes have led to the overexploitation of the surface water sources especially from the river bodies. Many perpetual rivers become short-lived and even dried up [1].

Water quality characteristics of aquatic environments arise from a massive amount of physical, chemical and biological interactions. The water bodies: rivers, lakes and estuaries are continuously subjected to a dynamic state of change with respect to their geological age and geo chemical characteristics [2]. This dynamic balance in the aquatic ecosystem is upset by human activities results in pollution which in turn manifests dramatically as fish kill, bad taste of drinking water, offensive odors and unchecked growth of aquatic weeds etc [1]. Quality of water is now a great concern for environmentalists as well as the common publics in all parts of the world. There are numerous sources of pollutants that could deteriorate the quality of water resources [2-3]. Likewise in Wukro, where there is no as such environmental protection practice there are a number of pollutant sources that continuously deteriorate the quality of surface and ground water since the foundation of the city. Based on obtained information, observation made during site visit and analytical results, the following hazard centers have been considered as major category of sources of pollutants in the study area. These are industrial establishment, agricultural activities, municipal wastes, fuel stations, garages and health centers [4].

On the other hand, surface water bodies become the dumping source for industrial effluent and domestic wastes. As a result, the naturally existing dynamic equilibrium among the environmental segments get affected leading to the state of polluted rivers [3-5]. According to World Health Organization's (WHO) decision, water for the consumers should be free from pathogenic organisms and toxic substances [1]. In spite of vast water resources in lakes and rivers and good monsoon, Ethiopia faces perennial problems of floods and droughts and high pollution of fresh water resources [2]. In Eastern Tigray of Northern Ethiopia, the Gudbahri river is situated between latitude 13^0 48'880" N and longitudes 39^0 36'890'' E. It is fed by both monsoons and its tributaries. It originates more than 6577 ft above sea-level in Keziha, near the red rock-cut church of Wukro Chirkos. It flows roughly east and enters the Gunfel River. At 110 km it is a relatively short river serving as the principal source of fresh water for human need.

It is a fact that good water quality produces healthier humans than one with poor water quality [5-10]. Gudbahri River is life line of Wukro and its water is used for domestic and agriculture purposes. Therefore, effective maintenance of water quality is required through appropriate measurements. Physico-chemical and micro-biological characteristics may describe the quality of water [11-18]. Therefore, our previous analysis on heavy metals of Gudbahri water was made [19]. In addition, with increasing number of industries and stakeholders of the river, the concern over the quality has also grown up and hence warranted for the present investigation.

Figure 1: River Gudbahri

In the present study various parameters (Water Temperature, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Total Solids (TS), Turbidity, Dissolved Oxygen (DO), Bio-chemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), pH, Electric Conductivity (EC), Salinity and Chloride content) of water samples from twelve different sites were analyzed.

Table I: Sampling Station in Gudbahri River

Station No.	Location of sampling points	Descrption
1	Keziha	Starting point where domestic wastes and agricultural runoff sources
2	Mybaeto	domestic wastes and agricultural runoff sources
3	Dengolo	domestic wastes and agricultural runoff sources
4	Laelay Wukro	Slaughter wastes, domestic wastes and agricultural runoff sources
5	Mosanu-Gudbahri	domestic wastes and agricultural runoff sources
6	Kalay-Gudbahri	Municipality wastes, car and animal wash, soaps, detergents, domestic wastes and agricultural runoff sources
7	Chirkos church	Toilet wastes, car and animal wash, soaps, detergents, domestic wastes and agricultural runoff sources
8	Kalabih	Municipality wastes, car and animal wash, soaps, detergents, domestic wastes and agricultural runoff sources
9	Alishaday	Municipality wastes, car and animal wash, soaps, detergents, domestic wastes and agricultural runoff sources
10	Shigara-arho	fertilizer, car and animal wash, soaps, detergents, domestic wastes and agricultural runoff sources
11	Adi-akawn	Tannery wastes and agricultural runoff sources
12	Genfel	Tannery wastes and agricultural runoff sources

II. MATERIALS AND METHODS

The water samples were collected in pre-cleaned, acid washed, plastic bottles from the river Gudbahri at twelve different points (Fig.1) starting from Kaziha to Adiakawn on 20th May 2013 to 23rd May 2013 and was later stored in a refrigerator below 4°C until used. Physico-chemical properties such as Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Total Solids (TS), Water Temperature, Turbidity, Dissolved Oxygen (DO), Bio-chemical oxygen demand (BOD), chemical oxygen demand (COD), pH, Electric Conductivity (EC), Salinity and

Chloride content were measured using standard methods. The description of sampling sites is provided in Table I.

III. RESULT AND DISCUSSION

Water samples were collected from the Gudbahri River during winter seasons and tested for physical and chemical parameters. The important water quality parameters, such as Color, Odor, Temperature, pH, TSS, TDS, TS, BOD, COD, DO, Turbidity, EC, Salinity and Chloride were analyzed. Assessment of the water samples for pollution is made by comparison of the

assessed values of all the physico-chemical parameters with the corresponding standards prescribed for drinking water by WHO.

Table II: Water Quality of Gudbahri River

Station No.	pH	Temperature (^{o}C)	EC (µs/cm)	TSS (mg/L)	TDS (mg/L)	TS (mg/L)	Salinity (mg/L)	Turbidity (NTU)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	Chloride (mg/L)
1	7.79	24.5	581	400	397	797	0.28	0.68	7.52	3.47	4	20.8
2	8.39	25.1	540	800	362	1162	0.25	3.142	8.14	2.92	4.8	35.4
3	7.67	26.8	382	400	326	726	0.23	3.192	8.92	3.16	6	18.0
4	7.91	27.5	495	2200	345	2545	0.24	2.719	7.23	3.85	7	51.6
5	7.33	25.5	605	600	411	1011	0.29	2.766	5.37	3	7.8	23.8
6	7.91	26.5	553	800	374	1174	0.26	6.302	8.49	2.77	3	22.2
7	7.85	29.7	488	800	344	1144	0.24	3.038	6.49	3.905	5	53.5
8	8.26	27.7	652	600	443	1043	0.31	19.29	11.48	5.015	12	437.5
9	7.89	26.8	860	800	600	1400	0.42	2.13	10.39	2.485	3.2	27.1
10	7.81	24.8	834	2200	582	2782	0.4	2.648	10.27	3.79	5.6	63.1
11	7.63	23.8	994	1800	688	2488	0.47	4.15	3.54	6.616	12.8	88.6
12	8.33	23.6	1090	3400	770	4170	0.53	65.15	6.82	5.63	16	92.9

Color, Oder and Temperature:

The river water should be colorless. Out of 12 samples 7 are nearly colorless, 1 muddy, turbid color, 2 turbid color, 1 light green and 1 oily & black color. The observation showed that as near the estuary as good in color. The river water should be odorless. 8 water samples are odorless, 1 pungent, 4 high pungent, 2 smile pungent. The observation showed that as near the estuary as good in odor. In the case of temperature, standard for sustaining aquatic life is 20-30 (^{0}C) and as it was winter (26.03^{0}C) all samples complies with the standard.

TSS, TDS and TS:

WHO Standard for TSS in terms of inland surface water is 150 mg/L. Gudbahri River was found to be 1233 mg/L (ranged from 400 to 3400 mg/L) which is above the permissible value. In case of TDS WHO Standard in terms of inland surface water is 1000 mg/L. The mean total dissolved solids concentrations in Gudbahri River was found to be 470.17 mg/L which ranged from 326 to 770 mg/L and it is within the limit. Higher values of total solids are mainly due to the presence of silt and clay particles in the river water. Water high in suspended solid may be aesthetically unsatisfactory for bathing [8-10]. The total suspended solids are composed of carbonates, bicarbonates, chlorides, phosphates and nitrates of calcium, magnesium, sodium, potassium, manganese, organic matter, salt and other particles. The effect of presence of total suspended solids is the turbidity due to silt and organic matter [11]. The minimum values of the three parameters were recorded in site 3 and maximum values in station 12. The maximum values might be due to the presence of several suspended particles. The higher amount of total solids in site 12 in comparison to others was perhaps due to run off from many bathing ghats, municipality solid garbage dump and other wastages.

DO, BOD and COD:

In the case of dissolve oxygen(DO), the tolerance limit for inland surface waters used as raw water and bathing ghat is 3 mg/l, for sustaining aquatic life is 4 mg/L whereas for drinking purposes it is 6 mg/L. DO value for Gudbahri river is between 3.54 to 11.48 mg/L (winter). At all places water has higher DO value than the limit prescribed. So, the contents do not satisfy the public water supply needs.

While in the case of biochemical oxygen demand (BOD), standard for drinking purpose is 0.2mg/L which is exceeded to the permissible value shown by the mean values of 3.88 mg/L. Chemical oxygen demand (COD) is other important parameter of water quality assessment. A standard for drinking purposes is 4 mg/L, which is not acceptable in-terms of Gudbahri river water sample analyzed (7.27 mg/L).

pH, Turbidity, EC and Salinity:

pH is the indicator of acidic or alkaline condition of water status. The standard for any purpose in-terms of pH is 6.5-8.5; in that respect the value Gudbahri River water are 7.33 to 8.39. The overall result indicates slightly basic water. The mean Turbidity of Gudbahri River was found 9.6 NTU which ranges from 0.68 to 65.5 NTU. The mean Electrical Conductivity (EC) of the water samples is 672.83µs/cm (ranged from 382 to 1090 µs/cm) which is above the standard limit of 300 µs/cm. Thus the water has very high electrical conductivity, implying the presence of reduced level of ionic species. However, the conductance of water increases at station 12, which might be due to enrichment of organic conducting species from soaps and detergents of the bathing places [13-14].

The mean Salinity of Gudbahri River was found 0.33 mg/L with a range from 0.23 to 0.53 mg/L. The mean chloride content of Gudbahri River water was found 77.9 mg/L with a range from

18.00 to 92.9 mg/L and it is within the limit. Chloride increases with the increasing degree of eutrophication [5]. The maximum chloride was found in site 12 and the minimum value was recorded in station 1.

The results from data analysis show that, the water is certainly unfit for drinking purposes without any form of treatment recommended by WHO, EU and Bangladish guidelines [3], [20-22] but for various other surface water usage purposes, it still could be considered quite acceptable. But as we know, once a trend in pollution sets in, it generally accelerates to cause greater deterioration. So few years from now, serious water quality deterioration could take place. However, there could be gross differences in the test results of some samples at different laboratories in the country, which could limit the use of these data for sensitive policy issues. The differences might be attributed to the approach adopted by laboratories in sample preservation, quality of chemicals used, testing method applied or qualification or expertise of the technicians or test performers.

The study provides first hand information based on preliminary investigation. A continuous monitoring of the riparian water covering all the seasons over a period time is necessary for fresh water source management. Since the water body serves as potable source as well as for other human needs, periodic monitoring will be helpful to reassure the publics and safeguard the precious common property resource from improper exploitation.

IV. CONCLUSION

The Gudbahri River is one of the most important River of Wukro that feeding the city in many ways. It also contents all kinds of garbage. From the beginning the importance of the river was very much and increasing day by day. But at present that river is under pollution. Like other rivers in the city its water quality is losing day by day. From the above chemical analysis the author saw that most of the water parameters do not comply with the tolerance limit prescribed by WHO and other standards. In addition, the results show that the water is certainly unfit for drinking purposes without any form of treatment. Still it has the time to control the pollution of the river. So it is very much necessary to conduct more research on this river and has to make awareness among the people about the pollution problem.

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AUTHORS

Correspondence Author – Mehari Muuz Weldemariam, Lecturer, Mekelle University, meharimz@gmail.com, meharichemistry@yahoo.com, +251 921 943113.

Prevalence of Asymptomatic Bacteriuria among Pregnant women in a tertiary care hospital

Dr. Rajshekhar. D. Kerure[*], Dr.Umashanker[**]

[*] Assistant Professor in General medicine[nephrology], Jawaharlal Nehru Medical College, Belgaum, Karnataka.
[**] Post-graduate in OB/GYN, I.P.G.M.E.R & S.S.K.M Hospital, Kolkata, West-Bengal.

Abstract- Urinary tract infections (UTIs) are the most common bacterial infections during pregnancy. Asymptomatic bacteriuria (ASB) is a major risk factor for the development of urinary tract infections during pregnancy, and with further risk of preterm birth & pyelonephritis if untreated. So, this study was carried out to determine the prevalence of Asymptomatic bacteriuria (ASB) in pregnant women & to isolate, identify the causative organisms; and to test the antimicrobial susceptibility of isolated pathogens.

A total of 300 pregnant women were studied over a period of six months at I.P.G.M.E.R & S.S.K.M hospital, Kolkata, a tertiary health care centre. Clean catch midstream urine sample was collected into a sterile container & then subjected to culture method. Out of 300 patients studied, Significant bacteriuria was noted in 33 patients (11%). 4% patients had insignificant bacteriuria. E.Coli was the most common etiological agent(72%), followed by Staphyloccus aureus.

Asymptomatic bacteriuria is not uncommon in antenatal patients. All pregnant women should be screened by urine culture to detect asymptomatic bacteriuria at their first visit to prevent overt UTI & other complications in both mother & fetus.

Index Terms- Antenatal women, Asymptomatic bacteriuria, Urine culture, UTI.

I. INTRODUCTION

Asymptomatic bacteriuria is common in women and increases in prevalence with age and/or sexual activity, due to short urethra, pregnancy, and easy contamination of urinary tract with fecal flora[1,3].

It may be of two types, symptomatic or asymptomatic. Asymptomatic bacteriuria (ASB) is defined as persistently & actively multiplying bacteria in significant numbers i,e., 10^5 bacteria per milliliter(ml) within the urinary tract without any obvious symptoms [2,6,7]. The pregnant women are two times more commonly affected than age matched non pregnant females[11,12]. This is due to urinary stasis due to progesterone effect in pregnancy in addition to different morphological & physiological changes occuring during pregnancy. Prevalence of asymptomatic bacteriuria(ASB) among pregnant women, as has been quoted in the western literature, varies from 2 to 10% [3,9]. Fewer studies on this topic are available on the Indian scenario and the reported prevalence rate is as high as 8% [4,5,8.]. Detection of ASB in antenatal women is important, as, undetected and untreated ASB may lead to symptomatic infection during that pregnancy in 25% of culture positive patients, acute pyelonephritis, hypertension in pregnant women, postpartum UTI, anaemia, preterm labour, low birth weight & perinatal death of the fetus [2,3,10].

The relatively high prevalence of asymptomatic bacteriuria during pregnancy and its significant consequences on women and on their pregnancies, plus the ability to avoid the sequelae with treatment, justify the screening of pregnant women for bacteriuria [4,5].

Urine culture is the gold standard screening technique for ASB during pregnancy[13,14,15]. The most common infecting organism is Escherichia Coli, which is responsible for 75-90% of bacteriuria during pregnancy. 25-30% of the asymptomatic bacteriuria cases develop into acute symptomatic UTI. Hence, early detection and treatment is of considerable importance not only to prevent acute pyelonephritis & chronic renal failure in the mother, but also to reduce prematurity & fetal mortality[1,13].

II. MATERIALS & METHODS

This prospective study was undertaken in 300 antenatal women, irrespective of their period of pregnancy, attending Obstetric & Gynecology OPD and Nephrology OPD, and those admitted in wards at I.P.G.M.E.R & S.S.K.M Hospital, Kolkata, over a period of six months from January 2011 to July 2011. Urine culture was performed in Microbiology laboratory. The study & data collection were carried out with the approval from the Institutional Ethical Committee.

Exclusion criteria:
1) Symptoms suggestive of infections in urinary tract (dysuria, frequency & urgency)
2) History of antibiotic therapy in previous two weeks
3) Known congenital anomalies of urinary tract.
4) History of fever
5) Pregnancy induced hypertension; &
6) Pregnancy with Diabetes Mellitus.

Informed consent was taken & antenatal women were counselled regarding the collection of "clean catch" mid stream urine sample in a sterile, wide mouthed container that can be covered with a tightly fitted lid. Microscopic examination of a wet film of uncentrifuged urine was carried out to detect the presence of the pus cells, erythrocytes, micro-organisms, casts etc. The urine samples were processed within 1-2hours of collection, using standard microbiological procedures. The culture was done on 5% sheep blood agar and Mac-Conkey agar by standard loop method and incubated at 37^0C for 24 hours.

Prolonged incubation was done for further 24hours if no growth obtained .The identification of organisms was done by Gram staining, motility test, catalase test, oxidase test, coagulase test, and routine biochemical tests as per Cowan and Steels Manual [15]. The growth was interpreted as sterile if no growth obtained . It was interpreted as Significant if the number of colonies corresponded to 10^5 colony forming units (CFU) per ml. Insignificant growth was reported if colony count was less than 10^5 CFUs per ml.

The standardized Kirby-Bauer disc diffusion method on Muller Hinton agar plate as per recommendations of NCCLS (CLSI) was used for antibiotic sensitivity testing [16]. The antibiotics tested were Ciprofloxacin, Norfloxacin, Erythromycin, Ampicillin, Amoxycillin-Clavulanic acid, Amikacin, Sparfloxacin, Co-trimoxazole, Cefotaxime, Ceftazidime, Nitrofurantoin, Pipercillin, Tazobactam, Imipenem, Tobramycin, Cefipime, and Cefperazone-Sulbactum. All the asymptomatic bacteriuric pregnant women were adviced to take treatment.

III.   RESULTS

Out of 300 pregnant women examined for asymptomatic bacteriuria, 231 samples were sterile with no growth. Significant bacteriuria was found in 33(11%) cases and insignificant bacteriuria in 12(4%)cases. Growth of contaminants was seen in 24(8%) samples [Table/fig-1].

The highest number of culture positive cases among pregnant women were in the age group of 26-35 years (57%), followed next by 18-25 years (30%) & >36years (12%). The youngest among the cases studied was 17 years old & the oldest was 41 years old [Table/fig-2].

Significant bacteriuria was found more in primigravida(59%) than multigravida(41%).

In our study, maximum number of culture positive cases were noted in second trimester (54.54%), followed next by first trimester(27.27%) and third trimester(18.19%) (Table/fig-3).

The commonest isolated organism was E.Coli in 24 patients (72.72%), followed by S.aureus in 4 patients (12.12%), Klebsiella pneumonia in 2 cases (6.07%), Acenatobacter, Proteus Mirabilis & Citrobacter each in one case (3.03%) of culture positive cases (Table/fig-4).

In our study, two organisms (6.06%) were found to be resistant to first line antimicrobial drugs like Ampicillin, Co-trimoxazole, Norfloxacin, Cefoperazone & Nitrofurantoin. Out of these two isolates, one each were E.Coli & K.pneumoniae. The two isolates were found to be sensitive to second line drugs. K.pneumoniae was sensitive to Amikacin, and E.Coli was sensitive to Cefuroxime & Ceftazidime.

IV.   DISCUSSION

Urinary tract infections are common in females & much more common in pregnancy. Infection of the urinary tract in pregnancy is due to the morphological and physiological changes that takes place in the genitourinary tract during pregnancy[3,5]. Asymptomatic bacteriuria of pregnancy needs special attention, due to lack of symptoms & its adverse consequences in

pregnancy. A cost evaluation study reported that screening for pyelonephritis is appropriate when the prevalence of ASB is greater than 2% [23]. An early detection and treatment of ASB may be of considerable importance not only to forestall acute pyelonephritis and chronic renal failure in the mother, but also to reduce the prematurity & fetal mortality in the offspring[6].

In our study, we found the prevalence of ASB to be 11% and so, screening all antenatal women for ASB, especially in early pregnancy by a quantitative urine culture is recommended.

Overall, the incidence in various Indian studies was found to be between 5 & 12%, and in Western studies, the incidence ranges from 2-7% [3,18]. In the present study, significant bacteriuria was found in 11% cases, which was almost similar to other studies [3,4,5,].). There are not many studies on the incidence of ASB in India. In a study which was by Lavanya SV et al [6]., the incidence of ASB was 8.4% in a south Indian population. This may be due to stasis produced by gravid uterus, and since most E.Coli strains prefer that environment, they cause UTI. Another reason could be as a result of poor genital hygiene practices by pregnant women who may find it difficult to clean their anus properly after defecating or to clean their genitals after passing urine [1,3,19]. The early detection of ASB is essential for an early treatment and for the avoidance of complications.

Antenatal women in age group 26-35 years had highest percentage of culture positive cases (57.57%), followed by 18-25 years age (30.30%) & >36 years age (12.13%) respectively (Table/fig-2). Similar age pattern was also observed in other studies [19,20]. The reason may be due to that, mos twomen between 26-35 years age group may be multiparous , and multiparity is a risk factor for acquiring asymptomatic bacteriuria in pregnancy [19,22].

In our study, most culture positive cases were seen in second trimester (54.54%), which was similar to Girishbabu R J study [1] and Nath et al study [11].

The gram negative bacteria were mainly responsible for asymptomatic bacteriuria. E.Coli was commonly found in 24 cases (72.72%) in our study which is similar to different studies, where also E.Coli was found to be the commonest isolate [3,12,24]. The most common organism which was isolated was E.coli (72.72%), followed by S.aureus (12.12%) and Klebsiella Pneumoniae (6.07%).

The isolates were most sensitive to nitrofurantoin and imipenem, followed by ceftazidime, amikacin, cefotaxime, co-trimoxazole, amoxicillin-clavulanic acid & erythromycin.

Incidence of low birth weight babies (50%) and prematurity (75%) was higher in untreated asymptomatic bacteriuric patients in a study by Lavanya S V et al. [24] and Nath et al.[11].

P.Mitra et al. [25] found pre-eclamptic toxemia was more common in the bacteriuric group (9.1%) as compared to abacteriuric group (6%).

All patients with significant bacteriuria were advised to take appropriate antibiotics as per the sensitivity report.

V.   CONCLUSION

Significant bacteriuria was present in 11% in this study. The most sensitive test for its detection is urine culture with clean-catch mid stream urine. Women with ASB may have serious

consequences on both mother & fetus. Therefore, it is important to screen all antenatal women for Asymptomatic bacteriuria at their first prenatal visit, preferably in first trimester, and those who are positive should be followed up closely after treatment because about 1/3rd will experience a recurrence. . It's time that we have a look at this strategy for improving the healthcare and for reducing the maternal and foetal morbidity and mortality.

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AUTHORS

First Author – Dr. Rajshekhar. D. Kerure, MD,DM(NEPHROLOGY). Assistant Professor in General medicine[nephrology], Jawaharlal Nehru Medical College, Belgaum, Karnataka. E-Mail: rdkerure@gmail.com
Second Author – Dr.Umashanker, DGO,MS(OBG). Post-graduate in OB/GYN, I.P.G.M.E.R & S.S.K.M Hospital, Kolkata, West-Bengal. E-Mail: ukumashankar@gmail.com

Correspondence Author – Dr. Rajshekhar. D. Kerure, Assistant Professor in General medicine[nephrology], Jawaharlal Nehru Medical College, Belgaum, Karnataka.
E-Mail : rdkerure@gmail.com
Present address – Dr. Rajshekhar. D. Kerure. Plot no. 13, Sector-11, Mahantesh nagar, Belgaum, Karnataka. Pin code-590016. Ph-09844245810, 09036901233.

Table/fig-1: Results of culture:

Results of culture	No. of cases	%
1) Significant bacteriuria	33	11
2) Insignificant bacteriuria	12	4
3) Contamination	24	8
4) Sterile	231	77
Total	300	100

Table/fig-2: Age distribution of Culture Positive cases

Age (years)	No .of culture Positive cases	%
18-25	10	30.30
26-35	19	57.57
>36	04	12.13
Total	33	100

Table/fig-3: Trimester wise distribution of culture positive cases:

Trimester	No.of Culture Positive cases	%
First	09	27.27
Second	18	54.54
Third	06	18.19
Total	33	100

Table/fig-4: Distribution of Culture Positive cases according to bacterial isolates.

Name of Isolate	No. of cases	%
E.coli	24	72.72
S.aureus	04	12.12
Klebsiella pneumonia	02	6.07
Citrobacter	01	3.03
Acenatobacter	01	3.03
Proteus mirabilis	01	3.03
Total	33	100

Nutritional Status of Kurmi Adolescent Girls of Raipur City Chhattisgarh, India

Pratibha Patanwar[*], **KKN Sharma**[**]

[*] Dr. Harisingh Gour (Central) University, Sagar (MP), India
[**] Dr. Harisingh Gour (Central) University, Sagar (MP), India

Abstract- **Introduction:** There are about 1.2 billion adolescents, a fifth of the world's population, and their numbers are increasing. Hence, it is essential to assess their nutritional status. **Objectives:** 1. To assess the nutritional status of adolescent girls and 2. To identify the correlations between socio-demographic characters and nutritional status among them. **Materials and Methods:** 500 adolescent girls aged between 16 -19 years were selected from the higher secondary schools of Raipur city, Chhattisgarh. Pretested multiple choice questionnaire applied. **Variable Studied:** Age Group, Type of Family, Monthly Family Income, Literacy and occupation, Diet habit. Height, Weight and Body Mass Index Were measured. **Results:** The study found that 53.8% of the adolescent girls were thin (BMI≤18.5). The prevalence of chronic energy deficiency based on BMI (grade I, II and III) were 26.0%, 14.4%, and 13.4 % respectively. None of the girls was found to be obese. Only 3.6 percent girls were overweight and 42 percent girls were found normal. **Conclusion:** It is essential to implement adolescent friendly health services as recommended by the World Health Organization (WHO) to improve the nutritional status.

Index Terms- Body Mass Index, under nutrition, overweight, Adolescent Girls, Raipur city.

I. INTRODUCTION

Adolescence is a journey from the world of the child to the world of the adult. It is an important stage of growth and development in the lifespan. Unique changes that occur in an individual during this period are accompanied by progressive achievement of biological maturity**(Tanner, 1992).** This period is very crucial since these are the formative years in the life of an individual when major physical, psychological and behavioral changes take place **(Patil et.al 2009).** Adolescent may represent a window of opportunity to prepare nutritionally for a healthy adult life **(Kaur et al., 2007).**

Adolescent girls, constituting nearly one tenth of Indian population, form a crucial segment of the society**(Government of India,2001).** The girls constitute a more vulnerable group especially in the developing countries where they are traditionally married at an early age and are exposed to greater risk of reproductive morbidity and mortality. In general adolescent girls are the worst sufferers of the ravages of various forms of malnutrition because of their increased nutritional needs and low social power **(Choudhary et al. 2009).** Early adolescence is a period of rapid growth and maturation in human development. The nutritional status of adolescent girls, the future mothers, contributes significantly to the nutritional status of the community **(Venkaiah,2002) .**

Under-nutrition among adolescent girls is a major public health problem leading on impaired growth **(Kalhan et al,2010).** Nutritional deficiencies has far reaching consequences, especially in adolescent girls. If their nutritional needs are not met, they are likely to give birth to undernourished children, thus transmitting under nutrition to future generations **(Mulugeta et al, 2009).** Previous study showed that girls from disadvantaged backgrounds have poor nutritional status **(Choudhary et al. 2009, Ghosh and Paul,1991)** Their weights and heights are lower than the well-to-do Indian counterparts **(Goyle, 2009).** This age group needs special attention because of the turmoil of adolescence which they face due to the different stages of development that they undergo, different circumstances that they come across, their different needs and diverse problems. Rural adolescent girls have been considered a low risk group for poor health and nutrition **(Soumyajit,2011)**. Despite all these important considerations, adolescent girls did not receive adequate attention in rural areas in our country, and only recently few studies have been carried out in this population group **(Patil et.al 2009,. Choudhary et al. 2009, Venkaiah,2002) .** It is well established that nutritional status is a major determinant of the health and well-being among adolescent and there is no doubt regarding the importance of the study of nutritional status **(NFHS 2)**. Nutritional status was evaluated using anthropometric indicators recommended by WHO Expert Committee **(WHO, 1995).** Keeping in view, the present study has been elucidate to assess the nutritional status of Kurmi school going adolescent girls in Raipur city, Chhattisgarh.

II. MATERIAL AND METHOD

Chhattisgarh is a state in Central India. The state was formed on November 1, 2000 by partitioning 16 Chhattisgarhi-speaking southeastern districts of Madhya Pradesh. In 2011, Raipur had population of 40, 62,160. Of which Kurmi caste population is 1.5 lakh (approx.) in Raipur. 500 randomly selected Kurmi, Other Backward Class (OBC) Girls of Raipur city, Chhattisgarh, India are the sample for present study. OBC is one of socially disadvantaged groups, as they still continue to lag behind the rest of the society due to their social and economic backwardness. In the specific census data it is not possible to quote the exact figure of their population. However estimate of OBC constituting 52% of the country's total population (Nema and Sharma). According to NFHS 1998-99 OBC constituting 39% of the country's population.

The present study was carried out among selected 500 higher secondary Kurmi girls students (16-19yrs of age) of Raipur city by purposive sampling method. After taking permission from the school authority, the class teachers of class were explained the purpose of the study and rapport was built up with the girl students and verbal consent was obtained from them. Briefing was done to the students regarding the questionnaire provided to them. Data on anthropometric and socio-demographic variables (i.e. Occupation, income and Literacy, Family type, diet habit) were collected using a pre designed questionnaire. Height and weight were measured using standard procedure as described below. Body mass index was computed from height and weight (weight in kg/ height in meter^2). Data were entered and analyzed by using SPSS 15.0. Nutritional status were assessed using WHO recommended anthropometric indicators. The students who were physically challenged were excluded from the study.

Anthropometric Measurement
Height

Height was measured using a vertical measuring rod with headpiece without wearing footwear. The children were asked to stand on flat surface, heels together and head positioned so that the line of vision was perpendicular to the body. The arms hanged freely by the side and head back, buttocks and heels are in contact with vertical measuring rods. The individuals were asked to inhale deeply and maintain a fully erect position. The movable headpiece brought onto the topmost point on the head with sufficient pressure to compress the hair. Height was recorded to the nearest 0.1cm.

Weight

Weight was recorded using a weighing machine. The accuracy of weighing machine was checked in every session against known weight . the girl were asked to stand still in centre of the weighing machine platform without support, with the body weight evenly distributed between both the feet. Weights were taken with standard minimal clothing required to maintain privacy. They were also asked to remove the shoes, socks etc.Weight was recorded to the nearest 0.5kg. The body mass index (BMI) was computed following the standard formula: BMI (kg/m^2) = Weight (kg) / Height ^{2} (m^2).

III. FINDINGS

The Body Mass Index (BMI), estimated from the height and weight measurements of individuals, is a widely accepted measure of nutritional status. Based on the BMI, women and men are classified as abnormally thin if their BMI is less than 18.5; overweight or obese if their BMI is 25 or more; and normal if their BMI is 18.5 or higher but less than 25. Persons with a BMI which is less than 18.5 are usually classified as having chronic energy deficiency.

In the present study, Out of the total 500 selected adolescent girls, 53.8% of the adolescent girls were thin (BMI≤18.5). The prevalence of chronic energy deficiency based on BMI (grade I, II and III) were 26.0%, 14.4%, and 13.4 % respectively. None of the girls was found to be obese. Only 3.6 percent girls were overweight and 42 percent girls were found normal. The mean age of the sample population is 16.9.

The results of multivariate regression analysis have been presented in **table-4.** Out of nine independent variables, two are found to be significantly associated with the BMI of the girls. These are Age of student and Diet habit. Therefore, these variables have come out as important predictor variables determining BMI. The independent variable age of student shows the significantly associated with BMI. This indicates that Age of girls more than 18 years of age, their BMI was lower than the girls whose age was below 18 years diet habit of the girls is also found to be significantly associated with BMI. The relationship indicates that girls whose diet habit was vegetarian, Their BMI was low as compared to non vegetarian. Other independent variables like type of family, Parents occupation, Parents education, Parents income when regressed with BMI the result shows the level of significance is comparatively low as compared with the age of student and Diet habit.

IV. DISCUSSION

The study highlights the extent of thinness and Overweight among kurmi adolescent girls of Raipur city. Nutritional status was evaluated using anthropometric indicators recommended by the WHO expert committee. In the present study we used BMI for age as an indicator to describe thinness or overweight. BMI for age as recommended by WHO as the best indicator for use in adolescents to describe under nutrition (thinness) or overweight. But there are few studies in india, which have attempted to describe thinness using BMI-for- age as indicator.**(GK Meidhi).** Prevalence of under nutrition were common among the girls in the late adolescent group (16-19yrs) (**Ashok Kumar).**

Present study shows that 53.8% girls were under-nourished (BMI≤18.5). Deshmukh et al reported an overall prevalence of 53% of thinness among adolescents; which is similar to present study**.** Nearly similar findings observed by **Singh N & Mishra CP (2001)** that 51.43% of adolescent girls from Varanasi were suffering from Chronic Energy Deficiency (CED). In a study conducted by **GK medhi,** (56.3%) of girls (15-18) had BMI less than 18.5.**.** The prevalence of thinness found in the present study is higher than the national average of 47% **(NFHS 3).** A higher percentage of thinness was reported by several of the studies from southern states and Rajasthan (93.5%) (**NNMB, Chaturvedi S.**). Choudhary et al have reported 68.52% of adolescents having a BMI less than 18.5 kg/square meter in rural area of Varanasi. Studies overseas in developing country like Bangladesh have also reported higher rate of prevalence (67%) of thinness among girls in the south east region (**Shahabuddin .) Anand et** al however reported lower percentage (30.1%) of thinness in north Indian rural school going girls near Delhi . **Kapoor G & Aneja S** (1992) reported 35.5% of adolescent girls (11-18 years) of Delhi to be undernourished. It was observed, that overall overweight among kurmi adolescent girl of Raipur city school was 3.6%. Subramanyam, et al., in their study among adolescent girls in Chennai, observed that prevalence of overweight (BMI >85th percentile) was 9.6% in adolescent girls which is higher than present study findings. While Mehta, et al. and Sood, et al in their study, reported a prevalence of overweight 15.2% and 13.1%, respectively, which was more than our study .The prevalence of overweight in our study is lower in

comparison to other studies. It is not towards increasing trend. So still the prevalence of under nutrition is major concern.

A multivariate regression analysis was performed in order to explain the most significant independent variables which influenced the dependent variable BMI of Adolescent girls. The regression analysis has been done to find the variations in dependent variable as influenced by independent variables and to study the relative significance and impact of various socio-economic, cultural and demographic independent variables on dependent variable. In Present study diet and age of student was significantly associated with BMI. This indicates that Age of girls more than 18 years of age, their BMI is lower than the girls whose age is below 18 years. These findings oppose the study conducted by the Shahabuddin et al reported that as age increased, thinness decreased in Bangladeshi girls. National Nutrition Monitoring Bureau**6** also reported that under-nutrition decreased from 78% in 10-13 years to 66% in 14-17 years. In the present study the mean BMI was (18.6±2.7). Similar findings reported by **(Yogesh Saxena) that** the Mean BMI was higher in late adolescent (17.87±1.74) than the early adolescents. Diet habit of the girls is also found to be significantly associated with BMI showing beta value of (.090). The relationship indicates that girls who are vegetarian, their BMI was low as compared to non vegetarian girls. One of the major reasons for thinness may be poor nutritional intake of adolescent girls and the increased physical activity, excessive energy outflows due to hard labour in agricultural activities.The frequency of overweight is low compared to that of underweight. One possible reason for the high occurrence of underweight could be traced to poverty, low dietary intake, excessive energy outflows due to hard labour, and chronic infections (M. Ramzan). The other possible reasons could be explained through factors such as biological, emotional, physical appearance, and behavioral factors. This, however, needs to be asserted by further research. In any case, several studies show that peer pressure, eating habits or emotional factors, and need to maintain an acceptable physical appearance are important factors that may result in underweight(Hossain, & Werner). Higher percentage of thinness may prove an obstacle in achieving RCH (Reproductive and Child Health) program targets, like reduction in proportion of low birth-weight babies and in improving reproductive outcomes.**(Kirchengast S.)**

V. CONCLUSION & RECOMMENDATIONS

These studies found that majority of the adolescent girls are undernourished. These percentages of malnourished adolescent girls are quite alarming and steps need to be taken to improve their nutritional status. Hence It is essential to implement adolescent friendly health services as recommended by the World Health Organization (WHO) to improve the nutritional status. Implementing this will decrease the poorly nourished adolescent mothers, who are more likely to give birth to low birth-weight babies, perpetuating a cycle of health problems which pass from one generation to the next.

Considering the results of this study, it is suggested that a comprehensive strategy should be implemented in disadvantaged groups of our country in order to prevent adolescent girl undernourishment. Efforts are needed to use the school system favorably for improving the nutritional status of girls. This has

earlier been suggested by Gopalan (1974)20. In future, studies should be done on adolescent girls in urban and rural sectors for to identify the factors responsible for this problem, which may in turn help to adopt and implement the proper strategies for upliftment of whole community.

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AUTHORS

First Author – Dr Pratibha Patanwar, PhD. Scholar, Dept. of Anthropology, Dr. Harisingh Gour (Central) University, Sagar (MP), India. , pratibha.patanwar@gmail.com

Second Author – Dr KKN Sharma, PhD. Assistant Professor, Dept. of Anthropology, Dr.Harisingh Gour (Central) University, Sagar (MP), India , email address: kknsagar@gmail.com

Correspondence Author – Ms. Pratibha Patanwar c/o Mr. Gambhir Jain, National Health System Resource Centre (NHSRC), NIHFW Campus, Babagang Nath Marg, Munirka, New Delhi. 110067. INDIA., Mobile: 0987182684 7. E-mail: pratibha.patanwar@gmail.com

Table- 1 Distribution of Girls According to the Various Grades of Under nutrition Based on BMI

BMI	Category	Number of girls
<16.0	Grade 3 thinness	67 (13.4%)
16.0 -16.99	Grade 2 thinness	72 (14.4%)
17.0 -18.49	Grade 1 thinness	130 (26%)
18.50 -24.99	Normal	213 (42.6%)
25.0 -29.99	Overweight	18 (3.6%)
>30.0	Obese	-
Total		500 (100%)

Table 2: Demographic data of adolescent girls

Variables	Mean±SD
Age (years)	16.91±0.953
Height (cm)	152.99±5.22
Weight (Kg)	43.59±7.26
BMI (Kg/m2)	18.6±2.7

Table 3 Regression Analysis

Model	Beta Value	Sig.
Constant	.508	
Age of Student	.102	**.048***
Occupation Mother	-.195	
Occupation Father	.003	
Education Mother	-.025	
Education Father	.255	
Income Father	-.094	
Diet Habit	.090	**.045***
Type of family	.012	

R)-Reference Category Sig-≤0.01: Highly Significant, Sig between 0.05 and 0.01: Significant at 1 to 5% level,

Selected characteristics of the study population

Variables	Frequency
N = 500	
Education of father	
Illiterate	**2**
Primary	**5%**

Variables	Frequency
Middle	9%
Matriculate to below graduate	43
Graduate and above	42
Occupation of father	
Government sector	47.4%
Private sector	7.8%
Business	10%
Agriculture	32.6%
Not working	2.2%
Education of mother	
Illiterate	6
Primary	12.5%
Middle	25.9%
Matriculate to below graduate	42.1%
Graduate and above	13.0
Occupation of mother	
Government sector	9.8%
Private sector	2.6%
Business	4.6%
Agriculture	11.8%
Housewife	71.2%
Father Income	
<5000	46.8%
5000-10000	50.6%
>10000	2.6%
Family Type	
Joint	33.2%
Nuclear	66.8%
Diet habit	
Vegetarian	52.8
Non-vegetarian	47.2%

Boko Haram Insurgency in Nigeria: Its Implication and Way Forwards toward Avoidance of Future Insurgency

Olaide Ismail Aro

Abstract- The end of 2011 general election in Nigeria results to mass recognition of another set of militant popularly called Boko Haram. These set of militant during the cause of prosecuting their objective have destroyed properties worth Billions of Naira, killed thousands of innocent people and add to religious misconception in Nigeria. It should be noted that the scope of this paper were not restricted to Boko Haram matters alone because the present writer belief that certain factors that applied to other groups that had emerged in Nigeria also laid foundation for emergence of Boko Haram. As a result of the above fact, militancy instigating factors as well as the effect of Boko Haram's means of prosecuting their objective along with way forwards toward avoidance of future insurgency are object of discussion here.

I. INTRODUCTION

Different sets of groups had arose in Nigeria with little or real militancy approach in prosecuting their different objective among them is Oodua People's Congress (OPC) within Yorubas, Bakassi Boys and Movement for Actualisation of Sovereign State of Biafra (MASSOB) among Igbos, Niger-Delta Militant as well as Boko Haram that is object of discussion here and others without particular identity within Northern part of Nigeria. And in my humble view, the activities of Boko Haram pre-dated 2011 general election; because there are the generation of people that have been engaging in different political and ethnical crisis courtesy of religion in the Northern part of Nigeria.

No wonder S. A. Ekanem, J. A. Dada and B. J. Ejue (2012:232) stated that Boko Haram have been in existence right from the 1960s but only started to draw attention in 2002. It is on record that this particular group have been operating under the name Shabaab Muslim Youth Organisation with Mallam Lawal as the leader since 1995 but leadership of the group shift to Mallam Mohammed Yusuf when Mallam Lawal left Nigeria to continue his education in Saudi Arabia. It is the leadership of Mallam Mohammed Yusuf that allegedly opened the group to political influence and popularity (Brock Joe). There is no gain in denying the fact that Mallam Mohammed Yusuf is the one that officially founded Boko Haram in 2002 in the city of Maiduguri with the aim of establishing Shari'a government in Borno and neighbouring State (Johnson Toni).

The official name of Boko Haram that is object of discussion here is *Jama' atu Ahlis Sunna Lidda' await wal-Jihad* which in Arabic Language means "People of the way of Prophet Muhammed (peace be unto him) and Community (of Muslims) in line with the earlier generation of Muslims" and not Boko Haram which simply means "Western secular education is

Islamically prohibited". Boko Hara has also been defined to means that evangelism deceptively camouflages as Western Education is Islamically unacceptable (DCCN, 2009: 2). Please note that the origin of the name "Boko Haram" have been traced to Media and Public/Community coinage (DCCN, 2009: 2).

In prosecuting their objective, Boko Haram are use to bombing Churches, Mosques, Police Stations, Schools; Universities inclusive and other Government owned Properties. As well as privately owned property without excluding innocent souls through the machinery of suicide bombers as well as slaughtering and kidnapping people; alien inclusive which have resulted to demise of the larger percentage of the Captives. The most pitiable fact is that most of those suicide bombers are teenagers which can be summarily belief to be the resultant effect of brainwashing. It is my humble view that Boko Haram during the cause of prosecuting their objective has done great harm to this Nation order than other set of militants that have emerged in Nigeria.

Corroborating this, Emmanuel Oladesu (The Nation Newspaper, 2013: 4) stated thus:

Since the end of the civil war no calamity of enormous proportion has befalled the fledging nation – state more than the harrow unleashed by the dreadful sec – Boko Haram. Many lives have been lost property worth billions of naira have been destroyed. Nobody is insulated from the attack. Government officials and buildings, traditional rulers, police and military formations and church worshippers are targets. On daily basis, there is panic. The fear of the invincible agitators has become the beginning of wisdom.

This is the situation of things until 28 January 2013 when the sect announced temporary ceasefire through one her leader Sheikh Mohammed Abdulazeez Ibn Idris (The Nation Newspaper, 2013:1) which were latter counter to be untrue by another member of the group. It should also be noted that Federal Government of Nigeria have offer members of Boko Haram amnesty which have not yield any positive result to the extent that different Committee has been set both at State and Federal level for the purpose of putting end to the activities of Boko Haram.

It is pitiful that the situation of thing would not have worst up to this extent if all the Northern Leaders have interfere in the matter at the earliest stage during the cause of which members of Boko Haram would have been tamed. No wonder Da'wah Coordination Council of Nigeria (2009:24) reported thus:

A number of Islamic Organisation including the Muslim Students Society of Nigeria (MSSN) and the National Council of Muslim Youth Organisation (NACOMYO) had on a number of occasions informed and warned some traditional leaders of the

impending problems they expect from the BH group. Unfortunately, they were not taken seriously. A few of the traditional leaders however did have dialogue with some of the BH members. These unfortunately did not result in much.

It should be noted that not all the stakeholder stands mute in respect of Boko Haram as a result of which dialogues and debates was introduced to wage into the matter.

Corroborating this Da'wah Coordination Council of Nigeria stated that a number of prominent Muslim Scholars[2], activists and Da'wah workers from various Organisations had been involved in dialogue and debates with the leadership and followers of Boko Haram group in order to either convince them of their wrong position or to dissuade others from joining them (DCCN, 2009:24). Although the dialogues and debates with members of Boko Haram convince some people within its domain to reject their ideology but disappointedly in some of the debates, some Scholars focused their attacked on the personality of Late Muhammad Yusuf instead of his ideology which is reported by Da'wah Coordination Council of Nigeria (DCCN, 2009:25) to won more sympathy for the group within its domain.

II. EFFECTS OF BOKO HARAM INSURGENCY IN NIGERIA

The insurgence of Boko Haram; particularly, the adopted mode of prosecuting their objective have posed serious danger to our Nation called Nigeria and its citizen without excluding foreigners which will be briefly discussed here.

Security Challenges:

By security challenges, it means the effect of Boko Haram insurgency in Nigeria on security of life and property as well as other consequential effect. The insurgency of Boko Haram in Nigeria have posed serious security challenges to Nigeria in the sense that people were been denied the choice of exercising their natural freedom of movement due to fear of attack from members of Boko Haram. Particularly in some parts of Northern Nigeria where Boko Haram have taken over through planting of bombs as well as brutalized attack on innocent souls which history have shown that the attack is not from Boko Haram alone but some group have been using the privilege of existence of Boko Haram to nurse their personal and ethnical agenda through brutalising of people.

Corroborating this, one of Boko Haram Leader; Sheikh Abu Mohammed Abdulazeez Ibn Idris stated that the group is aware of the fact that some criminals have infiltrated their movement and continued to attack and kill people using their names (The Nation Newspaper, 2013: 3). It could also be recalled that kidnaping have also been used by some group of people hiding under Boko Haram crisis during the cause of which innocent souls were been kidnapped with demands for ransom with fruitless effort in rescuing some of the captive which have even led to the death of numbers of the captive. Also, the insurgencies of Boko Haram in Nigeria have exposed

security lapses in Nigeria because of attacks that has been done on some unexpected places like Police Headquarter in Abuja, Abuja United Nation Office among others.

Also confrontations that have occur between Boko Haram and security forces during the cause of which serious casualty were recorded even among the security agencies and have also exposed Nigeria security lapses to the extent of exposing that Nigeria Police are only professionals in using forces to quench peaceful protest but cannot quench deadly once like Boko Haram insurgency. Boko Haram tragedy have also exposed further some of the fatal inefficiencies in the system by which Nigerian leadership has often sought to arrest or even prevent such recurrent civil crises(DCCN, 2009:24). The situation of things among others have led President Goodluck Jonathan to replace service chiefs in his administration; National Security Adviser[3] inclusive.

Economic Effect:

The economic effects of militancy insurgency in Nigeria simply connote consequential effect on people and government's life which can be viewed from 2 different perspectives. They are the effect on the State that is, Nigeria and individual member of the State that is, Nigerian; particularly residents of Bauchi, Borno, Yobe and neighboring State. The militants; not limited to Boko Haram alone by their nature are used to crippling the economic activities of any place they spread their tentacles as well as led to migration of people from the affected place due to restiveness. No wonder the Nation Newspaper (2013:3) reported about the activities of Boko Haram thus:

Borno and neighbouring Yobe State – the epicenter of the activities of the sect – have been crippled economically. Thousands of people have died in the sect's bloody campaign.

It must be noted that Boko Haram have not only led to closure and or abandonment of people's business activities within affected region but also led to migration of people from the affected Region as well as once led to reduction of people's patronage of product from Northern Region because of rumour that member of Boko Haram are planning to send poisonous product from their region to other parts of Nigeria. No wonder Mr Umar Ibrahim Yakubu (Leadership Newspaper: 2012) opined thus in respect of Boko Haram:

we discovered that 97 per cent of businesses were negatively affected by the security problem. Some of them had to close down, some of them had to retrench their workers, and others had to cut down in the number of hours of operation.

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[2] Few of them are Sheikh Abdul-Wahab (from Kano), Muhammad Awwal Adam "Albani" (Zaria), Mallam Isa Ali Fantami (Bauchi), Ibn Uthman (Kano), Imam Gabchia (Borno) and Late Sheikh Ja'far (Kano) e.t.c

[3] President Goodluck Jonathan sacked General Andrew Owoeye Azazi as National Security Adviser and replace him with Colonel Sambo Dasuki. The President also sacked O. O Petirin as Chief of Defence Staff and elevates Rear Admiral Ola Sa'ad Ibrahim to his position. Rear Admiral Ola Sa'ad Ibrahim before his elevation is Naval Staff who was replaced with Rear Admiral D. J Ezeoba. M. D Umar was also sacked and replaced with A. S Dadem as Chief of Air Staff. The President also sacked Ogbonna Onovo as Inspector General of Police and replaced him with Hafiz Ringim who was subsequently sacked and replaced with Mohammed Dahiru Abubakar. Mr. Afakriya Gadzama was also sacked and replaced with Mr. Ita Ekpeyong as Director-General of State Security Service.

Also the insurgencies of Boko Haram have reduced drastically; government derivation from the affected region due to restiveness in those places as well as reduced investment and growth of business in the affected places without excluding government executed project. No wonder 2011 World Investment Report of the United Nations Conference on Trade and Development reported that lull in business activities caused by insecurity in Kano State alone has cost the Nigerian economy N1.3trillion ($6 billion) as a result of attacks by the Boko Haram group. It was further reported that the report monitored on the Voice of America (VoA) also shown that Centre for Research and Documentation in Kano attributed the development to a drop in earnings for nearly all businesses in the state (Leadership Newspaper: 2012*).*

Political and Social effect:

By political effect, it means its effect on government's performance that's the government ability to deliver it objective to its citizen while social effect on the other hand connotes its effect on society and people's ways of life. The insurgence of Boko Haram in Nigeria has drastically reduced government of the day's performance in the affected area. Although it is trite fact that Nigerian politicians are fond of promising heaven and earth for the purpose of gaining people's mandate; it is my humble view that President Goodluck Jonathan were not be able to fulfil the larger parts of his promise due to confusion created in the Nation by insurgence of Boko Haram. It must be noted that the insurgence of Boko Haram have made public forum caution able place to be in some Northern Part of Nigeria.

It was bring to my knowledge around 2011 that it is now a policy that there cannot be public assemblage without permit in Federal Capital Territory; Abuja and some Northern part of Nigeria with exception of North-East where public assemblage have been totally banned due to activities of Boko Haram. The activities of Boko Haram have aggravate to the extent of developed negative impact in the mind of some Christian that all Muslims are extremist without taken into cognisance that extremism applicable to both Christianity and Islam; what would you say about one of the Nigeria respected Reverend who refused to assist his sister because she failed to convert to Christianity.

It should be noted that the activities of Boko Haram have made some Non-Muslim who have not be privilege to mingle with Muslim in their life to belief that all Muslim are fundamentalist while some of them were mischievous with their opinion with little exclusion about few Muslims from Yoruba Part of Nigeria. It should also be noted that the activities of Boko Haram have makes some Nigerian who are not from Boko Haram affected State to be avoiding affected State to the extent that some Nigerian Graduate who are serving the Nation under the scheme of National Youth Service Corp (NYSC) are seriously rejecting being posted to some part of Northern Nigeria.

The social challenges posed by insurgence of Boko haram can also be attested to by the mass movement of residents who are from other States of the federation; out of the North Eastern part of the country, especially Maiduguri, the capital of Borno State. And not only that, insurgence of Boko Haram have reach the extent that suspicious and rumour of attack is the easiest information to spread within North-Eastern Zone of Nigeria.

Nigeria Unity:

Nigeria as a Nation is heterogeneous in nature because its comprises of over 300 ethnic groups living together as a country but it is a pity that history have shown that this 'ill-unity' have been shaking since independence which were further compounded by the activities of Boko Haram because initial target of Boko Haram sect were Non-Northerners. Nigeria unity is called 'ill-unity' because Prof. Ebere Onwudiwe (2009) have stated that Nigeria is kept one rather than make one when he stated that the phrase "to keep Nigeria one is a task that must be done" should be replaced with "to make Nigeria one is a task that must be done" because the original slogan is not conceived at the deeper level of togetherness, and that is why the Country is in the bad shape that it is today. It should be noted that the unity of Nigeria is been shaking because of the political motive attached to the activities of Boko Haram which have instigate some region to continue their clamoring for succession.

Diplomatic Relation:

By diplomatic relationship, it means the consequential effect of Boko Haram insurgency on the relationship between Nigeria and other Nation of the World. The insurgence of Boko Haram in Nigeria has negatively affect the relationship between Nigeria and other Nation of the world because of bombing couple with kidnapping and hostage taking with or without demand for ransom; particularly of alien which have resulted to demised of some of them and have greatly been an object of disturb not only to Nigeria but include International Community. It could be recollect that few years ago, United State of America warned her nationals not to go to some State in Nigeria without forgetting that United Nation have once include Nigeria in watching list of terrorist in the World which was later removed. Also it is once reported that there are strong indications that Nigeria may be blacklisted by international anti-money laundering watchdogs called Financial Action Task Force (FATF)[4] over its inability to track the source of funds of Boko Haram and curb terrorism financing in general (Odidison Omankhanlen and Johnson Babajide: 2012).

III. MILITANCY INSTIGATING FACTORS IN NIGERIA

It has been submitted that Boko Haram that is order of the day are not the first militants group that have emerged in Nigeria which may not be the last particularly when some other unknown group have been perpetrating evil in the Northern parts of Nigeria. This is because it appears to this present writer that some factors in which are object of discussion here are creating enabling environment for militant's insurgency. The factors are 'ideology', 'unemployment and poverty', 'corruption and lack of development', 'fictitious fact and ignorance', 'failure of governance and good leadership', 'social justice, marginalization and neglect', 'human right violations' and 'frustration'.

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[4] Financial Action Task Force (FATF) is the global standard setter for measures to combat money laundering, terrorist and proliferation financing.

Ideology:

By ideology, it means a set of beliefs especially one held by a particular group that influence their behaviour. It could be recalled that the primary ideology behind formation of OPC is to defend, protect and promote Yoruba culture as well as interest and as a matter of fact, it is this ideology that influence them to challenge the annulment of June 12 Presidential election's results that favoured a Yoruba man; Chief M. K. O Abiola (Omobolaji Ololade Olarinmoye, 2006/2007: 111 - 131). The ideology of MASSOB is to revive the former Secessionist State of Biafra which was created in 1967 by the Ibo ethnic group while Niger-Delta Militants' ideology is based on political autonomy and a greater share of oil revenue derived from their region.

Boko Haram that is object of discussion here has ideology that is slightly differ from others. Boko Haram ideology is that western secular education is islamically prohibited and that there should be another system of education based purely on the teaching of the Qur'an and Sunnah[5] as understood by the earliest generations of Muslims without any attempt to provide for alternative curriculum for this system of education (DCCN, 2009: 10).

Unemployment and Poverty:

I have once observed that my Country; Nigeria despite the fact that is endowed with lots of natural gifts still far behind the economic and social progress required to impact the well being of the average Nigerian; as a result of which one half of the population live on less than one dollar per day and as well top three Countries in the world that have the largest population of poor people (Aro Olaide Ismail, 2011: 160). This among others served as one of the reason why larger part of Nigerian youths are unemployed and the employer of some of the available jobs are stressing importance on working experience as criteria for securing the job thereby resulted to poverty which as a matter of fact makes them available for easy inducement for militancy and other social vices like political thugs among others.

No wonder World Bank in an outcome of her research conducted in respect of Niger-Delta crisis view poverty as one of the key causes of conflict when he stated that the key root cause of conflict is the failure of economic development such that many of the world's poorest countries are locked in a tragic vicious cycle where poverty causes conflict and conflict causes poverty" (Punch Newspaper, 2007: 9). It is the resultant effect of poverty and unemployment that makes angry people particularly youth available in all parts of the federation for easy inducement for militancy and other social vices as well as increased people's apathy towards aiding security agent in combatting militancy and other social vices in Nigeria. No wonder Iwuanyanwu (The Punch Newspaper, 2012) is of the view that high level of unemployment in the Country is alarming and the government needs to address the issue if it hopes to win the war against insecurity.

Corruption and Lack of development:

The term corruption is incapable of precise definition but is synonymous to extortion, exploitation, fraudulency, venality,

dishonesty, profiteering, nepotism, breach of trust, malfeasance, bribery, crookedness, shady deal, jobbery among others. Lack of Development have been view as consequential effect of lack of people's vital need which is not closed but include lack of motor able road, constant electricity and water supply, frustrating telephone and internet network, inadequate houses as well as avoided natural disaster which were not given proper and timely attention such as erosion, flood among others.

And in analytical mind; mine inclusive, corruption has been an instrument that have been used to underdeveloped this Nation called Nigeria which have pave way for militancy because resources that could have been used to empower the people have been converted to private use and drastically reduce the resources available for development as well as provision of social services such as education, health as well as quality transport system; and thereby make room for people to be angry as well as create enabling environment for easy inducement of youth for militancy and other social vices.

No wonder Hutchful (1985) in his paper in respect of Niger-Delta crisis is of the view that anger of the people of the Niger-Delta Region especially the youth derives merely from the fact that other parts of the country; sometimes the arid regions are built to the standards obtainable in the developed world. They have bridges built over dry land and less travelled roads while most of the Niger Delta communities are only accessible by boats and seriously in need of bridges. It is on the basis of the above fact I'm of the opinion that it is the underdevelopment in Nigeria as a whole with exception of few places that is serving as the main drive behind the larger part of social vices that is troubling Nigeria today; Boko Haram and Niger-Delta militancy inclusive.

Fictitious facts and ignorance:

For the purpose of this arena, fictitious fact are facts which are not directly and or physically exist; which its existence can only be prove with the instrument of 'faith' as well as facts which cannot subjected to direct confirmation. Lots of proposition has been made by the 2 Holy Books that dominate religious practice in Nigeria; the Holy Quran and the Holy Bible about "heaven and earth' or better still "present and here-after" which have been interpreted by different religious leader based on their perception with some religious leader holding view that the content of a particular Holy Book cannot be understood unless the person is in sprit.

It has also been adopted as a means of religion propagation by both Christian and Muslim devotees particularly their different Leaders that non devout member will not gain paradise and will definitely end-up in hell at the here-after. While the term ignorance predicates lack of information or knowledge. It is ignoramus thinking coupled with passing of wrong message among religious leaders and followers that have aggravate the tension in Nigeria particularly Northern parts of Nigeria. It is pitiful that the larger percentage of Nigerians; both Christian and Muslim are religious fanatic who are used to displaying their religious fanaticism through extra ordinary preaching among others without hiding it while some in defence of their fanaticism refer to others devotees of other religion as fanatics.

Another factor that is instigating religious crisis in Nigeria is that an average Northerner probably Muslim sees all Southerner particularly Christian to be morally loose, permissive

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[5] Sunnah means ways and life of Prophet Muhammed (S.A.W)

and undisciplined religiously without consider Southern Muslim to be in the same category with them; religiously. Premise on fictitious fact and ignorant belief, lots of utterances have been made as well as lots of omission and action have arose which have aid militia and people's perception about the situation as well as have been used to create religious tension in Nigeria and as a matter of fact, insurgence of Boko Haram have been medially and subjectively associated with islamisation of Nigeria rather than objectively discuss the issue as it is that is; in line with the political objective that associate with the struggle.

Failure of good governance and good leadership:

I have once observe good governance as a system by which society's resources is been manage transparently with accountability as well as given room for popular participation in government among others by responsible leaders (Aro Olaide Ismail, 2011: 160 – 167). While good leadership has been observe as leadership that is driven by the concept of 'patriotism', 'honesty' and 'mean-well for the Nigerians' which will reflect through good governance (Aro Olaide Ismail, 2011: 64 – 71). It is my observation that the inability of the Nigerian government to consciously manage public resources entrusted on them for people interest have contribute greatly to insurgence of militancy in Nigeria; Boko Haram inclusive. If these entrusted resources have been use for the benefit of the whole Nigerians, youth would not be available for easy inducement for militancy and other social vices.

Ordinarily this entrusted resources is for the benefit of Nigerians as a whole whereas it is been use largely for the benefit of few people directly and indirectly in government. It is on the basis of the above fact am aligning myself with Usman when he observed thus about Niger-Delta which appear here as a typical example: Niger Delta Region is riddled with bad governance/corruption on the parts of government officials, both at the state and local government levels. It has been argued that if government officials in the region have utilized judiciously their monthly allocations, to better the lots of the ordinary people, through the creation of jobs, and embark on infrastructural development of the region, the situation would have been better than this current sorry state.

Rather, the jumbo monthly allocations are spent on frivolous things that have no corresponding bearings on the life of the people. As a matter of opinion, if proper review of Nigerian budget is done, it will be realised that few people that constitute Nigeria government are allocating fat sum to themselves at the expense of under-develop the state which were even made worst during this 4th Republic that we have been since 1999. It could be recalled that Mallam Lamido Sanusi Lamido; The Central Bank of Nigeria Governor once inform the public that 25% of Nigeria Annual Budget is been allocated to National Assembly alone[6].

The increase in crime rate and the helpless attitude of law enforcement agencies towards crime have been cited by the founders and admirers of Boko Haram in order to claim legitimacy for these groups. Mr Mu'azu (Peter Nkanga) in his

reaction in respect of situation of things in Nigeria stated that "there is widespread disenchantment with the Nigerian State arising from its failure to meet its obligations to the people and the perception that State policies are implemented to advance private interests for personal accumulation". It is my strong belief that failure of good governance and good leadership have indelible foot print in emergence of militancy in Nigeria; Boko Haram inclusive.

That is why I am not really surprise when Pastor Williams Kumuyi (Punch Newspaper, 2012); the General Superintendent of Deeper Life Bible Church linked the nation's numerous problem to inability of electorate to elect credible leaders.

Social injustice, marginalisation and neglect:

For the purpose of this arena, social injustice presuppose unfair treatment of people in the society while marginalisation on the other hand presuppose discriminative approach of distributing social amenities and other governmental project as well as uneven division of political office within Society. Also neglect for the purpose of this arena presupposes abandonment of certain sets or group of people in distributing social service to people. This social injustice, marginalisation and neglect have contributed immensely to insurgency of militancy in Nigeria which have unarguably been associated specifically among others as a factor that instigate insurgence of Niger-Delta Militants.

While Boko Haram insurgency has also been attributed to social injustice, marginalisation and neglect because it is the belief of some Northerner that the current tenure lawfully occupied by President Goodluck Jonathan; a Southerner ought to be occupied by a Northerner. It could be recall that South-East Region of Nigeria has been on their louder voice for the emergence of Nigerian President from their zone. It was reported on 25 of September 2012 by Punch Newspaper that the Ndigbo Unity Forum (NUF)[7] has called on the Federal Government to address the infrastructural challenges facing the South-East geo-political zone with allegation that the zone was "the most cheated" in the allocation of funds to the six zones since the dawn of the Fourth Republic which depicts marginalisation.

It is also be on record that South-West Region of Nigeria are desperately complaining of marginalization and social injustice in respect of holders of key political offices in President Goodluck Jonathan's administration that have commenced since 29 of May 2011. It should be noted that aside Ministers from all the 6 States that constitute this Region, no indigene of South-West is a member of key political office in this government despite the fact that national character in imbedded in our system. And in a deeper scrutiny by analytical mind; mine inclusive, transformation of Boko Haram from mere religious organisation with politician influence to militant group were as a result of feeling that the tenure of presidency occupied by President Goodluck Jonathan; a Southerner ought to have been occupied by a Northerner which portray marginalisation.

Human rights violations:

Security agents in Nigeria are fond of violating people's right particularly innocent soul courtesy of investigation and

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[6] The above expression was made at the occasion of Igbinedion University Okada 8th Convocation Lecture delivered by him titled Growth Prospects for the Nigerian Economy on 26 November 2010.

[7] Ndigbo Unity Forum (NUF)

enforcing the law which had with time make people wild particularly; youth and as a matter of fact, change peaceful protest to militancy particularly as it affect Niger-Delta Militant and Boko Haram insurgency. In 1966 as a case study, Nigerian troops was alleged to have terrorized entire communities including raping of innocent women in an attempt to suppress the Isaac Boro rebellion because he was considered to be a threat to the free exploitation of the petroleum resources in the Niger Delta (ICE Case Study: 5).

It should not be forget that on 11 January 1999, Ijaw women who were engaged in a peaceful demonstration for marginalization of their people in Port Harcourt were violently tear-gassed, beaten, stripped as well as detained by a combined team of policemen and soldiers (Brisibe, 2001:6). It has also been said that insurgence of Boko Haram commenced peacefully with religion preaching before sudden departure from religion preaching to violently attack on people and property as a result of violation of their member's right by Nigeria security agency.

Frustration:

The phrase frustration implies feeling annoyed and impatient by the people because larger percentage of them felt that they have not achieved their sets goals. The economic situation of Nigeria with arising consequence coupled with corruption, 'fictitious facts and ignorance', 'failure of good governance and good leadership', 'social injustice, marginalisation and neglect' and lack of development among others which have negatively reflect on the people and thereby lead to frustration on people's part to the extent of instigating militancy among other social vices particularly among the youths.

No wonder an author observed that there are wide spread of ignorance and poverty in Nigeria; a situation which Nigerian state has consistently failed to deal with. When one adds religious/social intolerance; youthful restiveness/idleness and unemployment to the mix (as seen in the Niger Delta), it leads to frustration. A frustrated soul will do anything to ventilate pent up emotions. The recent Boko Haram insurgency in Northern Nigeria puts these in good perspective (Samuel Asuquo Ekanem, Jacob Abiodun Dada and Bassey James Ejue; 2012:232).

IV. TOWARDS AVOIDANCE OF FUTURE MILITANCY INSURGENCY

It must be noted that Boko Haram and other groups that have arose in Nigeria do not emerged out of vacuum; that is there emergent can be traced to available lacunae in the system which this section aimed to filled. It is on the basis of the above fact I'm recommending the following as way forward toward managing Boko Haram sect and or preventing insurgence of another sect of militants in Nigeria.

Traditional institution integration:

Nigeria by nature is endowed with well organised traditional institutions headed by Obas, Emirs as well as Obis among others and their Lieutenants among Yorubas, Hausa/Fulanis and Igbos respectively. Some of the institution are well structured just like pyramid[8] to the extent that its links people directly particularly among Yorubas and Hausa/Fulanis. Despite the above fact, it is pitiful that the traditional institutions were relegated to ceremonial function alone. The institution is not properly integrated to Nigeria political system, particularly to solve problems that torched the society directly.

It is the belief of this present writer that the pyramid structure of this traditional institution can best be employed by the government to solve upcoming crisis that affect group of people particularly people with ascertainable identity because those Lieutenants will one way or the other have link to one of them which can be solved with the aid of negotiation. It is on the basis of the above I found it crucial for Government to integrate Traditional Institution into our political system.

Economic empowerment and employment generation:

Economic empowerment for the purpose of this arena simply appear as putting the machineries in motion to restore the people's essential lacking at basic level so as to be in position of acquiring the basics materials needed such as foods and shelter, housing, health services, safe drinking water, clothing, sanitation facilities, education e.t.c that will make them attain a minimum standard of living (Aro Olaide Ismail, 2011: 160 – 167). It is the belief of this present writer that if basic need were provided for people coupled with employment; particularly for youth, it will minimise people's desperation and frustration that make them available for easy inducement for militancy and other social vices.

No wonder Bill Clinton (Compass Newspaper, 2013); at the 18th Edition of ThisDay Annual Awards in Abeokuta, Ogun State capital challenged the Federal Government to urgently bridge the poverty gap among Nigerians towards solving the Boko Haram insurgency and religious strife in the country. He further thus in analysing Nigeria major three challenges:

Secondly, you have to somehow bring economic opportunity to the people who don't have. This is not a problem specific for Nigeria.

Reformation of security agency:

Nigeria Police just like other security agencies in Nigeria are facing so many challenges among whom are corruption, inadequate welfare packages, lack of necessary materials, lack of proper orientation, conducive environment among others which need attention by way of practical reform. It needs to be noted that some step are been taken towards this direction but failed to yield tangible result because war against corruption among other social vices have not really penetrate inner caucus of Nigeria society. Another form of reform needed by security agency is that security agencies need to be handling matters with proper investigative skill and professionalism because there are uses to early closure of case file.

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[8] Using Egbaland that constitute Ogun Central Senatorial District among others as a typical example, the Confederal State of Egbaland is divided into 4 Region having Alake as the head of a Region and Paramount Ruler of Egbaland. Each Region have their own Chiefs apart from some Chiefs installed by Alake under his paramouncy whose jurisdiction cut across Egbaland. Also each Region is divided into sections with their own head as well as Chiefs.

No wonder Mr Mu'azu (Peter Nkanga, 2011), who dwelt on the activities of Boko Haram which he said he had monitored over time in Borno State, stated that "the environment creates the terrorist group". He stated further that the sect's recurring attacks including suicide bombings in the country is the direct result of the Nigerian government's "brutal suppression of all forms of dissent" by its predictable use of force.

Proper religious enlightenment:

It is as a matter of fact that Christian and Muslim devotees need to avoid extremism in their religious practice and that both religious leaders during the cause of preaching; need not be given sermon that will cause civil disturbances. No wonder John Olurunfemi Onaiyekan (Punch Newspaper, 2012); the Roman Catholic Cardinal Archbishop of Abuja stated that Christian and Muslim extremists are responsible for many of the tension between the two communities in Nigeria, a Nigerian Archbishop called the believers to pursue a joint "divide mission". And stated further that most of our problem are caused by the reckless utterances and activities of extremist fringe, group on both sides of the divide.

Furthermore, Religious Leaders need to have at the back of their mind during the cause of preaching; the principle of "live and lets others to live" because some avoidable crises have been fuelled courtesy of preaching. Corroborating this, Da'wah Coordination Council of Nigeria (2009: 28 - 29) stated as follow: every member in the society has the duty to contribute their quota in the development and the promotion of peace in the society in accordance with level of their authority and influence.

Government attitude towards crisis:

It is my humbly view that Nigeria Government should adopt negotiation in handling up growing crisis rather than applying force. No wonder Ambassador Yusuf Mamman (Vanguard Newspaper, 2011) in discussing Boko Haram controversy blame it on extra judicial killings by the police. He stated further that if policemen were not careless in spraying innocent citizens who were not carrying any weapons with bullets, as shown on Al Jazeera TV, the problem would not have got out of control. Also in suppressing peaceful protest, security agencies should stop attacking peaceful protesters with force like what happen in Lagos during 2012 subsidy protest.

Corroborating this, Al-Jazeera (Vanguard Newspaper, 2011) reported that a group of innocent people packed in one place who were suspected to be members of Boko Haram. These people were not holding guns. They were not holding weapons and the police started killing them. Even when Mallam Yusuf Mohammed was murdered by the police, he was not holding anything. He was not holding any weapon. So, we must look at this from the point of investigation, arrest and prosecution. If investigation collapses because Nigerian police lacks direction and sense of purpose, then we must go back to the drawing board. What happened has made the Boko Haram members say, okay, since they are killing us, why surrender. If we surrender, they kill us, if we don't surrender; they kill us, so, no need. If you see what Al-Jazeera forwarded to the telephone of many people, those people were just standing, not holding any guns and then, police came and started spraying them with bullets, even your own anger would be kindled.

V. CONCLUDING REMARKS

Is of no doubt that different set of militants group have emerged in Nigeria with Boko Haram leading the prawn. It has been established that insurgence of Boko Haram have posed serious challenges to this Nation which have been briefly highlighted without neglecting factors that instigate militancy insurgency in Nigeria which latter concludes with recommendations towards avoidance of future militancy insurgency. It could be recalled that the main drive behind formation of all this ethnic militant are social injustice, marginalisation, neglect, deprivation and seeming insecurity for the people.

No wonder O. O Ehiede (2007: 273) stated that the militia groups in the Niger Delta emerged as a result of the peculiar problems in the Niger Delta among whom is environmental degradation and alleged political insensitivity of the state while the OPC sprang up as a consequence of the annulment of the 12th June 1993 presidential election won by Chief M. K. O. Abiola, a Yoruba. The author stated further thus:

we can see that the fears and demands of the ethnic militia groups have basically revolved around the issues of the national question: marginalisation and domination of one group by another . . . the concern of MASSOP is the marginalisation of the East in the power equation in Nigeria; that of OPC is about "power shift," and restructuring of the Nigerian federation and the quest for self-determination by groups in the Niger Delta region is based on the social justice, neglect and marginalisation that the area suffers in the Nigerian nation.

It is the belief of this present writer that in a deeper scrutiny by analytical mind; mine inclusive, there is a clear different between rat and rabbit no matter their similarity. Therefore there is a clear different between Boko Haram and their cause as well as Islam; the fact is speaking for itself. Corroborating this, the Nation Newspaper (2013: 5) reported thus:

*even though the group started out as a purely Islamic group, the disposition of the group became questionable for three reasons. Firstly, the sect is not only out for non-Muslims, it is fighting the government as well. This is evident in the group's bombings of the United Nation (UN) House in Abuja and other government owned structures. Secondly, recent **Boko Haram news** showed that the sect has non-Muslims as its members. Thirdly, the group has not spared some prominent Muslims, as they had attacked mosques and killed Islamic religious leaders in the past.*

And I belief that Boko Haram were have early been used by some Northern Politicians as a political militia but the group subsequently move out of their control and constitute threat to the whole Nigeria. No wonder Ambassador Yusuf Mamman (Vanguard Newspaper, 2011) stated that you cannot separate politicians from this because whether bombings were done by militants of the Niger Delta or Boko Haram or any armed group in Nigeria, politicians have a hand in it. Many armed groups are sponsored by politicians.

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AUTHORS

First Author – Olaide Ismail Aro, Member, Nigeria Bar Association.

The Author is an indigene of Abeokuta, Ogun State of Nigeria who had Diploma-in-Law from Olabisi Onabanjo University, Ogun State around 2006, Bachelor of Law Degree from Igbinedion University Okada, Edo State around 2011 as well as Barrister at Law from Nigeria Law School, Abuja as a result of which he was called to Nigeria Bar around November 2012. The Author E-mail Address is aro.olaide@gmail.com while his Phone Numbers are (+234)8023203691 and (+234)8032083453.

So far, the Author have published 5 Articles in Reputable Journals in Nigeria and outside Nigeria. They are (1) Towards the People's Constitution in Nigeria, Journal of Law and Diplomacy, Vol. 7, No. 2, 2010 pp. 87 – 92; (2) Economic Empowerment in Nigeria: Yesterday, Today and Tomorrow, International Journal of Humanities, Vol. 3, No. 1 2011, pp. 160 – 167; (3) The Nigerian Press: The Journey so Far, Continental Journal of Sustainable Development 2: 8 - 19, 2011; (4) Credible Political Opposition in Nigeria: On a Rescue Mission, Continental Journal of Social Science 4(3): 64 - 71, 2011 and (5) Credible Election in Nigeria: A Journey Of A Thousand Miles, International Bi-Lingual Journal of Anti-Corruption, Law, Humanities, Social Science and Development Studies, Vol. 3, No. 2, 2012 pp. 40 – 50.

Separation of Powers: Constitutional Plan and Practice

Nidhi Singh[*], Anurag Vijay[**]

[*] KIIT School of Law, KIIT University, Odisha, India
[**] LL.B. Hons., Faculty of Law, University of Delhi, India

Abstract- The present Article is an attempt to analyze the scheme of Separation of Powers as envisaged under the Indian Constitution and the difficulties faced by the three wings of the government in practice while implementing the provisions of the Constitution in letter and spirit. The author also draws a comparative analysis with the American Constitution scheme of Separation of Powers. Throughout the course of the paper various foreign and Indian cases have been discussed wherein the Courts have recognized that there is no clear straightjacket formula to determine separation of powers. Given the complexity of the democracies all over the world, overlap in jurisdiction is bound to arise. However, each wing of the government must keep an internal check to ensure they do not end up violating the rights of the people. The Hon'ble Supreme Court of India has recognized that Separation of Powers is a part of the basic structure of the Indian Constitution. It is in this context, that the author felt the need to examine the 'Constitutional Plan and Practice with respect to Separation of Powers in India'.

Index Terms- Executive, Indian Constitution, Judiciary, Legislature, Separation of Powers.

I. INTRODUCTION

The doctrine of separation of powers contemplates the idea that the governmental functions must be based on a tripartite division of legislature, executive and judiciary. The three organs should be separate, distinct and sovereign in its own sphere so that one does not trespass the territory of the other. Aristotle who first perceived and saw that there is a specialization of function in each Constitution developed this doctrine. Later other theorists like Montesquieu, John Locke and James Harrington described these functions as legislative, executive and judicial.All the theories that were forwarded by these political thinkers in relation to the doctrine of separation of powers were on a basic presumption that the liberties of the people should be protected from the tyrannical and despotic rulers when all the powers are vested and exercised by the very same persons. At this note it is important to quote Cooley who emphasizes the importance of the doctrine of separation of powers as:

"This arrangement gives each department a certain independence, which operates as a restraint upon such action of others as might encroach on the rights and liberties of the people, and makes it possible to establish and enforce guarantees against attempts at tyranny".

Under the U.S. Constitution, this theory has been applied to a certain extent, giving judiciary a unique position. As Hughes C.J., once said, "We are living under a Constitution but the Constitution is what the judges say it is." The framers of the U.S. Constitution have strictly adhered to this doctrine of separation of powers. But, in actual practice it has been seen that this rigidity in the form of watertight compartments is not possible. Therefore, functionally the constitutional provisions are premised on the principle of checks and balances. In *William Marbury v. James Madison [(1803) 2 Law Ed 69: 1 Cranch 138],* the U.S Supreme Court offered a new dimension to the doctrine of Separation of Powers. Lord Atkin too contributed to the evolution of this doctrine rendered in his decision in *Liver Sidge v. Anderson [(1942) AC 206].*

The framers of the Indian Constitution did not recognize the doctrine of separation of powers in a rigid sense. Unlike the American Constitution, this doctrine has not been strictly applied in the Indian Constitution. It cannot be explicitly seen but can be witnessed through the differentiation made in the discharge of functions by the different branches of the government in the Constitution. This doctrine is not completely alien to our Constitution. As we retrospect, relevant classic jurisprudence like *Ram Jawaya v. State of Punjab [A.I.R. 1955 S.C. 549]* clearly elucidates this principle. Chief Justice Mukherjea in the instant case said:

"It can very well be said that our Constitution does not contemplate assumption, by one organ or part of the State, of functions that essentially belong to another.* The executive indeed can exercise the powers of departmental or subordinate legislation when such powers are delegated to it by the legislature. It can also, when so empowered, exercise judicial functions in a limited way".

Thus, it can be inferred from the above that these organs of the government are allowed to exercise their functions but within certain limits. These limits are silver lined constitutionally and the same also guarantees limitable encroachments.

The Constitution of India has been founded upon the fundamental principle of Rule of law. It must be remembered that the quality of excellence of governance is evaluated on the touchstone of efficacy and the strength of Judicial mechanism.

II. ESSENCE OF DEMOCRACY

The doctrine of separation of powers is an inseparable part of the evolution of democracy. Democracy dictates a system in which every citizen can, without fear of retribution, breathe, express himself, and pursue his or her interests. It enables him to live a life of his choice to the extent he does not encroach upon the rights of the other people. It is in this context that it can be presupposed that a system of balances and counter balances exists among the three organs of the government to ensure a strong nurtured democratic system. The Legislature, the Judiciary and the Executive are the pillars of democracy. No democracy indeed contemplates conferment of absolute power in any single authority. As in the words of Lord Acton:

"Power corrupts and absolute power tends to corrupt absolutely".

Therefore the system of checks and balances is one of the most salient features of our constitutional scheme. The three organs can practically not be segregated into three watertight compartments due to their interdependence on each other to ensure efficacious governance. They have to work in accordance and in consonance to achieve a meaningful sustenance and purposeful progress of citizens. Though, minimum encroachment is always desirable. As has been observed by the Hon'ble Chief Justice Balakrishnan, "the Constitution lays down the structure and defines the limits and demarcates the role and function of every organ of the State including the judiciary and establishes norms for their inter relationships, checks and balances." Thus, all the three organs are expected to work in harmony instead of giving primacy to only one of the organs. Bestowing absolute power is anathema to democracy. The very objective of the historical freedom struggle was to protect and promote the democratic rights of the people.

The conscience of our Constitution speaks through its Preamble and the dynamics of its goal is spelt-out, in its various provisions. The will of the people finds its best expression in the very words as inscribed in the Preamble "We the People of India" and "do hereby Adopt, Enact and Give ourselves this Constitution". Thus, it is the people who are sovereign and they exercise this sovereign power in choosing their representatives to the Parliament.

III. Meaning of Separation of Powers

A complete and absolute separation of power is practically and theoretically not possible. Though, it is always possible to give a broad meaning to this doctrine. The basic concept of the separation of powers would mean:

a. That the same persons should not form part of more than one of the three organs of government.
b. That one organ of government should not control or interfere with the work of another.
c. That one organ of government should not exercise the functions of another.

Such a clear demarcation is always desirable to keep the democratic system of a nation intact. If legislative and executive powers are vested in the same person, there would be no liberty. The same follows if judiciary was distinct from the legislature and executive. If all powers are vested in the same body it will lead to arbitrariness. Giving legislative power to judiciary would amount to biasness and executive power would lead to despotism and tyranny. As of today, the Parliament exercises political and financial control over the Executive, and there are inherent checks and balances to keep each organ within the limits of Constitutional power. There is no relationship in this world which is perfect and is prone to certain tensions and strains. But, the way out to this issue is through the development of healthy conventions. There should be mutual respect for each other keeping in mind the purpose of their exercise of these powers. Ultimately the aim is to achieve a 'welfare state'; therefore a healthy coordination among the three can work wonders.

3.1 The Legislature

The Legislature has been accorded high-esteem in the Indian Constitution. It is primarily concerned with enactment of general rules of law that are germane to all aspects of the conduct of its citizens and institutions. The Parliament is the Union Legislature of India comprising two bodies namely Lok Sabha and the Rajya Sabha. It enacts laws, impose taxes, authorizes borrowing, and prepares and implements the budget, has sole power to declare war, can start investigations, especially against the executive branch, appoints the heads of the executive branch and sometimes appoints judges as well as it has the power to ratify treaties. As it anchors for the will of the people by ensuring a true and intact democracy, it can be said that it cannot be done all by the Legislature itself. It is an imminent threat to democracy if an absolute power is given to the nation's purse holder. By making the executive accountable to the popular house, the Constitution ensures a proper mechanism of checks and balances to the doctrine of separation of powers. The entire system has other facets which can help achieve the same. Therefore, this brings into question the role of the other two pillars: the judiciary and the Executive.

3.2 The Judiciary

The framers of our Constitution drafted it so meticulously that it provides for an independent and impartial Judiciary as the interpreter of the Constitution and as custodian of the rights of the citizens through the process of judicial review. This mandates the judiciary to interpret the laws but not to make them. They are not to lay down the general norms of behavior for the government. This brings us to the recent debate whether this behavior of the judiciary can be termed as judicial review or judicial activism? The higher judiciary in India, especially the honorable Supreme Court, the most powerful judiciary in the world, has become an epicenter of controversy over its role in entertaining and deciding public-interest-petitions. In deciding these petitions, the judiciary issues many directions to the Government which includes framing of legislation in many areas. Is it that the judiciary is transcending its limits and trenching upon the fields of the executive or legislature? And if so is the case, then what is the legitimacy of exercise of such powers? The role of the judiciary should only be limited to scrutinizing the constitutionality of the legislation and not directing the government to enact legislation. The scope of judicial review does not extend beyond enquiring whether an impugned legislation or an executive action falls within the competence of the Legislature or of the executive authority or is consistent with the Fundamental Rights guaranteed by the Constitution or with its other mandatory provisions.

The three organs have to exercise their functions keeping in mind certain constitutionally assigned encroachments. However according to Chief Justice Subba Rao in *Golak Nath v. State of Punjab [A.I.R. 1967 S.C. 1643]* :

"It [the Constitution] demarcates their jurisdiction minutely and expects them to exercise their respective powers without overstepping their limits. They should function within the spheres allotted to them. …..No authority created under the Constitution is supreme; the Constitution is supreme and all the authorities function under the supreme law of the land."

Therefore if any of the three organs tries to expand its jurisdiction it would follow an unavoidable conflict and affect the harmonious efficacy of the tripartite system of government. No organ has to superintend over the exercise of powers and functions of another, unless the Constitution strictly so mandates. Nonetheless, the interpretation by the judiciary of the laws and regulations adds flesh and blood to the basic structure of the Constitution. The Honorable Supreme Court has itself construed that the concept of Separation of powers is a "basic feature" of the Constitution. So if one encroaches the territory of the other it would be a clear violation of the basic structure of the Constitution and judiciary is not an exception to the same.

The entire debate of limitation of each organ's power has gone through a drastic change in the past two decades. Justice Pathak in *Bandhua Mukti Morcha v. Union of India [1984 3 S.C.C. 161]* said:

"It is a common place that while the Legislature enacts the law the Executive implements it and the Court interpret it and, in doing so, adjudicates on the validity of executive action and, under our Constitution, even judges the validity of the legislation itself. And yet it is well recognized that in a certain sphere the Legislature is possessed of judicial power, the executive possesses a measure of both legislative and judicial functions, and *the Court, in its duty of interpreting the law, accomplishes in its perfect action in a marginal degree of legislative exercise. Nonetheless a fine and delicate balance is envisaged under our Constitution between these primary institutions of the State"*.

It can be clearly inferred from the above that one may exercise the other one's function up to a limited extent but the issue that predates the Indian scenario is whether this system is working in a well-balanced manner.

3.3 Executive

The Executive can veto laws, can command of the military, makes decrees or declarations (for example, declaring a state of emergency) and promulgate lawful regulations and executive orders, can refuse to spend money allocated for certain purposes, can appoints judges, and has the power to grant pardons to convicted criminals. Like the other two pillars of democracy, the Executive is equally expected to be free of intrusions from the other two. It is always said that Executive is independent of the two but the incongruity persists. It is completely eroded in actual practice. The reason is that each time the executive is questioned for its actions by the judiciary and the Legislature. This dilutes the independence of the Executive to the maximum. It's not that the question of answerability pops up only in the case of executive. The judiciary and legislature are equally answerable but in their cases, a built-in system from within would be available for discharging those functions. This is the real state of affairs, which exists in practice.

Though the Indian Constitution allocates executive powers to the President and Governors (Article 53 (1) and Article 154 (1), they are empowered with certain legislative powers (Articles 123, 213 and 356) and certain judicial powers (Articles 103 and 192). Similarly the legislature exercises certain judicial functions (Articles 105 and 194) and judiciary exercises few legislative and executive functions (Articles 145, 146, 227 and 229). However the judiciary is made separate from the executive in the public services of the State (Article 50). In Bihar, the scheme of the

separation of the judiciary from the executive was introduced on an experimental basis but later on it was extended throughout the State. In some states, complete separation of judiciary from executive has been achieved through legislation. In seven states, complete separation of judiciary from executive has been effected through executive orders.

IV. THE EXECUTIVE AND THE LEGISLATURE IN THE INDIAN CONSTITUTION

In the early years of the Republic, the Supreme Court had already recognized that the Indian Legislature had a distinctly superior position vis-à-vis the other organs of the State. The observation made by Justice S.R. Das is a testimony to this in the famous case of *A.K.Gopalan v. State of Madras [1950 SCR 88]*: "Although our Constitution has imposed some limitations… [It] has left our Parliament and the State Legislature supreme in their respective fields. In the main, subject to limitations…our Constitution has preferred the supremacy of the Legislature to that of the Judiciary…and the Court has no authority to question the wisdom or policy of the law duly made by the appropriate Legislature…and this is a basic fact which the Court must not overlook."

Article 52 and 53 of Indian constitution says:

52. The President of India - There shall be a President of India.

53. Executive power of the Union. - (1) The executive power of the Union shall be vested in the President and shall be exercised by him either directly or through officers subordinate to him in accordance with this Constitution.

(3) Nothing in this article shall-(a) be deemed to transfer to the President any functions conferred by any existing law on the Government of any State or other authority; or (b) prevent Parliament from conferring by law functions on authorities other than the President.

Executive powers: All the executive actions of the Union government are taken in his name. He appoints officials of the Union Government, Prime Minister, and Council of ministers at the advice of the Prime Minister, Chief Justice and judges of Supreme Court and High Court at the advice of the Chief Justice of India. He appoints the chairman of UPSC, Comptroller and Auditor general of India, Attorney General of India, Chief Election Commissioner and other Election Commissioners, Governor of the states, members of Finance Commission and ambassadors.

Judicial powers: The President appoints the Chief Justice of the Supreme Court and other judges on the advice of the Chief Justice. The President enjoys legal immunity. He can grant pardon, reprieve, respite or remise punishment. The President can dismiss the judges by two-thirds majority of the members present in two houses. If they consider a question of law or a matter of public importance which has arisen, they can ask for the advisory opinion of the Supreme Court. However they may or may not accept that opinion.

Legislative powers: The President summons both houses of the Parliament and prorogues the session of the two houses and can dissolve the Lok Sabha but uses these powers according to the advice of the Council of Ministers headed by the Minister. The inaugural speech of the Parliament at the beginning of the

first session each year is delivered by him where he outlines the new policies of the government. A bill that the Parliament has passed can become a law only after the President gives their assent to it. He can return a bill to the Parliament for reconsideration but this not so in case of money bill. But in case the Parliament sends it back for the second time, the President is obliged to sign it. The President can promulgate ordinances when the Parliament is not in session but must get it ratified within six weeks. Moreover this is so only in case of the Union and Concurrent list.

Nonetheless, it cannot be said that the principle of separation of powers does not apply to the relationship between the executive and legislature. In spite of such explicit powers of the Executive, there are certain grey areas which call for a better application of the principle. It is important to maintain the separation of powers between the executive and the legislature is where the legislators exercise executive powers. Legislators exercise their check over the executive many a times through their power to head executive boards and agencies of various descriptions, the capacity to participate in executive committees which award contracts or select beneficiaries of various welfare schemes. Secondly, the grant of an annual fund to the legislators to carry out activities in their constituency gives them executive powers in disguise which leads to corruption over a period of time. Though, the President appoints the Council of Ministers in consultation with the Prime Minister, he generally acts on the aid and advice of the Council of Ministers. This shows that the area within which he enjoys independence is very limited and nominal. Article 74(1) makes it clear that the executive head has to act in accordance with the aid and advice given by the cabinet. Certain constitutional provisions also provide for Powers, Privileges and Immunities to the MPs, Immunity from judicial scrutiny into the proceedings of the house, etc. Such provisions are thereby making legislature independent, in a way.

V. THE EXECUTIVE AND THE JUDICIARY IN THE INDIAN CONSTITUTION

The relationship between the judiciary and the executive has always been a delicate question. A society governed by Rule of law always demands for separation of the judiciary from the executive. The rule of law is always exposed to the danger of being encroached by the executive. It is in this context that proper functioning of a democracy requires a clear separation of the two. The primary function of the judiciary is the administration of justice and justice can never be rightly administered without the fear or favor unless there is a separation of the judiciary from the executive. Article 50 of the Constitution provides that "The State shall take steps to separate the judiciary from the executive in the public services of the State." The intention of the framers of the Constitution was to bring about changes wherever possible and shall be done immediately, without any delay, and where immediate operation of this principle is not possible, it shall nevertheless be accepted as an imperative obligation.

Theoretically, separation of judiciary from the executive is always a welcome step. The intention is always to ensure that the judiciary does not decide cases under the influence of the executive, rather follows the principle of Rule of Law. But, the

real problem comes in practice where its separation is a problematic concern. The role of judiciary under the British Rule had always cautioned the framers of the Indian Constitution of the inherent limitations of the judiciary. These limitations of the judiciary pose a challenge to the separation of the two organs. Alexande Hamilton wrote in the Federalist papers:

"The judiciary is beyond comparison the weakest of the three departments of power. It has no influence on either the sword or the purse; no direction either of the strength or wealth of the society; and can take no active resolution whatever. It may truly be said to have neither "force" nor will, but merely judgment. So it only has the "power of judgment".

Thus, it can be said that if each of the three organs insists on independence, judiciary is likely to be pushed to the wall being subordinate to the executive department. Thus, it is submitted that it is difficult to achieve independence of judiciary from the executive as the ever increasing power of the executive is likely to topple the balance on which the Indian Judicial System rests. Now-a-days, there are many instances where judiciary has intervened in matters entirely within the domain of executive. In *People's Union for Civil Liberties v. Union of India [1997 1 SCC 301]* the Court observed that rule making is the function of the executive. As the learned Chief Justice Verma has pointed out in his Dr. K.L.Dubey Lecture:

"Judiciary has intervened to question a 'mysterious car' racing down the Tughlaq Road in Delhi, allotment of a particular bunglow to a Judge, specific bunglows for the Judge's pool, monkeys capering colonies to stray cattle on the streets, cleaning public conveniences, and levying congestion charges at peak hours at airports with heavy compliance of its orders. Misuse of the contempt power to force railway authorities to give reservation in a train is an extreme instance."

The Indian Judiciary is now moving from Judicial Activism to Judicial Adventurism. Policy decisions are best left to the executive. It is indisputable that Courts cannot run the government. If it tries to do that it would defeat the very purpose of the Constitution.

VI. THE JUDICIARY AND THE LEGISLATURE UNDER THE INDIAN CONSTITUTION

The provisions of the Chapter IV of Part V of our Constitution dealing with Union Judiciary provides for a close relationship between the Judiciary and Legislature. Article 122 of the Indian Constitution provides that the Court shall not call validity of any proceedings in Parliament in question on the ground of any alleged irregularity of procedure. And Article 212 provides that the Court should not enquire into the proceedings of the Legislature. But certain judicial anomaly has been felt in the recent past. The most prominent being the famous Jagdambika Pal case of 1998 involving the Uttar Pradesh Assembly and the Jharkhand Assembly case of 2005. The Interim Order of the Supreme Court in both the cases is a clear violation of the principle of separation of powers between the Judiciary and the Legislature. The judiciary blames Legislature for not doing anything worthwhile over the past three decades, whereas Legislature accuses Judiciary of doing the job of the legislature. When judiciary is not held accountable for the

legislative functions they what is the legitimacy behind the exercise of such powers?

There are several instances that show that there has been a tilt of amendment power in favor of Parliament and sometimes Judiciary. The 42nd Amendment Act of the Parliament brought a drastic change in the provisions of the Constitution. Under this amendment Article 368, which gives amending power to the Parliament, was so modified that any further amendment of the Constitution would be immune from being questioned in Court of law. The power tilted in favor of the legislature. Ultimately in *Minerva Mills v. Union of India [A.I.R. 1980 SC 1798]* Supreme Court ruled that the 'judicial review', being a basic feature of constitution, cannot be taken away by the Parliament by amendment of the Constitution. Apart from this, there are has been several instances where the judiciary has assumed the role of legislature without taking into account the practical difficulties and financial constraints. It has gone to the extent of not only framing guidelines but also the policies.

VII. THE FUTURE OF SEPARATION OF POWERS

The Constitution of India was drafted sixty years ago. Today in the era of Globalization where everything has become so advanced, can it be assumed that our Constitution is still adequate to address the present problems? Did the architects of our Constitution envisage the nation as we are today? The answer to these questions can be found in the underlying principles of our holy Constitution. Our Constitution embodies fundamental principles such as republicanism, secularism, equality, fraternity, social, economic and political justice that are self-sufficient in it to keep our system intact for the next fifty years or so. Though, they'll require different interpretations at different points in time. Similarly, the principle of separation of powers will require a more robust interpretation to guide the three organs of the government.

VIII. NEED FOR HARMONY

One of the major characteristics of a mature democracy is to ensure a harmonious relationship between the three organs of the government. It is indisputable that a good and intact democracy calls for a proper balance in the discharge of functions by the Executive, Legislature and Judiciary. There is no drawn map or an enunciated demarcation beyond which each of them cannot cross. What is most expected out of each of them is that they consciously realize the unseen boundaries and respect each other's sovereignty. This realization would help in upholding the rights of the citizens and establishing a 'welfare state'. It is important to value the efforts of the framers of our Constitution who envisaged the nation's future as a harmonious relationship between the pillars of the government. It is not only the duty of the tripartite to realize the same but also the obligation of the citizens to realize the ultimate sanctity of the Constitution.

IX. CONCLUSION

Constitution is the supreme law of the land. No organ should go beyond the role as assigned to it by the Constitution. It is the obligation of the Judiciary, Executive and Legislature to strictly adhere to one of the most fundamental features of the Constitution 'Separation of Powers'. It is needless to criticize the Constitutional Plan of separation of powers when the existing provisions are not being religiously observed. Undoubtedly, there is a need for a more robust interpretation and our dynamic Constitution has enough space to accommodate the same. The lofty ideal of the Constitutional system needs to be protected which can be preserved only when brought into practice. There is a major gap between the Constitutional plan and practice of Separation of powers. It can only be bridged when all the three organs move a step ahead than all the other democracies of the world by working in sheer harmony. By not doing so they are disregarding the rights of the people. The founding fathers of the Constitution had also defined the position and the powers of the three organs of the state. They had realized that government being an organic entity would never be able to achieve complete separation of powers. Therefore, aiming for a complete separation of powers is equivalent to talking in vacuum. But, that does not mean that each branch has exclusive powers rather they have their Constitutional limits to be adhered to. The spirit of the Constitution is not on exclusiveness but on shared coordination. The Executive has grown very powerful in the recent time that has certainly led them to a wide misuse of powers. Apart from the check kept on them by the Judiciary and Legislature, media and NGOs have played a major role in exposing the misdeeds of Government functionaries. Ultimately, the aim of the three organs is to protect the rights of the people. In a democracy, vigilant attitude of the people can help ensuring a proper functioning and prevent arbitrary exercise of the power. The three organs have to be at peace for our prosperity.

In India, we follow a separation of functions and not of Separation of powers. And hence, we don't abide by the principle in its rigidity. Though in India strict separation of powers like in American sense is not followed but, the principle of 'checks and balances', exists as a part of this doctrine. Therefore, none of the three organs can usurp the essential functions of the organs, which constitute a part of the 'basic structure' doctrine so much so that, not even by amending the Constitution and if any such amendment is made, the court will strike it down as unconstitutional.

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AUTHORS

First Author – Nidhi Singh, B.B.A. LL.B (Hons.), KIIT School of Law, KIIT University, Bhubaneswar, Odisha.   Email Address: nidhisingh.email@gmail.com

Second Author – Anurag Vijay, B.A. History (Hons.), University of Delhi, LL.B. (Hons.) Law Centre-II, Faculty of Law, University of Delhi. Email Address: anuragvijay027@gmail.com

Morphological study of microbial and hydrolysis of coconut palm peat (*cocos nucifera*) using worm tea

Renuka R.[1], Norli I.[1]*, C. K. Lee [2], MH Ibrahim [2]

Environmental Technology Division, School of Industrial Technology, Universiti Sains Malaysia, Minden, 11800 Penang, Malaysia

Abstract- Coco peat was used as biomass to produce reducing sugar with worm tea, rich with diverse microbial content, to assist sugar hydrolysis biologically. The aim is to determine the morphology of bacteria and ability to breakdown cellulose. Comparison of water and dilute acid pretreatment to produce reducing sugar from coconut peat at different pH was also studied. The bacteria were found to be *Bacillus pumilis, Bacillus subtilis*, *Micrococcus spp, Staphylococcus aureus* and *Aspergillus fumigatus*. All of them were investigated for starch hydrolysis test and cellulase clearance zone for breakdown of amylase and cellulase. Sugar yield was recorded the highest for acid pretreatment and worm tea hydrolysis at 7.94 Brix%, pH 9. These results indicated that compost tea has great potential in bioethanol production.

Index Terms- coco peat, worm tea, agar, Gram staining, yeast

I. Introduction

Soaring petroleum cost and depleting fossil fuel has set researchers to explore on alternative energy resources. Bioethanol (CH_3CH_2OH) or ethyl alcohol, is a liquid biofuel and can be derived from numerous varieties of biomass feedstocks using conversion technologies (Demirbas., 2005). Bioethanol usually derived from agricultural crops such as sugarcane, rice and maize. Unfortunately, usage of current starch-based resource will bring impact to food security due to limited land for agriculture (Chen et al., 2007; Chandel et al., 2007a). Lignocellulosic biomass is inexpensive, renewable and vastly available (Ho et al., 1998). The main substances of lignocellulosic biomasses are cellulose, hemicelluloses, lignin, extractives and ash (Karimi et al., 2006). Conversion of this biomass into glucose and other simple reducing sugars has been considered as a prospective path for bioethanol production (Curreli et al., 1997).

The samples used in this study are worm tea and coco peat from coconut palm (*Cocos nucifera*). Coconut peat or coir is a hard fiber from coconut palms (*Cocos nucifera*) which can be found in tropical countries. There are three types of coir have been used which is the mattress fiber coir, omat fiber coir and bristle fiber coir. The mattress fiber coir is short, thin, fragile and good mulching agent. Omat fiber coir is long and strong. Bristle fiber coir comes from the remaining coir after other coirs were separated. This bristle fiber coir has highest lignin content and the highest density among other two core types in coconut husk. Bristle fiber is used in the manufacture of brushes and brooms (Rajan et al., 2005).

Worm tea is the liquid extract of compost that comes from an infusion of water in compost for a defined period of time. The compost is removed and the remaining liquid is worm tea (Hargreaves, Adl and Warman., 2009). Worm tea consists of different organisms and nutrients, depending on the biomasses applied. There is no 'perfect' compost, but several different types. Compost supply nutrients and beneficial microorganisms, decreases environmental problems related to waste management by reducing them and by killing potentially harmful organisms (Amlinger et al., 2003; Sæbø and Ferrini., 2006; Bess 2000). Besides that, compost tea can be produced through two methods which are aerated system and non aerated system. Aerated system is a continuous system with the addition of air and nutrients such as molasses, rock, dust and so on to increase microbial population density. For non aerated system, the mixture is minimally disturbed after initial mixing (Carballo *et al*., 2008). For this study, worm tea was collected from compost made from biomass such as sugar cane (*Saccharum officinarum*), aloe (*Aloe vera*), banana flower (*Musa acuminate*), pandan leaves (*Pandanus fascicularis*. The objective of this study is to find a sustainable way of sugar yield using worm tea and investigate the ability of a consortium of microbial in worm tea to breakdown cellulose to simple reducing sugar.

II. Materials and Methods

2.1 Raw materials

Worm tea was kindly donated by a local company and coco peat was bought from a local company. Coco peat was washed thoroughly with tap water, autoclaved (121°C, 1 atm for 15mins) and dried (80°C for 72hr) prior to grinding to approximately 3cm.

2.2 Morphological studies

Three types of agar; Nutrient Agar, Potato Dextrose Agar, and Czapek Dox Bengal Rose were prepared according to the standard Preparation of Culture Media (APHA, 1999). Microorganisms were grown via spread plate method and all plates were incubated at 37°C for 24 hours, except Czapex Dox Bengal Rose Agar (7days). Gram staining was applied and morphology of microorganisms were studied under a light microscope (Microscope Millenium-LMS Series2000) (Maier, 2009). Starch Hydrolysis Test and Cellulose Clearance Zone were applied to discovered microorganisms.

2.1.1 Starch hydrolysis test

Starch hydrolysis test was done according to methods presented in Microbiological Applications Lab Manual. Plates were divided into four sections and 0.1ml of each inoculum was poured in the holes bore using the Durham tube. After 24 hours incubation, lugol iodine was added to detect presence of amylase enzyme.

2.1.2 CMC clearance zone (CCZ)

CMC agar was prepared according to recipe by Kim et al., 2012. The plates were divided into four sections on 0.1ml of pure inoculums were poured on each hole. After incubation for 48 hours, CMC agar plates were flooded with 1 % congo red and allowed to stand for 15 mins at room temperature. 10ml of 1M NaCl was thoroughly used for counterstaining the plates. The plates were examined for presence of clear zones around the colony, which indicates cellulose hydrolysis (Irfan et al., 2012). The diameter of the visible halo zone for both tests was measured in millimeter.

2.3 Pretreatments
2.3.1 Acid pretreatment

1.0M Sulfuric acid (H_2SO_4) was added to 20g of coco peat. The ratio between biomass and sulfuric acid was 1:10 w/v. The mixture was autoclaved and washed till neutral.

2.3.2 Water pretreatment

A total of 240ml of distilled water was added to a beaker containing 20g (1:12 w/v) of biomass (coco peat). The samples were autoclaved (Vertical High Pressure Steam Sterilizer (Sakura)/ASV2403) for 15 minutes at 121ºC, 1 atm. The biomass were washed before proceeding to the next stage.

2.5 Experimental setup

A total of eight reactors was set up in Erlenmeyer flasks (250ml), as shown in Table 2.1.

Reactor	Pretreatment	pH
R1	Acid pretreatment + worm tea	5
R2	Acid pretreatment + worm tea	9
R3	Acid pretreatment + distilled water	5
R4	Acid pretreatment + distilled water	9
R5	water pretreatment + worm tea	5
R6	water pretreatment + worm tea	9
R7	water pretreatment + distilled water	5
R8	water pretreatment + distilled water	9

Table 2.1 Reactors for sugar hydrolysis

Worm tea was added in the ratio of 1:12. 1M of Sodium Hydroxide (NaOH) was added drop by drop to alter the pH. The conical flasks were kept in incubated shaker (160rpm, 50^0C). Aliquots were withdrawn every 24 hours, centrifuged (Universal 32 Centrifuge, Hettich ZENTRIFUGEN) at 4000rpm for 10mins and tested for sugar content for 10 days time period.

2.6 Analysis

pH of the hydrolysate was tested using a calibrated pH meter (HACH, sension 3). Sugar content was evaluated using Refractometer PAL-1 (ATAGO).

III.   RESULTS AND DISCUSSIONS

3.1 Consortium of Microorganisms in Worm Tea

CHNS analyses yield that carbon 0.25%, Hydrogen 3.93%, Nitrogen 0.02% and sulphur 0.48%, suggesting the presence of live microorganism. Four different bacteria and fungi were screened from microbial grown on Nutrient Agar, Potato Dextrose Agar and Czapek Dox Agar. Bengal Rose was added to Czapek Dox to inhibit growth of microorganisms, allowing fungi to generate. Gram staining was performed and under light microscope with 100x magnification, all organisms were gram negative. The grayish green fungi were stained with lactophenol blue had both Uni and Bi sporangium. Thus, we conclude the fungi present had been of *the Aspergillus fumigatus family*. No further studies were made on fungi as author was keen on bacteria. The microorganisms were further studied on their morphological. The bacteria discovered were cocci and bacilli and all of them were purple, proving no Gram negative bacteria in compost tea. Based from catalase test, 103 and 104 proved to be catalase positive. Biochemical tests using API kits and manual calculations using chart provided revealed that all four bacteria are 101-*Bacillus subtilis,* 102- *Bacillus pumilis,* 103- *Micrococcus spp,* 104- *Staphylococcus aureus* and *Aspergillus fumigatus.*

To prove more on microbial activity, certain tests were performed. Starch hydrolysis test was performed on each pure culture to identify the organisms that are able to produce amylase enzyme, breaking down starch. All bacteria were able to, it was just the matter of speed of activity. The same method was implied to fungi, incubated for 7 days, however fungi did not show any clearance zone. Table 3.1 shows microbial activity, or effectiveness of the microorganisms in releasing amylase. The CMC agar test was also performed to evaluate effectiveness of the microorganisms in breaking down cellulose, as coco peat is inedible item, containing cellulose and not edible starch. For our achievement, the bacteria showed cellulolytic activity with clear surroundings. The results were summarized in Table 3.2. Based from the results, it is found that worm tea is an effective microorganism (EM). EM consists of mixed cultures of beneficial and naturally-occurring microorganisms such as phototrophic bacteria, lactic acid bacteria and yeast that can be used as inoculants to increase the microbial diversity of soils and plant. EM contains selected species of microorganisms that are mutually compatible with one another and coexist in liquid culture. The uniqueness of microorganisms and their often unpredictable nature, given a specific set of environmental and cultural conditions, has made them likely candidates for solving for solving particularly difficult problems in the life sciences and other fields as well. If used appropriately, EM can significantly increase the beneficial effects of these practices (Higa and Wididana, 1991b).

3.2 Hydrolysis of coco peat

Two types of pretreatment were employed; water pretreatment and dilute acid pretreatment and average results were calculated. Both pretreatments were then continued with hydrolysis using water and hydrolysis using compost tea, with coco peat as substrate. In this study, the effect of pH was evaluated. Graph 3.1 summarizes the initial and final value of reducing sugar from each reactor. Hydrolysis was done for 14 days. Interestingly, the level of sugar increased on day 8 for all the reactors except R5, R6, and R8 and thereafter remained constant till day 11. The results were collected at day 8. On day 2, almost all reactors have a slight drop in the reading. This may be due to the organisms in the compost tea adapting to the new feed. Sugar level increased by hydrolysis period. Microorganisms feed on coco peat, breaking down hemicelluloses into reducing sugars. This is also because hydrolysis of carbohydrate or lignocellulosic materials by microbial activity occurs and simultaneous conversion of cellulose to sugar to ethanol by microorganisms. The pH had a sharp effect on the hydrolysis. At alkaline pH, the yield is shown to be higher than acidic condition. Effect of temperature was not taken into consideration as all studies were done at room temperature and microorganisms functions well at room temperature. R2, with acid pretreatment reached maximum sugar concentration of 7.94Brix %. This could be an indicator that all the cellulose and hemicelluloses has been depolymerised to reducing sugar. R5 and R6 (water pretreatment) show less reducing sugar yield. The same trend was observed for R7 and R8. When observed clearly, it can be concluded that coco peat for these four reactors was treated with only water. The lignin has not been degraded, therefore, the hemicelluloses was not readily accessible for microorganisms to convert them into desirable products.

IV. CONCLUSION

In this work, we demonstrated that acid pretreatment is a suitable process to produce sugar from coco peat. Although it is not common to use compost tea as microorganism source, in our work, the isolates proved to be an excellent cellulose breakdown agent. Yet, it takes longer period for the process of breaking down and releasing the desired product. The best treatment is using dilute acid pretreatment of coco peat and using compost tea for enzymatic hydrolysis.

APPENDIX

Table 3.1: Amylase hydrolysis on solid media (Starch agar)

Isolates	Amylase	Diameter of clear Zone on agar (mm)	Amylolytic Activity
101 Bacteria	+	22.1	+++
102 "	+	17.6	+++
103 "	+	11.3	+
104 "	+	14.0	++
Fungi	-	-	ND

+: Positive, -: Negative +++, high activity, ++, moderate activity, +, low activity, ND: Not Detected.
+: low activity (< 11.5mm).
++: moderate activity (11.5mm- 20mm)
+++: high activity (> 20mm).

Table 3.2: Cellulase hydrolysis on solid media (CarboxyMethylCellulose agar)

Isolates Code	Cellulase	Diameter of clear Zone on agar (mm)	Cellulolytic Activity
101 Bacteria	+	19.2	+++
102 "	+	16.6	+++
103 "	+	17.1	+++
104 "	+	13.8	++
Fungi	+	1.4	+

+: Positive, -: Negative +++, high activity, ++, moderate activity, +, low activity, ND: Not Detected.
+: low activity (< 7.5mm).
++: moderate activity (7.6mm- 15mm)
+++: high activity (> 15mm).
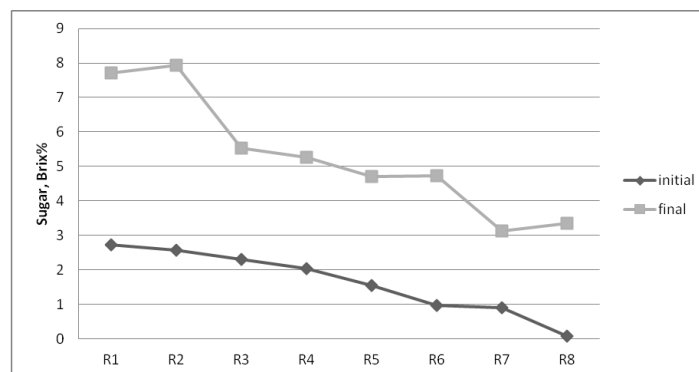
Graph 3.1: Initial and final value of reducing sugar, Brix% of different reactors.

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Authors

First Author – Renuka Radakrishnan School of Industrial Technology, Environmental Technology Division, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia, renuka1210@gmail.com

Second Author – Lee Chee Keong Bioprocess Technology Division, School of Industrial Technology, University Sains Malaysia, 11800 Penang, Malaysia

Third Author – Mahamad Hakimi Ibrahim. Environmental Technology Division, School of Industrial Technology, University Sains Malaysia, 11800 Penang, Malaysia

Correspondence Author – Norli Ismail, Environmental Technology Division, School of Industrial Technology, University Sains Malaysia, 11800 Penang, Malaysia

Shortest Route Algorithm Using Fuzzy Graph

Dr. G.Nirmala[*] &K.Uma[**]

[*] Head and Associate Professor in Mathematics, K.N.G.A. College(Women), Thanjavur .
[**] Assistant Professor in Mathematics, A.V.V.M. Sri Pushpam College, Poondi, Thanjavur Dist.

Abstract- The current widespread use of location-based services and **Global Positioning System** technologies has revived interest in very fast and scalable fuzzy shortest path queries. We introduce a new shortest path query type in which dynamic constraints may be placed on the allowable set of edges that can appear on a valid fuzzy shortest   path (e.g., dynamically restricting the type of roads or modes of travel which may be considered in a multimodal transportation network). Computing the shortest path between two given locations in a road network is an important problem that finds applications in various map services and commercial navigation products. Our experimental results reveal the characteristics of different techniques ,based on which we provide guidelines on selecting appropriate methods for various scenarios. Although the raw data about geography and roads may be more readily available today, computing fuzzy shortest paths is still not trivial. kruskal's algorithm allows us to compute point-to-point fuzzy shortest path queries on any road network in essentially linear time. . In a preprocessing stage, these heuristics compute some auxiliary data, such as additional edges (shortcuts) and labels or values associated with vertices or edges.

Index Terms - Fuzzy Graph, Fuzzy Shortest Path, Fuzzy Policy.

I. INTRODUCTION

We consider a fuzzy Network $N = (V, E)$ consisting n nodes (cities) and m edges (roads) connecting the cities of a country. If we measure the crowdness that is traffic of the roads of the network for particular time duration, it is quite impossible to measure the crowdness in duration as it is not fixed, but varies from time to time. So, appropriate technique to gradation of crowdness is an interval and not a point. In this case, the network N is an fuzzy network in which the weight of the each arc $(i, i+1)$ depends upon the crowdness.

Suppose that we want to select the fuzzy shortest route (path) between two cities. The following route fuzzy network provides the possible routes between the starting city at node A and the destination city at node U. The routes pass through intermediate cities designated by   different stages. Let G be a road network (*i.e.*, a degree-bounded connected fuzzy graph) with an edge set E and a vertex set V that contains n vertices. Let each edge $e \in E$ be associated with a fuzzy weight w(e), which we assume (without loss of generality) to be the length of e. For ease of exposition, we consider undirected fuzzy graphs in this work.

II. DEFINITION

Definition 2.1: A ***fuzzy graph*** with V as the underlying set is a pair G: (A, Γ) where

A: V --→ [0,1] is a fuzzy subset, Γ : VxV ------> [0,1] is a fuzzy relation on the fuzzy subset A, such that $\Gamma(u,v) \leq A(u) \cap A(v)$ for all u,v ∈ V.

Definition 2.2: A directed ***fuzzy walk*** in a fuzzy graph is an alternating sequence of vertices and edges , $x_0, e_1, x_1 , \ldots., e_n, x_n$ in which each edge e_i is $x_{i-1} x_i$.

Definition 2.3: A ***fuzzy path*** is a fuzzy walk in which all vertices are distinct.

Definition 2. 4: A fuzzy path from u to v, the v is said to be ***reachable*** from u, and the distance , D(u,v), from u to v is the length of any shortest such fuzzy path.

Definition 2.5: A fuzzy path between the point   s (source) to   t (sink) of fuzzy graph G is called fuzzy policy or fuzzy tree.

III. SHORTEST ROUTE ALGORITHM

To find the path of minimum distance between the point s(source) to   t (sink) of fuzzy graph G can be obtained using the following steps:

Step 1: Identify the decision variables and specify objective function to be optimized for fuzzy networks.

Step 2: Start by assigning the notation x_i (i=1,2,…n) to the decision variables connected with each of the cities .

Step 3: Decompose the fuzzy network into a number of smaller sub intervals. Identify the stage variable at each stage and write down the fuzzy transformation function as a function of the state variable and decision variable at the next stage.

Step 4: Represent each x_i as stage $(i+1)$, where $S(i+1)$ denotes the distance between x_i and x_{i+1}.

Step 5: Assign the initial value of the fuzzy network as zero. (i.e)the value of stage $(i+1)$ is zero.

Step 6: Write down a general recursive relationship for completing the fuzzy optimal policy of Fuzzy Network by using the fuzzy dynamic programming recursion as follows.

$D(x_i, x_{i+1})$ = min { stage (i) to stage (i+1) by multiple reaching point}.

Step 7: Construct appropriate stage to show the required values of the return function at each Stage in Fuzzy Networks.

Step 5: Determine the overall fuzzy optimal decision or policy and its value at each stage of an Fuzzy Networks.

Step 6: We get the shortest path of Fuzzy Networks .

IV. PROBLEM DEFINITION

We shall illustrate the technique with a simple example and provide the mathematical verification.

4.1 -TRANSPORT OPTIONS FROM CHENNAI TO KANYAKUMARI

For shortest route between the points Chennai and Kanyakumari by bus with fuzzy graph, consider the Tamilnadu map and point some cities and consider them as vertices. Point A (Chennai), located at initial stage, leads towards 7 stages with the end point U (Kanyakumari).

Fig.4.1

Here we consider each city as vertex and the distance between any two cities is represented as edge or arc. In order to develop the above problem in terms of fuzzy graph , the distance between any two cities are consider in the following manner:

Table 4.1

Distance in km	Membership grades
50-75	0.02
75-100	0.04
100-125	0.06
125-150	0.08
150-175	0.1
175-200	0.12
200-225	0.14
225-250	0.16
250-275	0.18

In order to identify the city involved in this problem, let us adopt alphabet A-CHENNAI , B-VELLORE, C-CHENGALPATTU, D-VILLUPURAM, E-THIRUVANAMALAI, F-DHARMAPURI, G-PERAMBALUR, H-NAMAKAL, I- ERODE, J-OOTY, K-THANJAVUR, L-TRICHY, M-COIMBATORE , N-PUDUKOTTAI , O-DINDIUL, P-KODAIKANAL, Q-RAMANATHAPURAM, R-MADURAI, S-TUTICORIN, T- THIRUNELVELI and U-KANYAKUMARI.

The figure 4.2 gives the distance of each cities
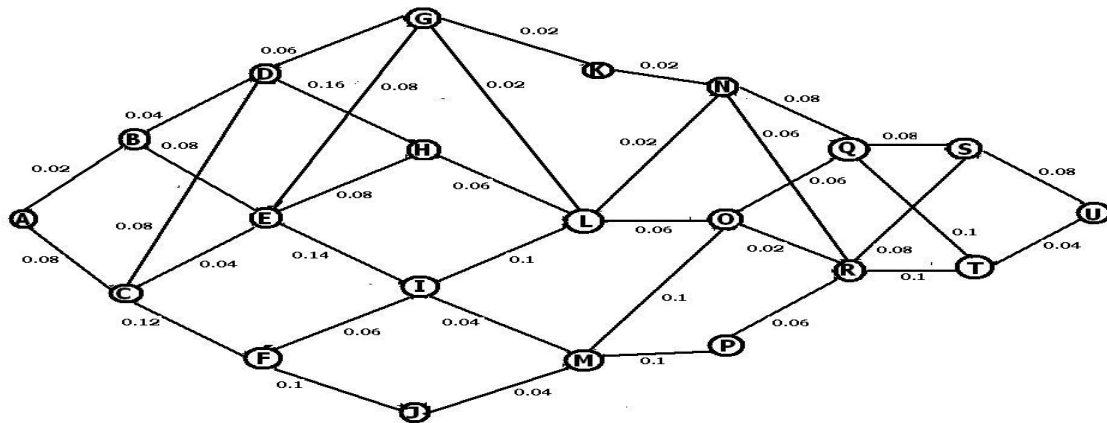
Figure 4.2- Fuzzy graph from Chennai to Kanyakumari with different routes

The decision variables do not initially have a number assigned but would be defined at each stage by an appropriate vertex on the same vertical line as the decision variable. For example, X_3 can be represented by G,H, I, or J. hence the decision variables can be the collection of vertices as follows:

X_0 : A
X_1 : B,C
X_2 : D, E, F
X_3 : G, H, I, J
X_4 : K, L, M
X_5 : N, O, P
X_6 : Q, R,
X_7 : S, T

X_8 : U

Any route going from A to U is called fuzzy policy or fuzzy tree. For example , ACFJMPRTU is a fuzzy policy or fuzzy tree .A fuzzy subpolicy or fuzzy subtree is any shortest path. For example , CEHLOQSU, BDGKNQTU, etc. are fuzzy subpolicies or fuzzy subtrees. In this fuzzy network, it is easy to enumerate all possible fuzzy policies or fuzzy trees. Among the possible fuzzy policies we have to find the fuzzy shortest distance between the point A and U.

We start by assigning the notation

Stage i – S_i – distance between X_{i-1} and X_i (i = 1,2…. 8) to the decision variables connected with each of the stages as shown in figure (4.3) .
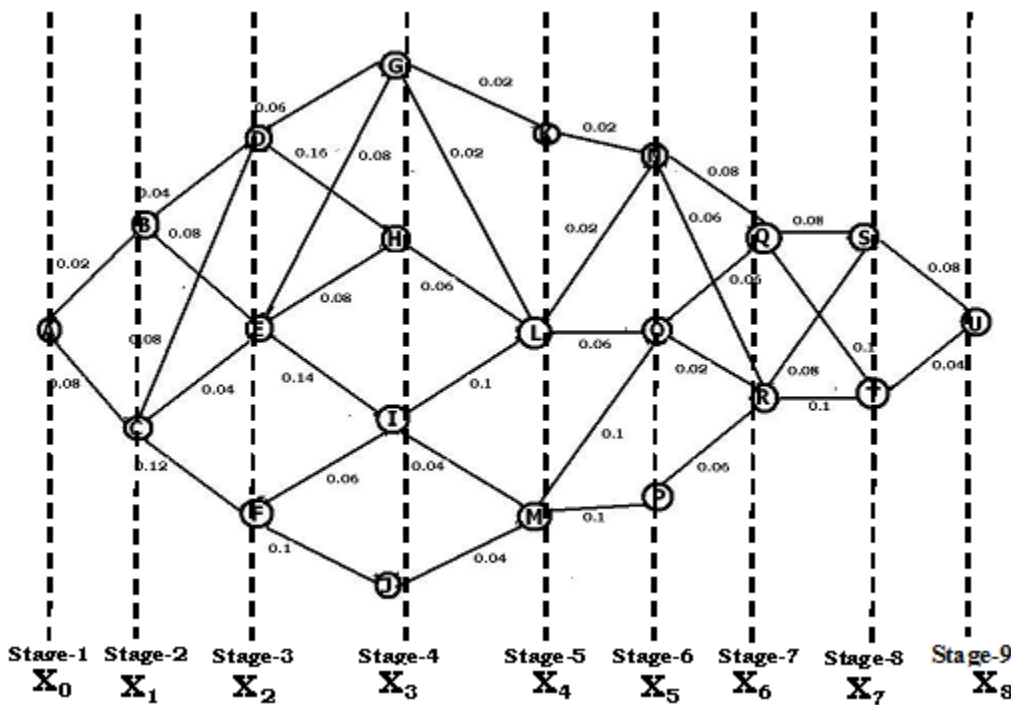
Figure 4.3- Stage wise representation as per Algorithm

Let $S1(X_0 , X_1)$ be the distance between the point X_0 and X_1 .It is apparent that the value assigned to decision variable X_1 is dependent upon the value of X_0 , which in this case is A for an initial value of zero. There is only one starting point in this network , namely , A , but in more complex networks, there could be multiple starting points resulting in a variety of values of X_0 . Similarly for $S2 (X_1 , X_2)$ be the distance between the point X_1 and X_2 . Hence $Sj(X_i , X_j)$ represents the distance between the point X_i and X_j respectively (i=0,1…….. 8 and j= 0,1……8).

The total fuzzy shortest distance for this stage is

$D (X_0 , X_1 ,X_2 , X_3 ,X_4 , X_5 ,X_6 , X_7 , X_8) = S1(X_0 , X_1)+ S2(X_1 , X_2)+ S3(X_2,X_3)+ S4(X_3,X_4)+ S5(X_4 , X_5)+ S6(X_5 , X_6)+ S7(X_6 , X_7)+ S8(X_7 , X_8).$

The fuzzy shortest distance for the stage 1 which terminates B or C . The choice is a simple one because the distance at X_0 or A is zero.

Therefore   S1(A, B) =0.02
                 S1(A, C) =0.08

$D (X_0 , X_1) = min(0.02,0.08)= 0.02$ with X_1=B

These values appear at the vertices in figure(4.3) to indicate the values at each vertex of X_1 . let us examine the fuzzy shortest distance at stage 2 namely $S2(X_1 , X_2)$

$D_{S1, S2}(D)= min(0.02+0.04, 0.08+0.08)=0.06$ with X_1 =B
$D_{S1, S2}(E)= min(0.02+0.08, 0.08+0.04)=0.1$ with X_1 =B
$D_{S1, S2}(F)= min(0.02+∞, 0.08+0.12)=0.2$ with X_1 =C.

The fuzzy shortest distance at X_2 can be shown in the vertices of figure(4.3). Thus for S2(X_1 , X_2) the least distance is :
ABD if one stops at D = 0.06
ABE if one stops at E= 0.1
ACF if one stops at F = 0.2.

Next, moving to X_3 ,we have to determine the fuzzy shortest distance at the vertices G,H,I and J.

$D_{S1, S2, S3}(G)= \min(0.06+0.06, 0.1+0.08, 0.2+\infty)=0.12$ with X_2 =D

$D_{S1, S2, S3}(H)= \min(0.06+0.16, 0.1+0.14, 0.2+\infty)=0.22$ with X_2 =D

$D_{S1, S2, S3}(I) = \min(0.06+\infty, 0.1+0.14, 0.2+0.06)=0.24$ with X_2 =E

$D_{S1, S2, S3}(J) = \min(0.06+\infty, 0.1+\infty, 0.2+0.1)=0.3$ with X_2 =F.

The fuzzy shortest distance at X_3 can be shown in the vertices of figure(4.3). Thus for S3(X_2 , X_3) the least distance is
ABDG if one stops at G = 0.12
ABEH   if one stops at H= 0.22
ACFI if one stops at I = 0.24
ACFJ if one stops at J= 0.3.

Similarly proceeding , we get the idea of fuzzy shortest route using

S4(X_3 , X_4), S5(X_4 , X_5),S6(X_5 , X_6), S7(X_6 , X_7) and S8(X_7 , X_8) as shown in figure 4.4
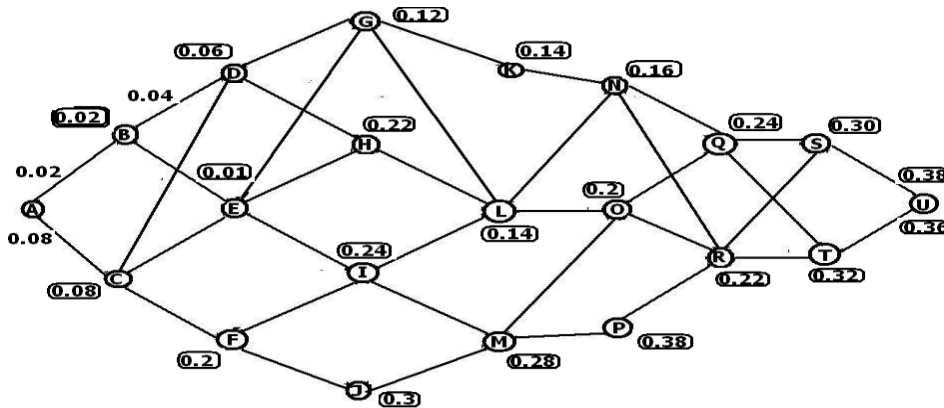
Figure 4.4
Fuzzy Shortest path from Chennai to Kanyakumari by Bus

The fuzzy shortest route from A to U   are (i) A-B-D-G-K-N-R-T-U (value =0.36) and
(ii) A-B-D-G-L-N-R-T-U (value =0.36)

Hence the fuzzy shortest route among the cities are
(i) CHENNAI -CHENGALPATTU -VILLUPURAM - PERAMBALUR   -THANJAVUR-PUDUKOTTAI-MADURAI-THIRUNELVELI -KANYAKUMARI.

(ii) CHENNAI -CHENGALPATTU -VILLUPURAM - PERAMBALUR   -TRICHY-PUDUKOTTAI-MADURAI-THIRUNELVELI -KANYAKUMARI.

4.2 -*Chennai to Kanyakumari By Train:* Take a direct train from Chennai to Kanyakumari. Several direct express trains ply from Chennai covering the distance is approximately 14 hours. Some of the trains are Kanyakumari Express (12633) and Thirukkural Express (12642). Stations covered during the journey are Chennai Egmore->Tambaram->Chengalpattu->Melmaruvattur->Tindivanam->Villupuram Jn->Vridhachalam Jn->Tiruchirapalli->Dindigul Jn->Madurai Jn->Virudunagar Jn->Satur->Kovilpatti->Tirunelveli Jn->Valliyur->Nagercoil Jn->Kanyakumari.

Fuzzy shortest route from Chennai to Kanyakumari by train
The shortest route from A to U is A-B-D-G-L-N-R-T-U (value =0.34)

Hence the fuzzy shortest route among the cities are

CHENNAI – CHENGALPATTU – VILLUPURAM – ARIYALUR – TRICHY - DINDIGUL - MADURAI-THIRUNELVELI -KANYAKUMARI

V.   CONCLUSION

The value of uncertain fuzzy shortest route among the cities from Chennai to Kanyakumari   by Bus is 0.36 and by Train is 0.34. The recursive procedure described here was carried out from A towards U. This same procedure is often utilized in the reverse direction −from U to A -which leads to an equivalent solution. It is useful for solving several different   types of network problems. Fundamentally, it consists of finding optimal fuzzy sub-policies or fuzzy subtrees and cumulating these through various cities and stages until optimal fuzzy policy or fuzzy tree or fuzzy shortest route is found large number of algorithms are available to solve the fuzzy shortest route

problem. The algorithm by kruskal's[5] is most efficient for complete fuzzy graph for uncertainty.

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AUTHORS

First Author – Dr. G.Nirmala, Head and Associate Professor in Mathematics, K.N.G.A. College(Women), Thanjavur .,
nirmalamanokar11@yahoo.com
Second Author – K.Uma, Assistant Professor in Mathematics,
A.V.V.M. Sri Pushpam College, Poondi, Thanjavur Dist.,
umak1976@yahoo.in

Design and Development of Warning System for Drowsy Drivers

Mrs.N.Neelima[1], Ms.S.Sri Lakshmi[2], Mr.T.Jaya Vardhan[3]

[1]H.O.D, Dept of ECE,Malla Reddy Institute of Technology & Science,Secunderabad,A.P,India
[2]Asst Prof, Dept of ECE,Malla Reddy Institute of Technology & Science,Secunderabad,A.P,India
[3]M.Tech, Dept of ECE,Malla Reddy Institute of Technology & Science,Secunderabad,A.P,India

Abstract- A Real-Time accident prevention system has been proposed in which the drowsy condition of the driver can be detected and appropriate action will be performed for each condition automatically. There are different ways to detect drowsiness one of them are using camera that points directly towards the driver's face and monitors the driver's eyes in order to detect fatigue. We have developed a drowsy driver detection system using Brain Computer Interface ,the system deals with EEG Signal obtained from the brain ,when rhythms are plotted on PC we can see the fluctuations of rhythms when subject is falling to drowsy or deep sleep in accordance with a appropriate voltage under normal condition and drowsy condition are read on software application, using these voltage under two states we have developed a warning tone for drowsy driver .However, the current BCI system is developed to detect the drowsiness ,cognitive state and when drowsy state arises a warning tone is generated to alert the driver from the drowsy state .

Index Terms- Brain Computer Interface, Cognitive,Drowsy,EEG,Warning System

I. INTRODUCTION

The Technology made shrink down everything , in concern in the field of Automation the automobiles has tremendously grown up every year & in accordance with this road accident also grown up due to drowsy driving , Although advance technology in transportation researchers ensuring safety, however the safety of a vehicle is an important task for automotive industries & researchers .Warning tones for preventing accidents is one of the design of safety systems, these warning tones for preventing accidents is an attracting in the public [2]. In concern safety is first priority for the public, several people are dead and some are seriously injured due to drowsiness, 55- 60 % related to drowsiness causing serious accidents on the roads, falling to drowsy drivers losing their abilities in controlling vehicles. in such cases the driver encounter to accidents, therefore it is essential to develop a warning tone when driver falling into drowsy for preventing drowsy accidents. There are many methods which have been developed warning tones and being used for drowsiness detection by means of physiological parameters like pulse rate, eyelid movement and head movement , perhaps current technologies have developed and implemented eye blinking, eye closure and head movement for monitoring alertness. The main aim of the project is to develop a prototype of warning tone for drowsy drivers, the focusing point in the design is monitoring drowsier in the form of voltage levels of EEG signals of both under normal condition and drowsy condition, two voltage levels are taken as reference & warning system is developed which is enough to avoid a car accident in drowsy condition.

II. RELATED WORK

Many Techniques developed to analyze the driver drowsiness [9]-[11]. In this paper the driver drowsiness & warning tone is based on the monitoring changes in the human cognitive state & provide biofeedback to the driver when drowsy state arises [13]-[15] . In this study a real time drowsy detection algorithm is developed and most previous case for EEG based drowsy detection is designed and developed, a detection and alert model for all subjects. Although these models may not be able to predict accurately in the cognitive state. The subject dependent system shows variations in EEG Spectra, due to different factors such as electrode displacement, skin electrode impedance and external noises, the EEG spectra in theta rhythm reflects the changes in the cognitive state these changes motivated us to develop warning system based on EEG Spectra [7] in theta rhythm with variations in the voltage levels for different EEG spectra.
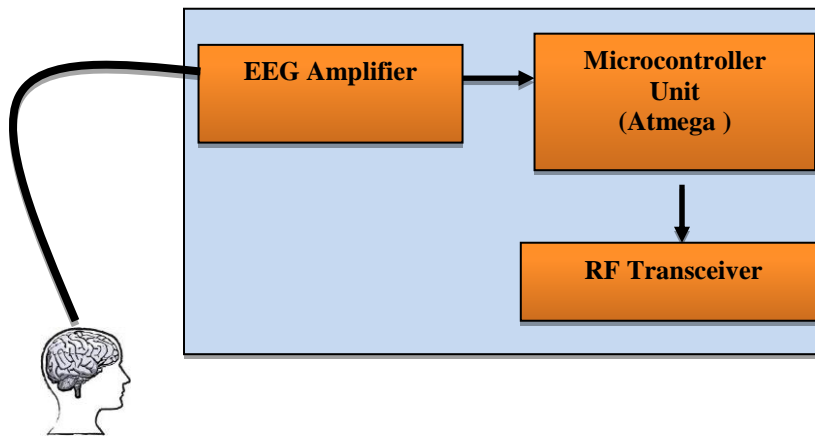
Figure 1: Data Acquisition Unit
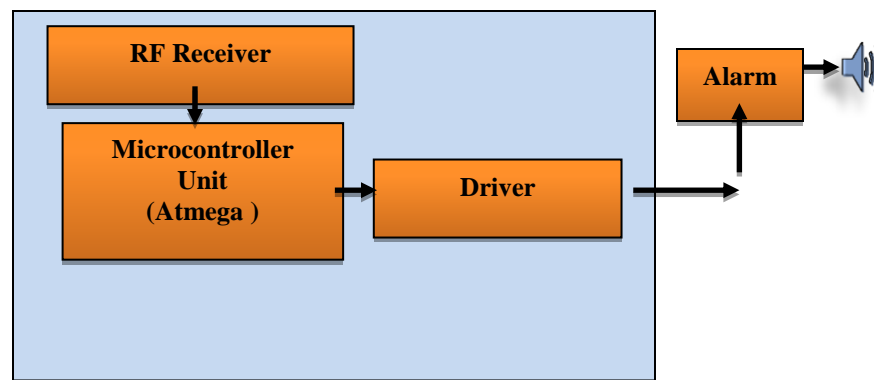
Figure 2 : Data Processing Unit

The EEG data obtained from the EEG electrode, and then amplified by EEG Amplifier which operates at +/- 5v is instrumentation amplifier. The programmed interrupts to controller unit are send to optoisolator circuit which take switching action for both normal and drowsy condition later data send to the Driver circuit to drive the data to alarm, soon after receiving the EEG Data, it will be monitored and analyzed by our drowsiness detection algorithm. If the drowsy state of the driver is detected, a warning tone will be triggered to alarm the driver.

The proposed algorithm comprises of 2 stages, the first stage is EEG data processing which includes capturing raw EEG voltages under normal & drowsy condition and data processing over the controller. The second stage is capable of judging drowsiness and warning system, 7.5 Micro Volts are considered as the normal condition i.e. wake up state & above 10 Micro Volts is considered as drowsy condition, during the experiment we monitored the variations in brain rhythms in both cases i.e normal & drowsy condition. In the final stage we programed the controller to respond when 7.5 Micro Volts as an interrupt when drowsy arises it is read as normal & displayed on LCD and when it is in drowsy condition i.e 10 Micro Volts set as drowsy when above 10 Micro Volts subject falling to drowsy & buzzer triggered to alarm to alert the driver.

III. PROPOSED ALGORITHM
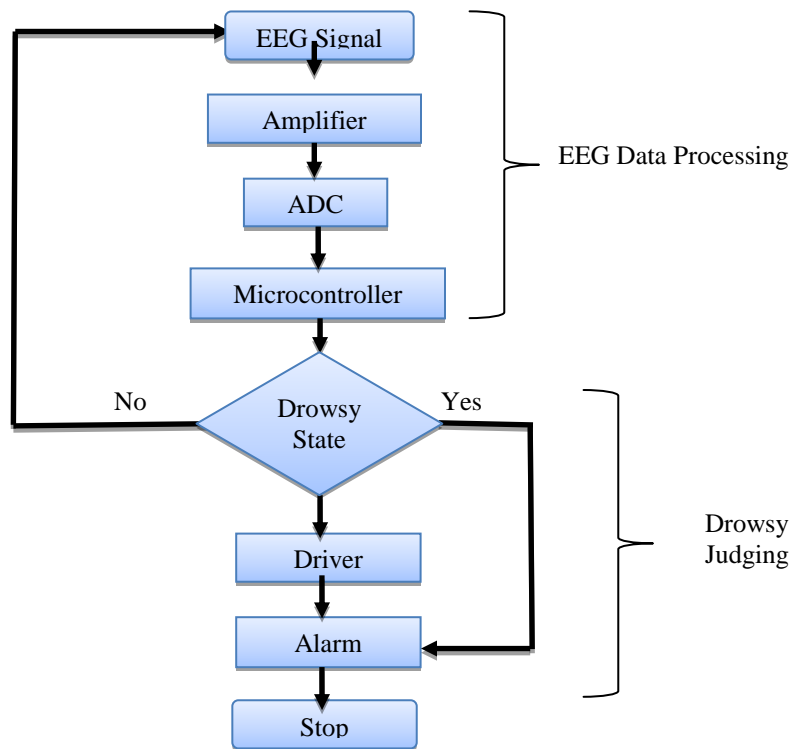
Figure 3: Proposed Algorithm

In the above figure 3, the first stage is EEG data processing which is done by using 3 electrodes in that 2nd electrodes placed on frontal lobe & 3rd electrode to ground , these three electrodes connected to EEG Amplifier and the output is given to PC and noted down the voltage for each rhythm. The second stage is the drowsiness, the appropriate amplitude levels are read on the software application , this window is scaled to detect the behavior of brain rhythms under different condition. The Final stage is warning System, Similarly the voltage levels are captured from the   EEG Software Application. To detect the drowsy condition we first detect the normal state and cognitive state. We have connected the electrode to subject head, start recording the brain rhythms. The next step is to capture the voltage levels in accordance with fluctuations in brain rhythms [6], monitoring both values after 7.5 Micro Volt driver failing to drowsy state slowly, when driver is completely under drowsy state. i.e 10 Micro Volts are recorded and above this state 10 Micro Volts are sleepy state and alarm is triggered to alert the driver from drowsy.

IV. RESULTS & DISCUSSIONS

1.Experiment Design

To verify the Feasibility of our proposed warning system for drowsy driver, an experiment is designed for testing here a car is suspended on strong base so that the car can take a motion, the signals from the electrodes travel to the high frequency filter this removes radio frequency noise picked up on the electrode wires. The instrumentation amplifier amplifies the difference of the two electrodes and sends that as a driven signal to the analog to digital converter. The controller we used is AT89C52 which is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out.

Figure 4: Experimental Setup
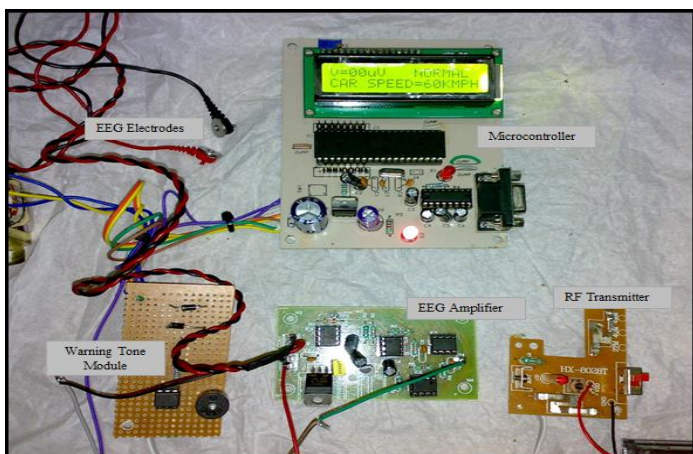
Figure 5: Hardware Setup

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional.
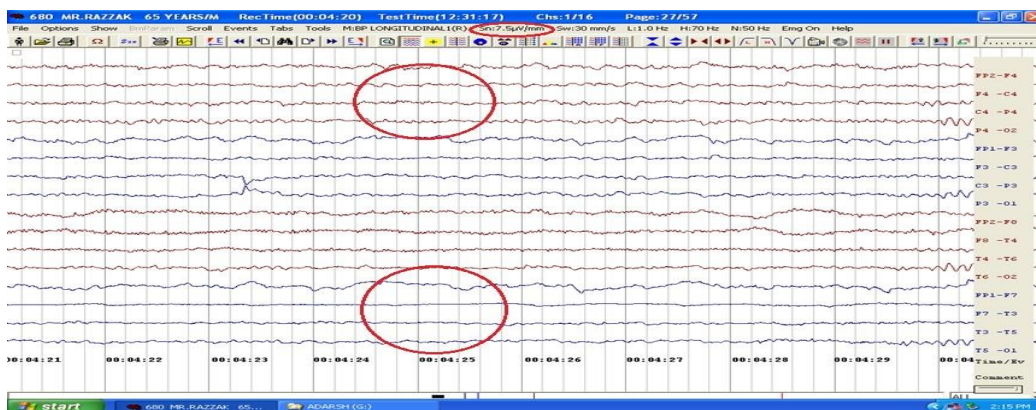
Figure 6: Brain Rhythms Under Normal Condition

the electrodes used is about 23 channel electrode , the application enabled with frequency reading, voltage reading , and recording the rhythm , Rhythm are grouped by frequency amplitudes are about $100\mu V$ max, in general the above picture rhythm's captured in normal position , the subject is 65 yr's old , the picture replicates that under normal condition the rhythms are reading normal condition here by we can see rhythm's under normal condition it is showing as 7.5 micro volts .

Figure 7: Brain Rhythms Under Drowsy Condition

The above picture rhythm's captured in normal position , the subject is 18 yr's old , the picture replicates that under normal condition the rhythm's are reading normal condition here by we can see rhythm's under Drowsy condition it is showing as 10 micro volts .

Figure 8:Working Model of Hardware under Drowsy

The Fig 8 depicts the experimental setup of warning system under and Drowsy condition. The Data transmission from Car and the module is carried out with RF Transceiver with 42 MHz High Frequency . the two voltages fluctuate from high and low (under drowsy and normal condition) are connected to optoisolator, during normal condition the behavior of the optoisolator isolate to a logic 1 state and during drowsy condition optoisolator isolate to logic 0, an appropriate warning is triggered automatically under drowsy and normal condition.

V. CONCLUSION

The Non-invasive System is to localize the brain rhythms and monitor the drowsiness, we developed the Warning System for drowsy drivers. During monitoring the system is able to judge the variations in rhythms in accordance with the voltage under normal & drowsy condition. When a driver is drowsy above the voltage variations is up to 10 Micro Volts in theta rhythm, an alert signal is triggered to alert the driver. This technology is completely accident prevent system & highly secured this can be used for transportation, as it is wired communication from brain to external devices, sometime driver may feel disgust in continuously wearing the electrodes .

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AUTHORS

First Author – Mrs. N.Neelima (Phd) ,Associate Professor, H.O.D,Department of ECE, Malla Reddy Institute of Technology & Science,Secunderabad,A.P,India. nagalla1981@gmail.com

Second Author – Ms.S.Sri Lakshmi (M.Tech) Assistant Professor ,Department of ECE, Malla Reddy Institute of Technology & Science,Secunderabad,A.P,India. surisrilu@gmail.com

Third Author – Mr.T.Jaya Vardhan(M.Tech) Student (ES & VLSI Design),Department of ECE, Malla Reddy Institute of Technology & Science,Secunderabad,A.P,India. jayavardhantee@gmail.com

A Review on Security Issues and Its Solution's Overhead in VANETs

Sumegha Sakhreliya*, Neha Pandya**

*IT Department, Parul Institute of Engineering and Technology/GTU, India
**CE Department, Parul Institute of Engineering and Technology/GTU, India

   Abstract: Vehicular Ad-hoc networks (VANETs) are very likely to be deployed in the coming years because of the safety requirements and thus become the most relevant form of mobile ad hoc networks. Security is the main issue in VANETs because of the main use of the VANETs is for safety related application and in that case the viability of the security may cause harm to human lives. In this paper, we address the security issues of this networks and the methods are used to solve the security issues and its consecuses overhead in VANETs.

   Index Terms: OBU, TPM, PKI, Group Signature, ECDSA, TESLA

I. INTRODUCTION

In 2007 , road accidents have cost 110 deaths ,4600 injuries and €438 million daily in the European Union. The damage is similarly devastating in the United States with 102 deaths ,7900 injuries and $630 million[1] daily therefore Vehicular ad hoc networks (VANETs) have appealed to many research interest now a days from academic, from research scholar and deployment efforts from industries[2].VANET applications can be divided in to three types 1) safety-related 2) traffic optimization and 3) infotainment[1].

VANETs are a subset of MANETs (Mobile Ad-hoc Networks) in which communication nodes are mainly vehicles. As such, this kind of network should deal with a great number of highly mobile nodes, eventually dispersed in different roads[3].In the vehicular adhoc networks (VANETs) intelligent vehicles can communicate among themeselves (Vehicle-to-vehicle(V2V) communication) and with the road-side infrastructure (Vehicle-to-Ifrastructure (V2I) communication) as shown in the below Fig.1.Moreover, a large number of Certificate Authorities (CAs) or Trust Authority (TAs) will also exits ,where each CA is responsible for the identiry management of all vehicles registered in its region (e.g. National territory ,district ,countary) [4][5].
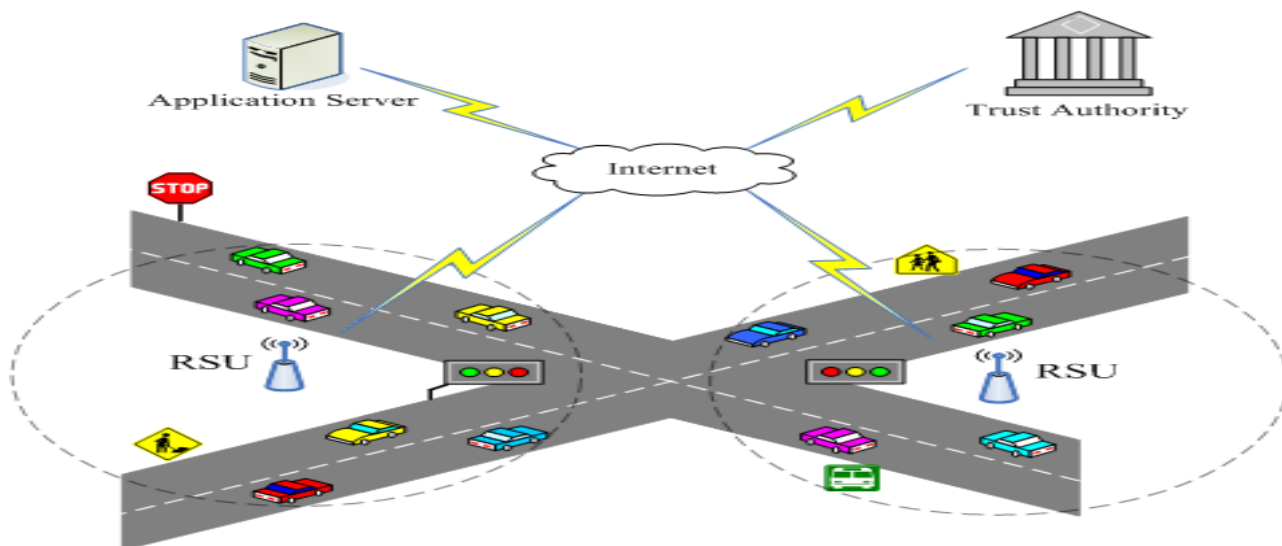
Figure 1.VANETs Example

It is anticipated that vehicles eqipped with the wirelss communication devices can communicate with each other and the roadside units(RSUs) located at critical points such as intersactions.Vehicles   are expected to communicate by means of the Dedicated Short-Range Communication Protocol (DSRC) standard, which applies the IEEE 802.11p standard for wireless communication.To offer communication with participants out of radio range,the messages could be forwarded by other vehicles (multihop Communication)[2].

Trusted Platform Modules (TPMs) or Tamper Proof Devices (TPDs) is often mounted on vehicles. These devices are especially interesting for security purposes, as they offer reliable storage and computation. They usually have a reliable internal clock and are supposed to be tamper-resistant or at least tamper-evident.In this way, sensitive information (e.g. user credentials or pre-crash information) can be reliably stored[3].In this paper in section II we will see different VANET entities,in section III security requirements in VANET,in section IV different VANET schemes, in sectio V ECDSA ,in section VI TESLA and in section VII conclusion.

II. VANET ENTITIES

A. *Common VANET Entities*
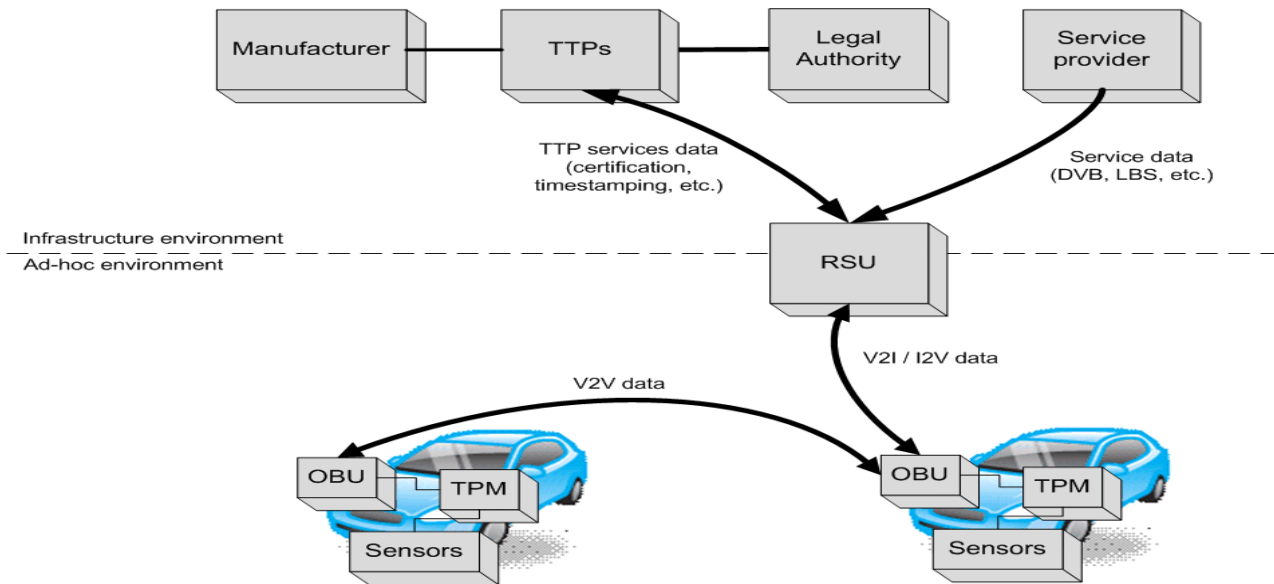
Figure 2.Common VANET Entities

a. Infrastructure Environment:

As shown in above Fig.2 the infrastructure within the upper part of the figure is fixed and that contain following entities[3].

I. Manufactures :As the manufactures are the one who had made the vehicle as the manufacturing process they can identify each vehicle uniquely so they are consider within the VANETs sometimes.

II. Trusted Third Parties :Trusted Third Parties (TTPs) or Central Authority (CA) are used in the VANET for credential Management and provide certficates and provide public/Private key within the VANETs.For its working TTPs are required to communicate with Manufacturer and Legal Authority.

III. Legal Authority :Legal Authority provide the Unique Identification Number that is Registration Number or licence plate number to the vehicles as the part of the registration process.

IV. Service Provider :Service Providers provide the services related to Infotainment e.g.downloading, web surfing and digital video broadcasting and location based services.

b. Ad-Hoc Environment:

As shown in above Fig.2 the infrastructure within the lower part of the figure is Ad-hoc and that contain following entities[3].

I. On Board Unit (OBU) :OBU are mounted on the vehicle and are used for V2V and V2I communication.

II. Trusted Platform Module(TPM) :Trusted Platform Module or Tamper Proof Device is the tamper proof devices and are tamper resistance used to store certificates and secret keys for the vehicle's On Board Unit.

III. Sensors :Sensors are used for gathering vehicles own information e.g fuel consumption and for enviornment e.g road slippery.

B. VANETs Messages Types

Several applications are enabled by VANETs, mainly affecting road safety. Within this type of application, messages interchanged over VANETs have different nature and purpose. Taking this into account, four different communication patterns can be identified[3]:

a. V2V warning propagation

There are situations in which it is necessary to send a message to a specific vehicle or a group of vehicles. For example, when an accident is detected, a warning message should be sent to arriving vehicles to increase traffic safety[3].

b. V2V group communication
In this type of message pattern, only vehicles having some features can participate in the communication. These features can be static (e.g. vehicles of the same enterprise) or dynamic (e.g. vehicles on the same area in a time interval)[3].

c. V2V beaconing

Beacon messages are sent periodically to nearby vehicles. They contain the current speed, heading, braking use, etc. of the sender vehicle. These messages are useful to increase neighbor awareness. Beacons are only sent to 1-hop neighbour vehicles[3].

d. I2V/V2I warning

These messages are sent either by the RSUs to vehicles or a vehicle to RSU when a potential danger is detected. They are useful for enhancing road safety. As an example, a warning could be sent by the infrastructure to vehicles approaching to an intersection when a potential collision could happen[3].

III. SECURITY REQUIREMENTS IN VANETS

A. Security Requirements For VANETs

Along with growth of VANET there are many security and privacy challanges are imerged as below.

a. Entity Identification & Athentication :

Entity Identification imposes that each participating entity should have a different and unique identity. However, identification itself does not imply that the entity proves that it is its actual identity – this requirement is called entity authentication.In V2V warning propagation it needs identification to perform message routing and forwarding – identifiers are essential to build routing tables and sender authentication is needed for liability purposes.[3]

b. Privacy Preservation

Privacy preservation is critical for vehicles. Privacy is achieved when two related goals are satisfied 1) untraceability and 2) unlinkability(Gerlach, 2005).First Property states that vehicle's actions should not be traced (i.e. different actions of the same vehicle should not be related). On the other hand, second property establishes that it should be impossible for an unauthorized entity to link a vehicle′s identity with that of its driver/owner[3].

However, this privacy protection should be removed when required by traffic authorities.This requirement is present in all V2V communications in case of liability.However it does not apply to I2V warnings, as the sender (i.e. the infrastructure) does not have privacy needs[3].

c. Non-repudiation

Non-repudiation requirement assures that it will be impossible for an entity to deny having sent or received some message. It is needed for the sender in V2V warnings and beacons. In this way, if a vehicle sends some malicious data, there will be a proof that could be employed for liability purposes[3].

In case of I2V and V2I warnings, non- repudiation of origin is needed, so wrong warning messages can be undoubtedly linked to the sending node. Non-repudiation of receipt is not currently needed, but it will be in the future.[3]

d. Confidentiality

Confidentiality, that is, to assure that messages will only be read by authorized parties. This requirement is only present in group communications, in which only group members are allowed to read such information. The remaining VANET settings transmit public information[3].

e Availability

Availability implies that every node should be capable of sending any information at any time. As most interchanged messages affect road traffic safety, this requirement is critical in this environment.By Designing communication protocols and mechanisms of such type can save as much bandwidth and computational power as possible can fulfill this requirements. It is present on all communication patterns, that is, it affects not only V2V communications, but also I2V ones[3].

f. Data Trust

Related to the information itself, data integrity and accuracy must be assured.This needs are globally referred as data trust. Data at stake should not be altered and, more importantly, it should be truthful. False or modified data should lead to potential crashes, bottlenecks and other traffic safety problems. For this reason, data trust must be provided on all VANET communications[3].

IV. VANET SCHEMES

A. Public Key Infrastructure (PKI)

In VANETs, the primary security requirements are identified as entity Authentication, Message integrity, and Nonrepudiation. The PKI is the most viable technique to achieve these security requirements[11][14].

In that scheme each vehicle register it self to the Trusted Authority (TA) or the Central Authority (CA).They can either get the credintial online via RSU or either offline by the CA.The Central Authority Provides the Certificate[10] and the pair of Public/Private keys.The public key of the vehicle will be provided to all the vehicles while the vehicle will use its private key to provids the signature to the message by using ECDSA[1][8][13](Elliptic Curve Digital Signature Algorithm).

All implementations of this standard shall support the signing algorithm ECDSA over the two NIST curves p224 and p256.ECC.IEEE 1609.2 suggest the inclusion of an ECDSA[1](Elliptic Curve Digital Signature Algorithm) signature in every packet to provide broadcast authentication,Integrity and Non Repudiation.OBU signs a safety message using its private key, and then sends the message, signature and its certificate OBU → OBU : M , Sig (prk _ OBU , M), cert_ OBU as shown in below Fig 3[1][12].
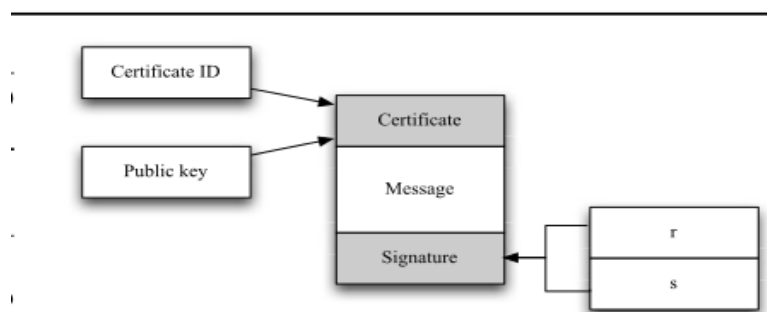
Figure 3. Message Format using ECDSA algorithm[1]

Fixed public keys allow an eavesdropper to associate a key with a vehicle so as to violate driver's privacy.To provide privacy ABAKA scheme provide to use psudoidentity to vehicle[2].

B. Multiple Certificates Per OBU

Raya and Hubaux in 2007 use a classical PKI to provide secure and privacy preserving communications to VANETs.In that the each OBU owns a set of certified public/private key pairs.In this scheme A large set of keys needs to periodically renewed (during regular vehicle maintenance visits).OBUs contact trust authorities through RSUs and send the created pseudonym and public key. Authorities send the built certificates back[12].

In this scheme the vehicle use the private key for short period of time so an evasdropper can not track the vehicle by its key or identity.The drawback of this scheme is that it suffers from a Sybil attack.A malicious OBU can pose as multiple vehicles by using the different private key for short perod of time.Other drawack is that we have to preload vehicle with large number of certificates wich consumes memory and large overhead to revoke a OBU incase of dispute[12].

C. Group Signature

To provide privacy Group Signatures scheme is provided by the Lin et al in 2007.In that scheme the vehicles form the group and the group leader or Group Manager is selected randomly.The real identity of the each vehicle is recorded by the Group manager so Group manager and it only can trace the identity of a signer from the group signature and revoke the group member in case of dispute. That scheme is used by AMOEBA[6].

Group signature guarantees the unlinkability of the messages since group member can anonymously sign on behalf of the group.OBU uses a group signature to sign a message to prove that the signer is a valid OBU (not which OBU).

It reduce the storage cost of multiple public/ private key pairs and the bandwidth consumption used to transmit the certificate revocation list.The drawback of this scheme is Computationally expensive.In the AMOEBA [6] that is based on the group signature scheme in that vehicles form groups. The messages of all group members are forwarded by the group leader, which implies that the privacy of group members is protected by sacrificing the privacy of group leader. Moreover, if a malicious vehicle is selected as a group leader, all group members' privacy may be leaked by the malicious leader[7].

V. ECDSA ALGORITHM

A. ECDSA algorithm

ECDSA is a variant of the Digital Signature Algorithm (DSA), which operates on elliptic curve groups. ECC is an approach to public-key cryptography based on the algebraic structure of elliptic curves over finite fields. To use ECC all parties must agree on the elements defining the elliptic curve,which are domain parameters of the scheme. Each participant does not usually achieve the generation of domain parameters since this involves counting the number of points on a curve, which is time-consuming and troublesome to implement it. As a result, NIST and SECG published domain parameters of elliptic curves for several common field sizes. Johnson signature scheme[13] is an algorithm to compute ECDSA, and includes three phases: key generation, signature generation and signature verification.

B. Complexity of ECDSA

a. Scalar multiplication

In ECDSA, a scalar multiplication of a given random point is used in signature generation and verification. This operation is the most time-consuming part of the total signature computation . Specifically, given a n-bit long scalar k and a point P on the curve, we have to compute the elliptic curve scalar multiplication kP.There are two possible algorithms to calculate kP ; the Add-and-Double algorithm and the Montgomery algorithm[1][15].

b. Modular multiplication

Modular multiplication is typically the most critical operation in the computation of elliptic curves scalar multiplication. Given a word length of n bits, an n-bit integer m called the modulus, and two n-bit operands x and y, the problem is the computation of xy mod m[1][15].

c. Modular inversion

The modular inversion is another time consuming operation in scalar multiplication. The Montgomery inversion is a way to compute $x^{-1} \bmod m$. The Montgomery inversion is based on Montgomery multiplication algorithm. Montgomery inverse of an integer $x \in [1, m - 1]$ is $j = x^{-1} b^n$ such that where m is prime and $n = \log_2 m$ is the bit-length.The time complexity of the Montgomery modular inversion is $O(n)$.

d. Time complexity

ECDSA signature generation and verification are fully performed by modular multiplications, squaring, modular inverse and hash functions. So the time complexity of ECDSA is given in function of TMUL , TSQR , TINV and THASH[1][15] .

Signature generation time is:

T*sign*   = 2TMUL + TINV + TkP + THASH

        = (6n+2)TMUL+TINV + 5nTSQR + THASH   **(1)**

Signature verification time is:

T*verify* = 2TMUL + TINV + 2TkP + THASH

        = (12n + 2)TMUL + TINV + 10nTSQR + THASH   **(2)**

e. Processing delay

Vehicles have to generate a signature for each message sent and verify signature for each message received. The time required for these operations is called processing delay.ECDSA with a P-224 curve (respectively P-256) fits with an authentication key size of 224 bits (respectively 256). In Table 1, TkP is almost equal to signature generation time[1][15].

Table 1.Operation times on a Pentium D 3.4 GHz workstation

Key (bit) size	TMUL (µs)	TINV (µs)	TkP (µs)	THASH (µs)
224	1.23	18.91	2468.71	8.47
256	1.39	22.01	3297.23	10.09

Table 2, which gives Tsign and Tverify , shows that using P-256 instead of P-224 in the signature generation adds a time overhead of 33.2%. Using P-256 instead of P-224 in the signature verification adds a time overhead of 33.4%. Theoretical analysis of ECDSA shows a linear-time complexity depending on the key size.In Table 3, the processing delay increases when key size increases. These experimentation results validate the analytical model[1][15].

Table 2.Signature generation and verification times on a Pentium D 3.4 GHz workstation

Key size (bit)	Signature generation (ms)	Signature verification (ms)
224	2.50	4.97
256	3.33	6.63

VI. TESLA

A. TESLA

TESLA has a low overhead since it is built on symmetric cryptography. To secure TESLA, both the sender and receivers are loosely time synchronized[8]. It means that the synchronization is not strictly precise, but the receivers requires to know an upper bound on the sending time.Consider the chain of length n with the values K1 , . . . , Kn for time intervals I1 , . . . , In . TESLA can generate this chain by choosing the last value Kn randomly and repeatedly using a one-way hash function H to derive the previous keys: Ki =H(Ki+1)$\forall$i∈{0,...,n−1} . The value K0 serves as a commitment to the entire chain, which is used to authenticate the following values of the chain[9].

Moreover, TESLA uses a second hash function H to derive the key Ki : Ki = H (Ki), which can be used to compute the Message Authentication Code (MAC) of message for each time interval.If a sender wants to broadcast a message for the interval Ii,it broadcasts mi , the MAC M ACKi (mi) and the disclosure key Ki−d , where d is the delay interval of key disclosure.Receivers store the message and MAC until the key Ki is broadcast as the key remains secret for the future d − 1 intervals. Then, receivers recover the commitment by iteratively invoking the hash function, and apply the valid key to check the stored MAC[9].

The Drawback of TESLA is that it does not provide the Non repudiation as it is using the symmetric key cryptography algorithm[8].In TESLA as it is using the delay key disclosure technique it has to wait for authentication till the key disclose[9].The below Table 3. shows the time required by MAC algorithm.

Table 3.Computation time of MAC algorithm

Operation	Comp.Time
MAC,MAC Key	1μs

VII. CONCLUSION

In this paper we had seen the various schemes use in VANET to solve the various security issues.We had also discuss the various cryptogarphy schemes that are both symmetric cryptography and asymmetric cryptography scheme and also disscuss the problems with them.so,still this schemes used to provide the various security are come with some computational and processing overhead.The time require to use assymetric cryptography requires more time than symmetric cryptography while symmetric key cryptography used in TESLA requires storage of MAC till the key disclosure.So there is a scope of development of some scheme that gives benefits of both of the cryptographic schemes.

ACKNOWLEDGMENT

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AUTHORS
First Author – Sumegha C. Sakhreliya,Student-ME(IT), Parul Institute of Engineering and Technology/GTU,India, sumegha137@gmail.com
Second Author – Neha H. Pandya,Professor-ME(CE),Parul Institute of Engineering and Technology/GTU,India, neh.pandya@gmail.com

Substrate based inhibitors of Strawberry Dioxygenase: Homology Models

Alok Jha[*], Ramasare Prasad[**]

[*] Indian Institute of Technology Roorkee, India
[**] Indian Institute of Technology Roorkee, India

Abstract- The stereoselective oxidation of an unreactive alkane C-H bond is most often carried out by monoxygenases or oxygenases including dioxygenases which use iron as a cofactor and constitute a family of enzymes, e.g. Redox enzymes. A dioxygenase is an enzyme which incorporates both the atoms of molecular oxygen into kinds of substrates. The oxidative transformation reactions are common reactions during fruit ripening and Abscisic acid biosynthesis in strawberries. The main substrate of 2-OG (oxoglutarate) dependent dioxygenases is glutarate which is converted in succinate during flavor biogenesis. The dioxygenase currently studied belongs to 9-cis-epoxycarotenoid dioxygenases (NCEDs), which catalyzes the final step in Abscisic acid biosynthesis. Oxidative reactions catalyzed by 2-OG dependent dioxygenases are important mechanistic steps in the biosynthesis of variety of metabolites in plants as well as mammals, including flavor compounds and materials of medicinal and agrochemical importance, such as plant hormones e.g. gibberellins and abscisic acid, and antibiotics such as cepahlosporin and β-lactamase inhibitor clavulanic acid. Members of carotenoid cleavage dioxygenases (CCDs) family catalyze the oxidative cleavage of carotenoids at various chain positions leading to the formation of a wide range of apocarotenoid signaling molecule. Here, we report a selective inhibition of strawberry dioxygenase and assume that these inhibitor compounds can resolve functions of this diverse enzyme family. To explore the possibilities we have used a chemical approach to select designed inhibitors for different classes of carotenoid cleavage dioxygenases. We have used substrate based inhibitors such as oxoglutarate analogue Cyclohexanedione- Ca, Abamine derivative BAS8769 (N-[4-(4-Fluoro-phenyl)-thiazol-2-yl]-benzene-1, 4-diamine) and Dicamba which contains benzyl-aryl, cyclohexanone and benzoyl ring moieties respectively. We hypothesize that these are potent dioxygenase inhibitors and selectively inhibit dioxygenase enzymes that cleave carotenoids at 9,10,11,12 positions and also 2-oxoglutarate dependent dioxygenases e.g. 4-hydroxyphenylpyruvate dioxygenases (HPPDs).

Index Terms- dioxygenase, oxoglutarate, abamine, dicamba, HPPD, oxidative transformations

I. INTRODUCTION

The ripening of fruits involves a complex series of biochemical events which include tissue changes in texture, aroma, coloration, flavor and firmness. On the basis of fruit differential respiration and ethylene effects, climacteric and non-climacteric fruits have been classically defined and the molecular mechanism of their ripening have been the focus of study over the past decades. The molecular mechanism of ripening of climacteric fruit have been described as ethylene perception and signaling transduction. A model for non-climacteric fruit ripening has been suggested for strawberry which involves Abscisic acid (ABA) perception and signaling transduction. The plant hormone Abscisic acid (ABA) is a key hormone involved in a broad spectrum of growth and development processes including seed maturation and dormancy [3,4], root and shoot growth [5], drought responses [6,7] and nutrient depletion[8]. In maize, the world's most productive cereal crop, a 9-cis-epoxycarotenoid dioxygenase (NCED) catalyzes the rate-limiting step in ABA biosynthesis [9,10] -the oxidative cleavage of the 11,12 carbon-carbon double bond of 9-cis-epoxycarotenoids, either 9-cis-violaxanthin or 9-cis-neoxanthin [11]. The C15 aldehyde, xanthoxin, is oxidized and converted through two subsequent reaction to the biologically active ABA [12,13]. Thus, NCEDs including VP14 are key regulators that determine ABA levels [13], which in turn control ABA-regulated processes. Dioxygenases have been classified on the basis of substrates; the carotenoid cleavage dioxygenases (CCDs) catalyze cellular processes by carotenoid cleavage. The carotenoid cleavage dioxygenases include 9-cis-epoxycarotenoid dioxygenase (NCED) which regulates the rate-limiting step in ABA biosynthesis by cleaving the carbon-carbon double bond of 9-cisepoxycarotenoid. Other group of dioxygenases include 2-oxoglutarate (2-OG) or α-ketoglutarate dependent dioxygenase such as prolyl hydroxylase, catechol dioxygenase, tryptophan-2,3-dioxygenase and indoleamine-2,3-dioxygenase, 4-hydroxyphenylpyruvate dioxygenase etc. Prolyl hydroxylase regulates hypoxia inducible factor 1 α (HIF 1α), in which proline residues are hydroxylated [14]. Both tryptophan-2,3-dioxygenase and indoleamine-2,3-dioxygenase participate in tryptophan metabolism via Kinurenine pathway[15]. The hydroxyphenylpyruvate dioxygenases (HPPDs) are different from carotenoid cleavage dioxygenases (CCDs) as they participate in succinate biosynthesis by converting 4-hydroxyphenylpyruvate in to 2, 5-dihydroxyphenylacetate (homogentisate) with the concomitant release of CO_2 [16,17]. This transformation involves decarboxylation, aromatic hydroxylation and substituent migration in a single catalytic cycle. The reaction mechanism is similar to those catalyzed by the α-ketoacid dependent superfamily of oxygenase enzymes [18]. These ketogenic and glucogenic products have a direct energetic contribution; in higher organisms the pathway serves additional functions.

Carotenoids are synthesized in plants and microorganisms as photoprotective molecules and important components in animal diets, an example being β-carotene (pro-vitamin A). The

oxidative cleavage of carotenoids occurs in plants, microorganisms and animals and leads to the release of a range of apocarotenoids that function as signaling molecules with diverse functions [19]. In insects the visual pigment retinal is formed by oxidative cleavage of β-carotene β-15,15′-dioxygenase [20]. Retinal is produced by an orthologous enzyme in vertebrates, where, it is converted to retinoic acid, which is also a regulator of differentiation during embryogenesis [21]. A distinct mammalian CCD is believed to cleave carotenoids asymmetrically at the 9,10 position [22], that is involved in the metabolism of dietary lycopene [23]. The plant volatiles β-ionone and geranylacetone are produced from an enzyme that cleaves at the 9,10-position [24] and the pigment α-crosin found in the spice saffron results from an 7,8-cleavage enzyme [25].

The advent of detailed structural information on the molecular target sites of agrochemical now allows a rational target site based approaches to improve both selectivity and potency towards the pathogen species and away from nontarget organisms. One enzyme that is potentially complaisant with such an approach is 4-hydroxyphenylpyruvate dioxygenase (HPPD), the target site for recently commercialized herbicides and therefore of great interest for the design of novel herbicides [26, 27]. In mammals the enzyme has an important role in the catabolism of tyrosine. Deficiency of these enzymes in humans causes type III tyrosinemia, a rare autosomal recessive disorder characterized by elevated serum tyrosine levels, neurological symptoms and mental retardation [28-31]. Inhibitors of HPPDs have found use as drugs for the treatment of type I tyrosinemia by blocking the formation of toxic catabolites derived from tyrosine in these disease conditions [32]. In plants, HGA formed by HPPD activity is utilized as the aromatic precursor for tocopherols and plastoquinone [33]. Plastoquinone is the redox cofactor for phytoene desaturase, a key enzyme in the biosynthesis of photoprotectant carotenoids [33]. The loss of these essential phytoprotectants result in the intense and characteristic bleaching of new plant growth by application of HPPD inhibitors herbicides leading to plant death.

II. Substrate based Inhibitor design

Considerable success has been obtained in probing function and substrate specificity of CCDs in their native biological contexts, particularly in plant species with simple genetic systems or that are amenable for genetic approaches. CCDs are often active against a broad range of substrates and in many cases the true in vivo substrate of a particular CCD remains unknown. Therefore, to investigate both apocarotenoid and CCD functions in their native cellular environment different small molecules can be applied easily to a broad range of species, their application can be controlled to provide detailed studies of biological functions, and individual proteins or whole protein classes may be targeted by varying the specificity of the small molecules. Notably, functions of plant hormones gibberellins, brassinosteroids and abscisic acid have been successfully probed using this approach by adapting triazoles to inhibit specific cytochrome P450 monoxygenases involved in the metabolism of these hormones [34]. In the case of CCD family the tertiary amine Abamine [35] and the more active AbamineSG [36] have been reported as specific inhibitors of NCED, while Abamine was

used to show new functions of abscisic acid in legume modulation [37]. However, other selective inhibitors for other types of CCD are also known, CCD inhibitor based on hydroxamic acid where variable chain length was used to direct inhibition of CCD enzymes that cleave carotenoid at specific positions. We, therefore, report a novel combination of inhibitors for dioxygenase enzyme superfamily and demonstrate the use of such novel strawberry dioxygenase inhibitors to control disadvantages of the dioxygenase in the model plant.

III. Results and Discussion

Dioxygenase selective inhibition:

9-cis-epoxycarotenoid dioxygenases are proposed to be a dioxygenase with a mechanism involving a carbon-carbon intermediate followed by formation of a dioxetane ring or Criegee rearrangement prior to cleavage[11,38,39]. The dioxygenase inhibitors which have been previously reported elsewhere for different types of dioxygenases are most likely based on chemical structure modifications in various dioxygenase substrates or natural inhibitors. It was reported that the tertiary amine Abamine is a reversible competitive inhibitor of NCEDs and it inhibited Abscisic acid biosynthesis in plants [35] and Abamine SG with an extended three carbon linker between the methyl ester and nitrogen was subsequently developed with an improved activity [36]. Similarly, the 2-oxoglutarate (2-OG) dependent dioxygenase substrate 2-oxoglutarate analog Cyclohexanedione-Ca may inhibit this type of dioxygenases. Chemical compounds containing amines, imidazole are potential dioxygenase inhibitors such as plant hormone auxin based synthetic compounds 2,4-D (2,4-Dichloroacetic acid) and Dicamba (2-methoxy 3,6 chloroacetic acid) can inhibit dioxygenase functions. These chemical compounds act on the methyl group of the substrate. Here, we report the 2-OG glutarate analog Cyclohexanedione-calcium or Cyclohexanedione-Ca, Abamine derivative BAS8769 and Dicamba as potential 2-OG dependent dioxygenase, 9-cis-epoxycarotenoid dioxygenase and 4-hydroxyphenylpyruvate dioxygenase inhibitors. The precise mechanism of action of Abamine is uncertain but our hypothesis was that the protonated amine mimics a carbocation intermediate in the catalytic mechanism with the oxygenated aromatic ring bound in place of the hydroxyl-cyclohexyl terminus of the carotenoid substrate [38]. Inhibition may be due in part by chelation of the essential metal ion cofactor by the methyl ester of Abamine. However, a lot of Abamine derivatives have been reported, for example an Abamine derivative containing an acid group (-COOH) in place of the methyl ester was not active [36] even though theoretically this should be more effective at binding the iron cofactor. Hydroxamic acids are known to act as inhibitors of several classes of metalloenzymes such as matrix metalloprotease by chelation of the essential metal ion cofactor [40]. Therefore, we selected hydroxamic acid derivative or Abamine derivative N-[4-(4-Fluoro-phenyl)-thiazol-2-yl]-benzene-1,4-diamine or BAS8769 in which hydroxyl-cyclohexyl terminus of the carotenoid has been mimicked as above by an oxygenated ring and the hydroxamic functional groups are positioned at variable distance from the aromatic ring. We searched for different aryl-C_3N analogues, aryl-C_2N and aryl-C_1N analogue and selected BAS8769 from the database. The

compound BAS8769 contains 4-fluorobenzyl group that has been found to promote activity in the Abamine series [35], also the thiazole group includes in the selection of hydroxamic acid or Abamine derivative BAS8769. The coupling of the appropriate acid with a substituted o-benzyl hydroxylamine and the carbon spacer from the cyclohexyl moiety was involved in the selection of BAS8769. Our hypothesis was that the halogenated i.e. chlorinated or fluorinated aromatic ring side chain compounds can be potential inhibitors for this class of dioxygenases, therefore, the study remains focused on inhibitors containing

such aromatic rings e.g. 4-Fluoro-phenyl rings in BAS8769, chloroacetic acid in Dicamba. The 2-OG dependent dioxygenase inhibitor Cyclohexanedione-Ca, which is 2-OG analogue, contains calcium as calcium plays important role in the diverse functions of dioxygenases. Biochemical studies of plant species susceptible to Cyclohexanedione herbicides indicated that these herbicide inhibitors inhibit acetyl co-A carboxylase in grasses [41], however, these inhibitors could be effective also in broadleaf plants depending on the sensitivity.
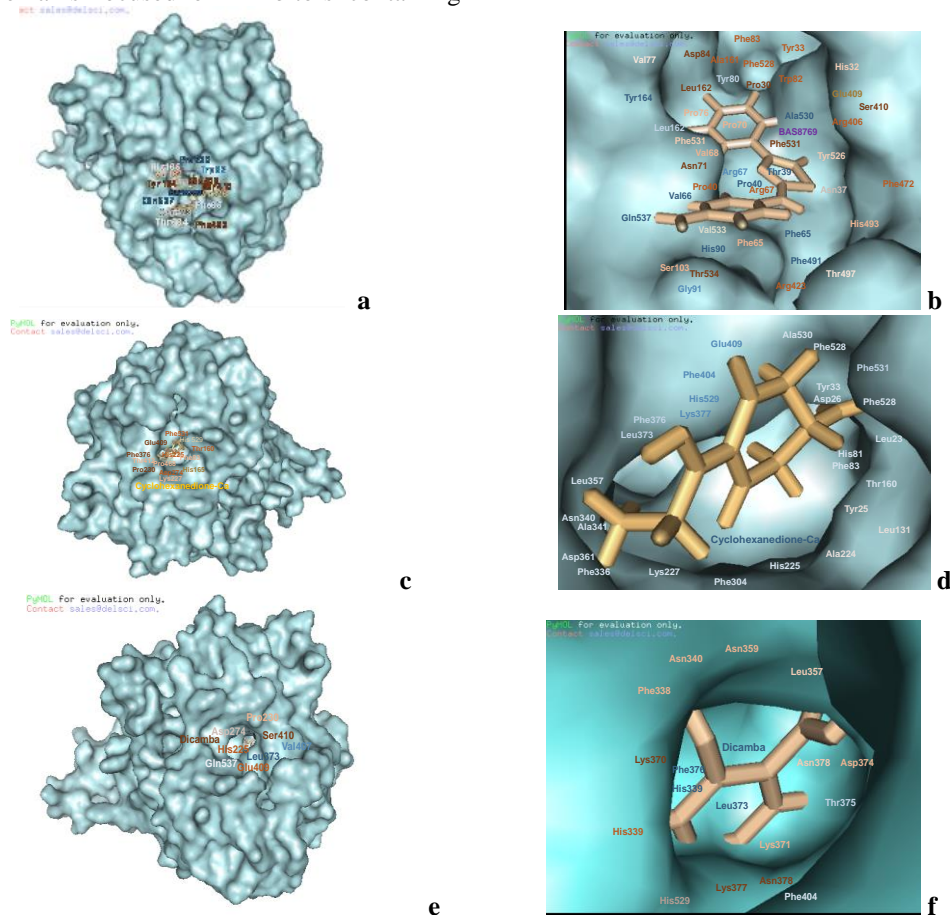
Fig. 1 Dioxygenase substrate based inhibitors: a,b represent abamine derivative compound BAS8769. **c,d** represent oxoglutarate analogue Cyclohexanedione-ca. **e,f** represent Dicamba. The correct positioning of hydroxamic ring in the active site is required for competitive binding, the phenyl or benzoyl rings of inhibitors are anchored in the hydrophobic base of the substrate binding pocket. Cyclohexanedione-Ca is in a hanging position supported by Phe528 residue, while Phe531 and Arg67 form the base of substrate binding pocket. BAS8769 and Cyclohexanedione-Ca shows superficial interaction with the residues in the substrate binding pocket whereas Dicamba is deeply anchored in the substrate binding pocket and its benzoyl moiety and chloroacetic side chain are interacting with residues His225 and Phe531 respectively, that are involved in forming walls of substrate binding pocket.

The interaction of BAS8769 and Cyclohexanedione-Ca and Dicamba with dioxygenase involves certain conserved residues.

However, residues interacting with BAS8769 and Cyclohexanedione-Ca are similar but Dicamba has different interaction pattern, this indicates similarity and difference in the chemical structure of these substrates. All these substrates are aromatic ring compounds with varying side chains, BAS8769 and Cyclohexanedione-Ca are modified as the aromatic ring contains Fluoro-phenyl and Thiazole side chains in BAS8769 and in Cyclohexanedione-Ca the aromatic ring contains C_2H_5O- and $CH_3(CH_2)_2-$ and C_2H_5S- groups as side chain. The synthetic auxin inhibitor Dicamba contains dichloro- and methoxy- groups on benzene ring, which makes electron centered at the aromatic ring and a potential target for electrophilic reactivity, while in some cases nucleophilic reactions are also a possibility. We propose a reaction mechanism for binding of these substrates, the way of access to the catalytic site and the mode of binding in the substrate binding pocket is crucial to determine accurately how the inhibition occurs, however, the chemical groups on inhibitors and interacting residues can indicate the mechanism behind the

inhibition process. The co-ordination geometry of inhibitor binding is consistent with that of other enzymes of dioxygenase superfamily thus we are able to propose that certain specific mechanism is applied in such cases. The most plausible explanations to the mechanistic possibilities are the presence of specific motifs which lead to activation of the substrate and reactions associated with enzymatic activity. The proposed mechanism involves the ionic or radical mechanism for substrate intermediate generation which in turn inhibits the dioxygenase enzyme activity. The reaction of dioxygenase substrate with dioxygen to form a hydroperoxide which upon a nucleophilic attack on neighboring alkene forms a dioxetane which in the presence of water gets exposed to form epoxide. The iron-oxo intermediate, then carries out hydroxylation at benzylic position or electrophilic hydroxylation at C-1 of the aromatic ring followed by a 1, 2-alkyl shift e.g. Dicamba [1,2]. The inhibition is possible and evidences suggest that the substrate analogues in which hydroxymethyl substituent is positioned in an axial orientation with the cyclohexanone ring can be potential dioxygenase inhibitors, indicating that the conformations adopted by the hydroperoxide is important e.g. Cyclohexanedione-Ca. The exposure of mononuclear iron (II) complex to oxygen leads to the concomitant oxidative decarboxylation of a benzyolformate ligand and the hydroxylation of a nearby aryl ring in the ligand e.g. BAS8769. The reactivity of this complex therefore effectively mimics the reactivity of this class of dioxygenases. The type of hydroxylation reaction in which the reaction proceeds via three oxygens, two oxygens are derived from dioxygen and another one is derived from water, this labeling pattern can be explained by a similar transformation to give an epoxyquinone intermediate, followed by base- catalyzed epoxide opening by water and ketone reduction [1,2].
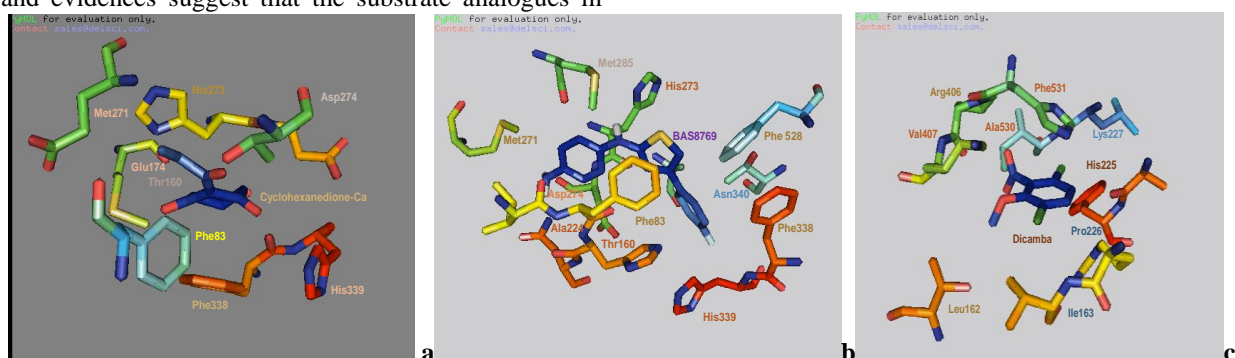
Fig. 2 Dioxygenase inhibitor interactions. a. Cyclohexanedione-Ca b. BAS-8769 c. Dicamba

The residue Phe83 interacts with the oxygen atom of the cyclohexanone ring of Cyclohexanedione-Ca. Other residue Thr160 forms polar interaction with the cyclohexanone ring, whereas, in BAS8769 these residues interact differently. Phe83 interacts with the benzyl-aryl ring of BAS8769 by forming a π-π interaction, while Thr160 is interacting with the carbon atom of the benzyl-aryl ring. Other residues, Glu174 including active site residues His339 and His273 in Cyclohexanedione-Ca, are interacting with the carbon atoms of cyclohexanone ring. These are hydrophobic interaction but in the case of BAS 8769, His273 forms polar interaction with the hydrogen atom, while its carbon atom interacts with nitrogen atom of cyanoaryl ring of the substrate. His273 also forms π-π interaction with the benzyl ring carbon atoms and with hydrogen atoms of the phenyl ring of BAS8769; it forms cation-π interaction. The residue Phe338 is interacting with a hydrophobic interaction with carbon atoms of cyclohexanone ring and with oxygen atom it forms a hydrogen bond or a weakly polar interaction in Cyclohexanedione-Ca. In BAS8769, Phe338 forms a π-π interaction with the carbon atom of benzyl-aryl ring. The residue Phe338 also interacts with the sulfur atom S1 of thiazole side chain of BAS8769, which suggests that Phe338 is responsible for dioxygenase inhibition by BAS8769. The sulfoxide elimination is an important tool to double bond generation in aromatic rings, the Phe338 interaction with sulfur atom S1 of thiazole group can generate double bond in the phenylalanine ring and the discriminate binding may participate in dioxygenase inhibition and can also be associated with increased glutathione-S-transferase activity enhancing glutathione conjugation as observed in triazine herbicide inhibitors. This is a common mechanism of atrazine detoxification in some grasses and broadleaf weeds. [42-45] Moreover, Phe338 can also induce substrate selectivity by its characteristic cis-cis conformation [46]. The residue Phe528 is interacting with benzyl-aryl ring carbon atoms by forming π-π interactions, while its carbon atom forms a halogen bond or interact with the fluorine atom F1 of fluoro-phenyl ring of BAS8769. It suggests that Phe528 along with forming the base of the substrate binding pocket, participate to position the hydroxamic acid cyclic end group in the active site to facilitate the inhibitory activity of BAS8769 in this class of dioxygenases. Synthetic auxins act as mimics of natural auxin and are categorized into different classes based on the position of their carboxycyclic acid moieties on their aromatic rings. The classes include phenoxyalkanoic acids (e.g.2,4-D), benzoic acids (e.g. Dicamba) and pyridine-carboxylic acids (e.g. picloram) [51]. Overall, effects of auxinic herbicides can be divided into three consecutive phases in the plant: stimulation of abnormal growth and gene expression, inhibition of growth and physiological responses and senescence and cell death [52]. The Dicamba interaction with specific amino acid residues in dioxygenase can serve the basis for its mode of actions. The residue His225 is interacting with the oxygen atom of benzoic ring by a polar interaction or a hydrogen bond, while, forms π-π interaction with carbon atoms of the benzoyl moiety, which suggests that His225 can be participating in forming a catalytic triad of homologous residues mechanistically to facilitate the inhibitory activity of

Dicamba in this class of dioxygenases. His225 also interacts with the chlorine atom of chloroacetic acid group of Dicamba. The chlorine atom of Dicamba also interacts with the residue Phe531. Other residues, Leu162 and Ala530 can also interact with the chlorine atom. The interactions of Pro226 with the oxygen atom of benzoyl moiety and the nearby residue, Lys227, which provides some stability to the structure and its ammonium group, can be neutralized by the oxygen atom of benzoyl moiety, which involves carbon atoms of Lys227. Other residue, Arg406 interacts with weak polar or hydrophobic interactions with carbon atoms of the benzoyl ring and also with chlorine atom of the chloroacetic acid side chain. Val407 can also interact with the chlorine atom of the chloroacetic acid side chain, while, Thr412 interacts with the benzoyl ring carbon atoms by hydrophobic or weak polar interactions. We suggest that these interactions could have functional significance for Dicamba mode of actions. The purpose of selecting inhibitors of these classes for strawberry dioxygenase was that the inhibitors based on structural mimic of the substrate position an iron chelating hydroxamic acid group within the active site. The positioning of hydroxamic acid group within the active site depends on the distance between the hydroxamic acid group and an aromatic ring, all the inhibitors that we have selected can achieve this, as the distances match within the carotenoid substrate between the proximal cyclic end-group and the cleavage site. Dioxygenase structures of known types indicate that cleavage position is determined by the distance between the Fe(II) catalytic centre and the opening of the long non-polar tunnel that allows the access to carotenoid substrates [47]. The cleavage of monocyclic γ-carotene in Nostoc sp. CCD(NosCCD), for example occurs at 7′,8′-position where the proximal terminus is linear, but at 9,10-position where the proximal terminus has a more compact cyclic end group [48], indeed, this suggested that the cyclic end group arrested at the entrance of the tunnel. We predict from the structure model of strawberry dioxygenase for inhibitor mechanism, that the aryl-C_1N, aryl-C_2N, and aryl-C_3N compounds would be selective for 7,8, 9,10 and 11,12 cleavage reactions [49,50], however, we also speculate that these inhibitors may have 15-15′ specificities [49], they all still maintain a somewhat greater selectivity toward the 9,10 and 11,12 cleavage. These inhibitors Cyclohexanedione-CA, BAS8769 and Dicamba may exhibit different activity pattern with 9, 10 and 11, 12 cleavage enzyme activity with significant inhibitory activity in both plant and human dioxygenases. This also indicates that the variant of hydroxamic acid inhibitors are able to distinguish between enzymes that have similar activities but highly divergent primary structure e.g. Tryptophan-2, 3-dioxygenase, Indoleamine-2, 3-dioxygenase in humans.

IV. CONCLUSIONS

The mode of activation and paucity of pharmacological tools have made dioxygenases one of more challenging oxygenases to characterize and an important target for the development of herbicide inhibitors and also useful drugs. The structure model offers insights into the high affinity binding of structural mimics of various substrates. Therefore, this structure and inhibitor complex will provide a template for development of strawberry dioxygenase inhibitors and the development of

inhibitors for other dioxygenases to probe their biological roles. Further efforts will focus on improving the possibility of inhibitor compounds bound to an active state dioxygenase structure.

V. METHODS SUMMARY

In the homology modeling protein sequence should be analyzed for certain specificities before generating structure model to validate the structure. Therefore, we retrieved the strawberry dioxygenase amino acid sequence from NCBI database (www.ncbi.gov.in), and further analyzed it for sequence based similarity and multiple alignments against other protein sequences. With more than 30% similarity and less gap in the alignment, the template 3NPE_A served as an ideal template for structure model generation. The structure model was generated from geno3D server (**geno3d**-pbil.ibcp.fr/). The dioxygenase sequence was analyzed for secondary structure and topology predictions, using PSI-PRED (128.16.10.201/**psipred**/) and EMBL-EBI (www.**ebi**.ac.uk/) tool ProFunc for protein functions. The multipass model expectation value threshold 0.002 in the expectation value of 10 and the alignment was done in the matrix BLOSUM62 for model generation. We deduced substrate 3D structure from PubChem compound. (www.ncbi.nlm.nih.gov). Dicamba=CID3030, Cyclohexanedione-Ca=CID13006, N-[4-(4-Fluoro-phenyl)-thiazol-2-yl]-benzene-1,4 diamine=BAS08769360. The substrate docking studies were performed by using Hex (**hex**.loria.fr/), and dockingserver, (www.**dockingserver**.com/). The pictures were generated by PDB viewer PyMol (www.**pymol**.org/).

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AUTHORS

First Author – Alok Jha, Research Scholar, Department of Biotechnology, Indian Institute of Technology, Roorkee, Roorkee. E-mail: alok.gene@gmail.com, Phone: +919897594489

Second Author –Prof. Dr. Ramasare Prasad, Professor and Head
of the Department, Department of Biotechnology, Indian
Institute of Technology, Roorkee, Roorkee.
E-mail: rapdyfbs@iitr.ernet.in, Phone: 91-01332-285791

Correspondence Author –
Prof. Dr. Ramasare Prasad, Professor and Head of the
Department, Department of Biotechnology, Indian Institute of
Technology, Roorkee, Roorkee. E-mail: rapdyfbs@iitr.ernet.in,
Phone:91-01332-285791

Microbial pollution- total coliform and fecal coliform of Kengeri lake, Bangalore region Karnataka, India.

N. Latha and M. Ramachandra Mohan

Lake Management and Water Quality Research Unit,   Department of Zoology, Bangalore University, Bangalore-560 056.

Abstract- A survey of the occurrence of fecal indicator bacteria (total coliform TC, fecal coliform FC) in Kengeri lake was carried out during the period of 3 years (Jan 2005 to Dec 2007) using membrane filter (MF) technique. The study was implemented to assess the hygiene of water quality in order to give an indication about the actual magnitude of fecal pollution post the discharge of domestic sewage discharge. The total coliform was high in April, may and low in September while fecal coliform was high in June, July and September and low in April. On the basis of the result water was considered to be unsatisfactory for domestic and agricultural purposes throughout the study period. In general total coliform count in the Kengeri lake, greatly increased in summer months and decreased in winter and monsoon months while fecal coliform revealed high values in monsoon which declined in summer months.

Index Terms- TC (total coliform), FC (fecal coliform), Urban sewage discharge.

I.   Introduction

Aquatic ecosystem contains characteristic communities of microorganisms and non indigenous species that are introduced into such environments, which commonly decline in abundance and ultimately disappear. The factors regulating the composition of aquatic microbial community would be useful in predicting the persistence and behaviour of human, animal and plant pathogens in natural water (Yigal Henis *et al.,* 1989). Water contaminated with fecal matter have the capability to pose serious health risks for shell fish consumers and swimmers and major economics losses for shell fish harvesting and business (Trevette *et al.,* 2005). Bacterial, viral and protozoan pathogens can be introduced into waters in various ways, including leaking septic tanks, sewer malfunction contaminated storm drains, runoff from animal feedlots, human fecal discharge and other sources (Aslan- Yilmaz *et al.,* 2004). Enumeration of fecal coliforms, *E coli* and /or Enterococcus Sp. has generally been used to assess microbial water quality. These micro organisms share a common feature, they all can inhabit the intestines of warm-blooded animals, including wildlife, livestock and humans and therefore can be excreted in the feces of these animals. Although these have been some association between high levels of indicator bacteria and disease outbreak (Chou *et al.,* 2004)**,** there is little or no prediction of species sources of contamination or correlation with human pathogens when using these indicators (Gonzalves and Joshi, 1964).

The aim of microbiological examination of water is to detect whether pollution has occurred or not. Though it would be ideal to look for the pathogens themselves it is not practicable since they are usually few and far outnumbered by nonpathogenic organisms. Therefore biological indicator of pollution, coliform bacteria, either total coliform or fecal coliform are generally used as indicators of pollution of water. Also Enterococci and fecal Streptococci such as *Streptococcus faecalis* are regularly present in faeces and are recognized as indicators of fecal contaminations. The natural bacterial floras of water are those species which are constantly present in water. The presence of nonpathogenic organisms is not a major concern, but intestinal contaminates of fecal origin are important. These pathogens are responsible for intestinal infections, such as bacillary dysentery, typhoid fever, cholera and paratyphoid fever. Water contamination with pathogens and pollutants create many health problems for the water consumers. The study is undertaken to know the microbial pollution of Kengeri lake.

II.   Material and methods

Samples of water for bacterial analysis were collected at monthly frequency during January 2005 to December 2007. The samples are collected in sterilized borosilicate glass stoppered bottles, the stopper and neck of the bottle should be covered to protect against dust and handling contacts and wrapping paper, pressed over stopper and neck sealed by secure hood. The samples are stored at a temperature between $6\text{-}10^0\text{C}$ in refrigerator.

III.   Experimental design

Membrane filter technique was used for counting coliform numbers (quantity) in water bodies. This technique involves filtering a known volume of water through a special sterile filter. These filters are made of nitrocellulose acetate and poly carbonate with a 150µm thick and have 0.45µm diameters pores. When the water samples are filtered bacteria in the sample are trapped on the surface of the filter. The filter is then carefully removed placed in a sterile petri plates containing the solidified media and incubated for 20-24 hours at 37^0C and 44.5^0C for Total coliform and Fecal coliform respectively.

The enumeration of fecal coliform and total coliform population was made by membrane filter technique with the following high media;

IV. M-FC MEDIA

The medium containing: Tryptone 10.0g; Proteose peptone No.3 5.0g; Yeast extract 3.0g; Sodium Chloride 5.0g; Lactose 12.5g, Bile Salt No.3 1.5g; Aniline blue 0.1g; Agar 15.0g and water 1000ml.

V. M- ENDO MEDIA

The medium containing: Tryptose 10.0; Thiopeptone, 5.0; casitone, 5.0; yeast extract,1.5; lactose, 12.5; sodium chloride, 5.0; dipotassium dihydrogen, 4.37; potassium dihydrogen phosphate, 1.375; sodium lauryl sulfate, 0.05; sodium dosolycholate, 0.10; sodium sulfite, 2.10; basic fuchsin, 1.05; Agar 15.0g and water 1000ml.

VI. RESULT AND DISCUSSION

The total coliform count during 2005-2007 is represented in the fig. 1.In the year 2005, the highest total coliforms were observed (232/100ml) in May and lowest were observed (98/100ml) in September. In the year 2006, the highest total coliforms were observed (510/100ml) in April and lowest were observed (210/100ml) in September. In 2007, highest total coliforms were observed (1500/100ml) in May and lowest total coliforms were observed (640/100ml) in September.

The fecal coliform count during 2005-2007 is represented in the fig. 2. In the year 2005, the highest fecal coliforms were observed (98/100ml) in June and lowest were observed (48/100ml) in April. In the year 2006, the highest fecal coliforms were observed (112/100ml) in September and lowest were observed (70/100ml) in April. In 2007, highest fecal coliforms were observed (510/100ml) in July and lowest fecal coliforms were observed (210/100

ml) in April.

The water contamination, the outcome of rapid development of industry, has resulted in contamination of all kinds of natural water system. This contamination is not only confined to highly industrialized countries, where the population explosion has given rise to complications such as increasing amounts of waste, waste water and other types of contaminants which have endangered living organisms dependent on this vital resource. Water acquires bacteria from air, soil, sewage, organic wastes, dead plants and animals. Almost any organism may thus be found in water at any time. However, most of the bacteria find condition unfavourable and soon die and survivors contribute natural flora of that water body. Coliform bacteria also consists of an artificial grouping of organisms believed to be associated with fecal pollution but in reality may also include environmental organisms from soil, vegetation and decaying organic matter (Geldreich and Bordnee, 1962).

Total coliforms are a group of closely related bacteria that are not harmful to humans. TC is common inhabitants of ambient water and may be injured by environmental stress, lack of nutrients and water treatment in a manner similar to most bacterial pathogens. TC are used to determine the adequacy as otherwise the data obtained on TC in the studied lake indicate the degree of pollution, and its relationship to sewage input quanta in the different lakes. In general, it is found that the densities of TC greatly increased in the summer months and decreased in winter and monsoon months, a trend that is dependent on the inflow of water into the lakes.

Higher values of bacteria in Kengeri lake was due to bathing and washing at the locations making them more polluted further cattle dropping from the catchment area have contributed for its count this is in similar with the findings of (Bagde and Varma, 1982). Bacterial number was reported lowest in the winter and highest in summer in many water bodies as reported by (Saxena et al., 1966 and Seenayya, 1973). Low winter counts were attributed to lower multiplication and poor growth following low temperature. The highest coliform counts were witnessed in summer when dissolved oxygen was the least. This may be due to heavy consumption of dissolved oxygen, which was more vigorous in warm weather (Hannan, 1979).

Fecal coliform bacteria are routinely used to monitor aquatic systems for sewage contamination, and considerable attention has been directed at evaluating the survival of FC in aquatic systems. The general trend of the densities of FC greatly increased in the monsoon months and decreased in the summer months (as in the case of TC highest bacterial population during monsoon months is obviously due to transport of organic matter from various sources through surface run off from the catchment area). Other factors that have increased bacterial population density in Kengeri lake are a) the human activities causing pollution and b) the runoff water from catchments areas flowing into the lakes with abundant nutrients and direct sewage inlet into lake. The temperature also influences the trend in variation of density of bacterial population. This is in accordance to other researchers (Patralekha, 1992).

Fecal coliform bacteria are bacteria that originate from intestinal tracts of homothermic animals. Their presence indicates fecal contamination of water. Total and fecal coliform bacteria are sensitive and commonly used indicators of bacterial pathogen contamination of natural waters. Their presence implies the potential presence of micro organisms that are pathogenic to humans. Fecal coliform bacteria have a strong correlation with fecal contamination of water from warm-blood animals. If 1 fecal coliform per 100 ml of water is detected, the water is considered unsafe to ingest (USEPA, 1998). Since the counts are higher than USEPA standards the Kengeri lake water is unsafe for human and domestic usage. Further agricultural operations need to be aware of the potential for the spread of disease-causing micro organisms to farm workers while handling such water. Disease associated with enteric bacteria range from bacteria that cause mild to life threatening gastroenteritis, hepatitis, skin infection, wound infections, conjunctivitis, respiratory infections, and generalized infections (Moe, 1997).

Moreover, human activities in the catchments area usually cause some intensification of the transport of nutrients, thus aggravating the processes of degradation. In addition storm water and other sources without a human component can contribute heavy loads of indicator bacteria to surface water (Haack et al., 2003). From the observations made in the present study, it is also evident that interferences in the catchment area by direct or indirect activities of human and cattle influences the water quality of the studied lake.

VII. Conclusion

From the data obtained in this study on health risk indicators and pathogen densities of Kengeri lake it is concluded that due to increasing load of bacterial counts the lake grouped under the polluted and this water is neither fit for domestic nor agricultural purposes.

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Authors

First Author – Latha,N, M S c,Ph D,Bangalore University, lathanarayan201@gmail.com

Second Author – Prof.M.Ramachandra Mohan .Dept of Zoology,Bangalore University,mohanramachandr@gmail.com

Correspondence Author – Latha,N, M S c,Ph D,Bangalore University, lathanarayan201@gmail.com
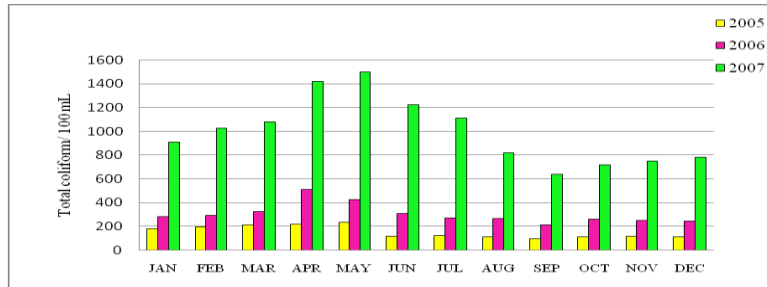
Fig.1: Monthly variation of Total Coliform in Kengeri Lake during Jan 2005 to Dec 2007
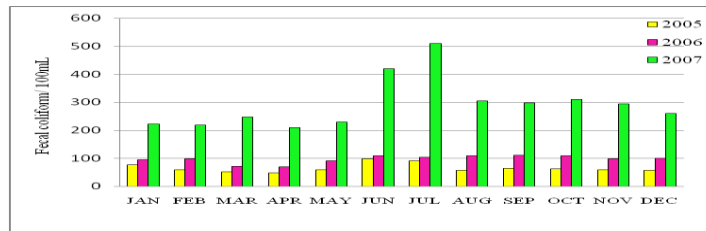
Fig.2: Monthly variation of Fecal Coliform in Kengeri Lake during Jan 2005 to Dec 2007

An Insight Investigation of Dengue Fever Outbreak in Pondicherry

Dr G Gnanamani[*], Dr K N Prasad[**], Dr Basavaraj M Ingalgeri[***], Dr P S Vinoth kumar[****]

[*] Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India
[**] Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India
[***] Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India
[****] Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Abstract- **Background:** Dengue fever is one of the major health problem and leads to death in few cases. It is an emerging disease of tropical and sub-tropical regions, affecting urban and semi urban areas. Eight cases of dengue fever were reported to our hospital from semi urban area of Pondicherry, so an insight investigation was carried out.**Aims & objectives:** To find out the numbers and details of people affected by fever during the outbreak periodand to find the environmental factors**. Methodology:** Community based, cross sectional, direct interviewing of community using pretested questionnaire in Kudapakkam and Agaram villages in Pondicherry in the first week of November 2012. History of fever and other details since last 3 months was collected at the time of interviewing. **Results:** In this study 192 number of fever cases were found in 2721 population in 632 number of houses. There were 8 confirmed cases of dengue fever, no deaths or serious complications were reported during this outbreak.Sixty five percent of fever cases were in the age group 1-30 years and the median duration of fever was 3 days (1-20 days). Daily wagers were affected more than other occupations. At least one fever case was present in 111 houses. Breeding places for mosquitoes were observed surrounding the houses of fever cases.**Conclusion:** The prevalence of fever during the period of investigation was 70 per 1000 population. There was no serious complicated dengue fever or death.

Index Terms- Community based, Dengue, Fever, Outbreak, Prevalence,

I. INTRODUCTION

In recent times Dengue fever is getting attention in medical and social fields in developing countries especially in South East Asia. An estimated 50 million Dengue infection occurs annually and nearly 2.5 billion people living in Dengue endemic countries[1]. According to WHO, nearly 75% of global burden of dengue fever are in south east regions and western pacific region[1,2].Dengue fever inflicts significant health, economic and social burden on the population in these countries. Dengue fever epidemics or outbreaks are reported either cyclical or periodical manner in most of the states in India. Even though the nature of clinical manifestations of Dengue fever varies from fever, shock, hemorrhage and death as case fatality rate of 10-15%, the exact nature of this disease is not well known[2]. Among the strongly suspected Dengue fever cases, it was found to be serologically positive for Dengue viral antigens in 40% of inpatients[3]. Dengue fever outbreaks may happen two or more times in the same geographical area in the same year. This emerging disease in India extending from urban area to semi urban and rural areas. The occurrence of fever while Dengue fever outbreak will create panic among patients and the family members because of uncertain course of clinical manifestation of Dengue fever. The possibility of viral infections other than Dengue fever is higher in number during outbreaks and the number of such studies and details availability are few in number. This study was conducted with an objective to find out the number of fever cases during the outbreak period and presence of favorable environmental factors.

II. METHODOLOGY

This is a community based, cross sectional, investigative study by using pretested questionnaire done in Kudapakkam and Agaram village of Pondicherry during the period between August and October 2012. Four cases confirmed Dengue Fever in first week of August and another 4 cases in the month of September 2012 were reported in the tertiary care hospital of Sri Lakshmi Narayana Institute of Medical Science, Pondicherry. These cases were traced to two villages as mentioned above and the details about the episode of fever in this population since August to October 2012 was planned to collect in the first week of November 2012. House to house survey was done in 632 houses comprising of 2721 population by directly interviewing cases, care taker, parents or guardian. Data regarding the age, sex, education, occupation, economic status, history of fever, laboratory investigations, hospitalization, verification of available reports on diagnosis and treatment, mosquitoes breeding places etc. were collected on the pretested questionnaire from each patient. Simultaneously health education about disposal of materials having the sources for vector of Dengue Fever is given to the community. The spot map was prepared to localize the fever cases and environmental factors regarding mosquitoes breeding places.

III.   RESULTS AND DISCUSSIONS

There were 192 fever cases in 2721 population during the period August 2012 to October 2012. There were 8 confirmed cases of dengue fever, 3 typhoid cases, 10 ARI cases and 4 UTI cases. The prevalence of fever was 70 per 1000 population during this 3 months period.

Table 1: *Description of fever cases according to age and sex*

Age group in years	Population in number	H/o Fever present N (%)	Male		Female	
			Total	Fever cases N (%)	Total	Fever cases N (%)
1-15	699	75 (10.7)	355	33 (9.3)	344	42 (12.2)
16-30	852	51 (6)	385	16 (4.2)	467	35 (7.5)
31-45	623	42 (6.7)	330	23 (7)	293	19 (6.5)
46-60	377	17 (4.5)	181	04 (2.2)	196	13 (6.6)
≥61	170	07 (4.2)	87	02 (2.4)	83	05 (6.1)
Total	2721	192 (7)	1338	78 (5.8)	1383	114 (8.2)

Table 1 shows majority of fever cases were in the age group of less than 46 years accounting for 87.5% (168 cases out of 192 cases). There were 114 cases of fever among female population and the prevalence of fever was 12.2% in the age group of less than 16 years. Fever cases in the age group of economically productive life were observed to be 110(5.9%). It is a common observation that people aged less than 30 years are affected elsewhere[4,6]

Table 2: *Distribution of number of fever cases according to occupation*

Occupation	Population in number	H/o Fever present N (%)	Male		Female	
			Total	Fever cases N (%)	Total	Fever cases N (%)
Daily wages	595	41 (6.9)	450	26 (5.8)	145	15 (10.3)
Salary	277	08 (2.9)	242	06 (2.5)	35	02 (5.7)
Business	55	00 (0)	50	00 (0)	05	00 (0)
Dependents	1794	143 (8)	596	46 (7.7)	1198	97 (8.1)
Total	2721	192 (7)	1338	78 (5.8)	1383	114 (8.2)

*Dependents include Home makers, Students, Old age & others.

Table 2 shows nearly 25% of the cases were daily wagers and 10% was the prevalence of fever among females in this study, 48% of the female dependents were children below 16 years and 40% were house wives. Among the dependents, 5.3% and 7.3% of home makers and students were having history of fever respectively. Twenty percent of fever cases were observed in children less than 6 years.

Table 3: *Distribution of number of fever cases according to family size*

Family size in number	Population in number	Number of houses	H/o Fever present	Number of cases per house				
				1	2	3	4	5
≤ 3	407	161	30	21	3	1	0	0
4	872	218	70	40	12	2	0	0
5	720	144	42	29	5	1	0	0
6	432	72	34	13	5	2	0	1
≥ 7	290	37	16	8	2	0	1	0
Total	2721	632	192					

Table 3 shows, Out of 632 houses, 111(17%) houses had at least 1 fever case per house. Two fever cases per houses in 27 houses and 3 cases per house in 6 houses. The median duration of the fever cases in this study was 3 days (range 1-20 days).

Discarded tyre, coconut shells, flower vases, uncovered barrels and buckets, and house hold water storage vessels were containing mosquito larvae in and around the patient houses in these two villages. Similarly it is a common source in other places[5,6].

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AUTHORS

First Author – Dr G Gnanamani, Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Second Author – Dr K N Prasad, Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Third Author – Dr Basavaraj M Ingalgeri, Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Fourth Author –Dr P S Vinoth kumar Postgraduate Student, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Kudapakkam, Pondicherry 605 502, India

Content Based Image Retrieval in Biomedical Images Using SVM Classification with Relevance Feedback

Sukhada Aloni

Abstract- Content-based image retrieval (CBIR) framework for diverse collection of medical images of different imaging modalities, anatomic regions with different orientations and biological systems is proposed. Organization of images in such a database (DB) is well defined with predefined semantic categories; hence, it can be useful for category-specific searching. The proposed framework consists of machine learning methods for image pre-filtering, similarity matching using statistical distance measures, and a relevance feedback (RF) scheme.

In this framework, the probabilistic outputs of a multiclass support vector machine (SVM) classifier as category prediction of query and database images are exploited at first to filter out irrelevant images, thereby reducing the search space for similarity matching. Images are classified at a global level according to their modalities based on different low-level, concept, and key point-based features. It is difficult to find a unique feature to compare images effectively for all types of queries. Hence, a query-specific adaptive linear combination of similarity matching approach is proposed by relying on the image classification and feedback information from users. These images constitute an important source of anatomical and functional information for the diagnosis of diseases, medical research, and education. Effectively and efficiently searching in these large image collections poses significant technical challenges as the characteristics of the biomedical images differ significantly from other general purpose images.

Index Terms- Content Based Image Retrieval (CBIR), Medical Images, Support Vector Machine (SVM), Relevance Feedback (RF)

I. INTRODUCTION

Technique based on image or visual contents usually referred as features for the purpose of searching images with respect to request and interest of user from large image databases. In this paper content based image retrieval method is used as diagnosis aid in medical fields with the advent of imaging, clinical care could be significantly impacted with improved image handling. In recent years, rapid advances of software and hardware technology have made easy, the problem of maintaining large medical image collections Visual features as color, and shape and texture are implemented for retrieval of images. Traditional methods of image indexing have been proven neither suitable nor efficient in terms of space and time so it triggered the development of the new technique. It is a 2 step process where image features are extracted in first step to a distinguishable extent. In second step matching of features which are visually similar is done. The two retrieval systems namely, content and text based retrieval systems differ in the sense that the indispensable part of latter system is human interaction. High level features as keywords, text description uses by humans to measure similarity and image interpretation. Image retrieval system is an effective and efficient tool for managing large image databases. A content based image retrieval system allows the user to present a query image in order to retrieve images stored in the database according to their similarity to the query image [8][13].

Content based image retrieval (CBIR), also known as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision techniques to the image retrieval problem, that is, the problem of searching for digital images in large databases. Content based image retrieval is opposed to concept based approached. "Content-based" means that the search will analyze the actual contents of the image rather than the metadata such as keywords, tags, and/or descriptions associated with the image. The term 'content' in this context might refer to colors, shapes, textures, or any other information that can be derived from the image itself. Thus a system that can filter images based on their content would provide better indexing and return more accurate results.

The term Content-Based Image Retrieval (CBIR) seems to have originated in 1992, when it was used by T. Kato to describe experiments into automatic retrieval of images from a database, based on the colors and shapes present. Since then, the term has been used to describe the process of retrieving desired images from a large collection on the basis of syntactical image features.

Feature (content) extraction is the basis of content-based image retrieval. In a broad sense, features may include both text-based features (key words, annotations) and visual features (color, texture, shape, faces). However, since there already exists rich literature on text-based feature extraction in the data base management system and information retrieval research communities, we will confine ourselves to the techniques of visual feature extraction. Within the visual feature scope, the features can be further classified as general features and domain specific features [1][14].

Content-based image retrieval (CBIR) is the application of computer vision to the image retrieval problem, i.e., the problem of searching for digital images in large databases. "Content-based" means that the search makes use of the contents of the images themselves, rather than relying on textual annotation or human-input metadata. The visual features used for indexing and retrieval are classified in into three classes: primitive features that are low-level features such as color, shape and texture; logical features that are medium-level features describing the image by a collection of objects and their spatial relationships; and abstract feature that are semantic and contextual features.

The obvious loss of information from image data to a representation by abstract features is called the semantic gap and constitutes nowadays a major research topic in this field. In order to close this semantic gap to improve retrieval performances, specialized retrieval systems have been proposed in literature[2]. Indeed, the more specialized the application is for a limited domain, the smaller the gap can be made using domain knowledge. Nonetheless, the concepts for medical image retrieval are limited to a particular modality, organ, or diagnostic study and, hence, usually not directly transferable to other medical applications.

II.   PROPOSED METHOD

The objective of this paper is to develop and implement high-level methods for CBMIR with applications in medical-diagnosis tasks on radiological image archive. Based on a general structure for semantic image analysis that results in 6 layers of information modeling, Image Retrieval in Medical Applications (IRMA) is implemented with distributed system architecture suitable for large databases. And the main objective is to design a framework for classification driven biomedical image retrieval framework based on image filtering and similarity fusion by employing supervised learning technique. In our proposed method we have presented to evaluate the effectiveness of the proposed retrieval approach, exhaustive experiments were performed in a medical image collection. The collection comprises of 5 000 biomedical images of 30 manually assigned disjoint global categories, which is a subset of a larger collection of six different datasets used for retrieval evaluation campaign in Image CLEF 1 under the medical image retrieval track in 2007[4] [18]. In this collection, images are classified into three hierarchical levels. In the first level, images are categorized according to the imaging modalities (e.g., X-ray, CT, MRI, etc.). Next level is the image body part, and the final level is the orientation. The categories are selected based on analyzing the visual and some mixed-mode query topics during these three years (2005, 2006, and 2007) of Image CLEF campaign under the medical retrieval task. Around 80% of the images are gray level (e.g., X-ray, CT, and MRI) and 20% are color images (e.g., microscopic pathology, histology, dermatology) with varying resolutions[10].
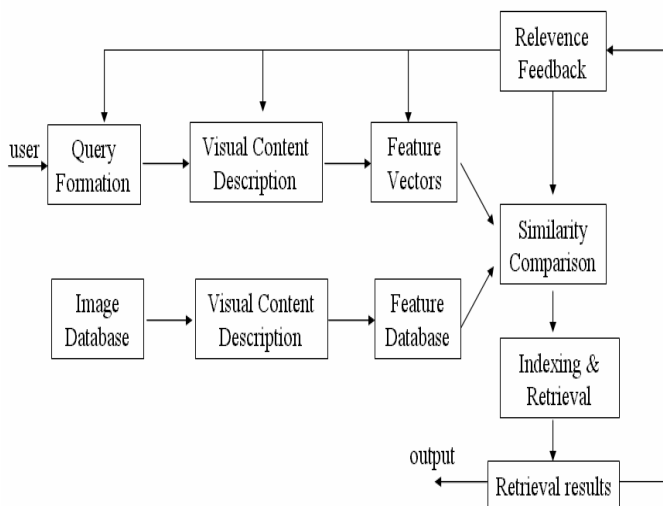
Fig 1: Content-Based Image Retrieval System.

A. Data Set

For the implementation of Content-Based Biomedical Image Retrieval Using SVM Classification and Relevance Feedback system a data set collected from different source for various class of Medical image is considered. Figure shows the database considered for the implementation. The collected Medical images are human body (or parts and function thereof) for clinical purposes (medical procedures seeking to reveal, diagnose or examine disease) or medical science (including the study of normal anatomy and physiology). Although imaging of removed organs and tissues can be performed for medical reasons, such procedures are not usually referred to as medical imaging, but rather are a part of pathology and passed for implementation.
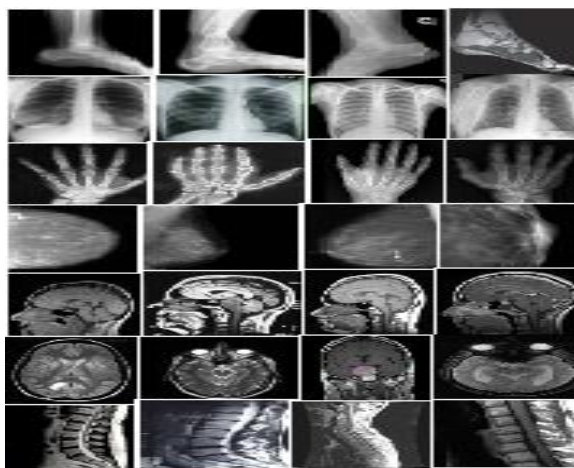
Fig.2: A Typical Example of the Used Bio Medical Images.

B. Content-Based Image Retrieval

In early days because of very large image collections the manual annotation approach was more difficult. In order to overcome these difficulties Content Based Image Retrieval (CBIR) was introduced. Content-based image retrieval (CBIR) is the application of computer vision to the image retrieval problem. In this approach instead of being manually annotated by textual keywords, images would be indexed using their own visual contents .The visual contents may be color, texture and shape. This approach is said to be a general framework of image retrieval [3][16].There are three fundamental bases for Content Based Image Retrieval which are visual feature extraction, multidimensional indexing and retrieval system design. The color aspect can be achieved by the techniques like averaging and histograms. The texture aspect can be achieved by using transforms or vector quantization .The shape aspect can be achieved by using gradient operators or morphological operators. Some of the major areas of application are Art collections, Medical diagnosis, Crime prevention, Military, Intellectual property, Architectural and engineering design and Geographical information and Remote sensing systems [1] [5].

Retrieval Based on Color: Several methods for retrieving images on the basis of color similarity are being used. Each image added to the database is analyzed and a color histogram is computed which shows the proportion of pixels of each color within the image. Then this color histogram for each image is stored in the database. During the search time, the user can either specify the desired proportion of each color (for example, 75% olive green and 25% red), or submit a reference image from which a color histogram is calculated. The matching process then retrieves those images whose color histograms match those of the query most closely [17].

Retrieval Based on Structure: The ability to match on texture similarity can often be useful in distinguishing between areas of images with similar color. A variety of techniques has been used for Measuring texture similarity in which the best established rely on comparing values of what are known as second order statistics calculated from query and stored images. Essentially, these calculate the relative brightness of selected pairs of pixels from each image. From these it is possible to calculate measures of image texture such as the degree of contrast, coarseness, directionality and regularity, or periodicity, directionality and randomness. Alternative methods of texture analysis for retrieval include the use of Gabor filters and fractals. Texture queries can be formulated in a similar manner to color queries, by selecting examples of desired textures from a palette, or by supplying an example query image[17]. A recent extension of the technique is the texture thesaurus, which retrieves textured regions in images on the basis of similarity to automatically-derived code words representing important classes of texture within the collection.

Retrieval Based on Shape: The ability to retrieve by shape is perhaps the most obvious requirement at the primitive level. Unlike texture, shape is a fairly well-defined concept and there is considerable evidence that natural objects are primarily recognized by their shape. A number of features characteristic of object shape (but independent of size or orientation) are computed for every object identified within each stored image. Queries are then answered by computing the same set of features for the query image, and retrieving those stored images whose features most closely match those of the query. Two main types of shape feature are commonly used global features such as aspect ratio, circularity and moment invariants and local features such as sets of consecutive boundary segments. Alternative methods proposed for shape matching have included elastic deformation of templates, comparison of directional histograms of edges extracted from the image, and shocks, skeletal representations of object shape that can be compared using graph matching techniques. Queries to shape retrieval systems are formulated either by identifying an example image to act as the query, or as a user-drawn sketch.

Retrieval Based on Other Features: One of the oldest-established means of accessing pictorial data is retrieval by its position within an image. Accessing data by spatial location is an essential aspect of geographical information systems, and efficient methods to achieve this have been around for many years. Similar techniques have been applied to image collections, allowing users to search for images containing objects in defined spatial relationships with each other. Improved algorithms for spatial retrieval are still being proposed. Spatial indexing is seldom useful on its own, though it has proved to be effective in combination with other factors such as color and shape. Several other types of image feature have been proposed as a basis for CBIR. Most of these rely on complex transformations of pixel intensities which have no obvious counterpart in any human description of an image. Most such techniques aim to extract features which reflect some aspect of image similarity which a human subject can perceive, even if he or she finds it difficult to describe. The well-researched technique of this kind uses the wavelet transform to model an image at several different resolutions. Promising retrieval results have been reported by matching wavelet features computed from query and stored images. Another method giving interesting results is retrieval by appearance. The advantage of all these techniques is that they can describe an image at varying levels of detail (useful in natural scenes where the objects of interest may appear in a variety of guises), and avoid the need to segment the image into regions of interest before shape descriptors can be computed. Despite recent advances in techniques for image segmentation, this remains a troublesome problem.

C. Relevance Feedback (RF):

Relevance feedback is a significantly important algorithm which attempts to reduce the gap between the two levels of features, namely high and low. [7].
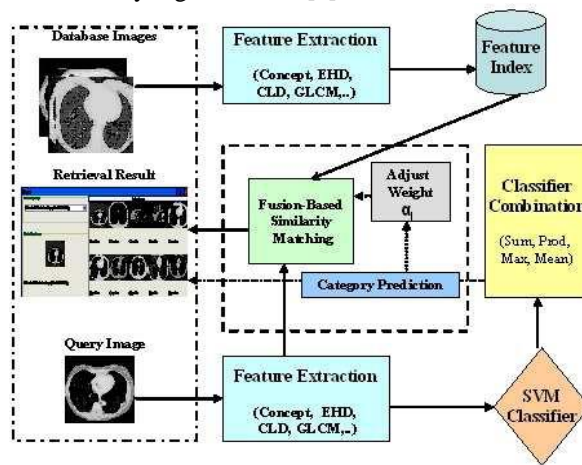
Fig 3: Block diagram of the classification-driven similarity fusion framework.

Relevance feedback was originally developed for improving the effectiveness of information retrieval systems. The main idea of relevance feedback is for the retrieval system to understand the user's information needs[15]. For a given query, the retrieval system returns initial results based on pre-defined similarity metrics. Then, the user is required to identify the positive examples by labeling those that are relevant to the query. The system subsequently analyzes the user's feedback using a learning algorithm and returns refined results. A typical relevance feedback mechanism contains a learning component and a dispensing component. The learning component uses the feedback data to estimate the target of the user. The approach taken to learn feedback data is key to the relevance feedback mechanism. In addition to the visual concept feature, we extract the global features. First one is ,

Color Feature: To represent the spatial structure of images, we utilize the Color Layout Descriptor (CLD) of MPEG- 7 [19]. The CLD represents the spatial layout of the images in a very compact form. It is obtained by applying the discrete cosine transformation (DCT) on the 2-D array of local representative colors in the YCbCr color space where Y is the luma component and Cb and Cr are the blue and red chroma components. Each channel is represented by 8 bits and each of the 3 channels is averaged separately for the 8×8 image blocks. In this work, a CLD with only 10 Y, 3 Cb, and 3 Cr, is extracted to form a 16-dimensional feature vector. Second One is Edge Feature: To represent the global shape/edge feature, the spatial distribution of edges are utilized by the Edge Histogram Descriptor (EHD) [9]. The EHD represents local edge distribution in an image by dividing the image into 4×4 sub-images and generating a histogram from the edges present in each of these sub-images. Third one is Texture Feature: We extract texture features from the grey level co-occurrence matrix (GLCM) of each image. In order to obtain efficient descriptors, the information contained in GLCM is traditionally condensed in a few statistical features[15]. Four GLCM's for four different orientations (horizontal 0∘,vertical 90∘, and two diagonals 45∘ and 135∘) are obtained and normalized to the entries [0,1] by dividing each entry by total number of pixels. Higher order features, such as energy, entropy, contrast, homogeneity and maximum probability are measured based on averaging features in GLCMs to form a 20-dimensional feature vector for an entire image Finally, two more features are extracted as Color Edge Direction Descriptor (CEDD) and Fuzzy Color Texture Histogram (FCTH) from the Lucene image retrieval (LIRE) library CEDD incorporates color and texture information into one single histogram and it requires low computational power in extracting comparing to MPEG7 descriptors. To extract texture information, CEDD uses a fuzzy version of the five digital filters proposed by the MPEG-7 EHD, forming 6 texture areas. This descriptor is appropriate for accurately retrieving images even in distortion cases such as deformation, noise and smoothing. In contrast, FCTH uses the high frequency bands of the Haar wavelet Transform in a fuzzy system, to form 8 texture areas [1][9].

Support Vector Machine (SVM) is a useful learning approach in relevance feedback. The dispensing component should provide the most appropriate images after obtaining feedback from the user. However, the dispensing component has two conflicting goals during each feedback round. On the one hand, the dispensing component has to provide as many relevant images as possible. On the other hand, the dispensing component, based on the information needs of the user, has to investigate the images of unknown relevance to the target. As the dispensing component returns more relevant images to the user, it has fewer images to mine the needs of the user at each round, and vice versa. A sensible strategy also plays an important role in relevance feedback. Hence, approaches to learning user feedbacks and dispensing strategies for returning the results both determine the performance of relevance feedback mechanisms.[14],

Relevance feedback is a feature of some information retrieval systems. The idea behind relevance feedback is to take the results that are initially returned from a given query and to use information about whether or not those results are relevant to perform a new query. We can usefully distinguish between three types of feedback: explicit feedback, implicit feedback, and blind or "pseudo" feedback.

D. Support vector machine:

A support vector machine (SVM) is a concept in statistics and computer science for a set of related supervised learning methods that analyze data and recognize patterns, used for classification and regression analysis. The standard SVM takes a set of input data and predicts, for each given input, which of two possible classes forms the input, making the SVM a non-probabilistic binary linear classifier. Given a set of training examples, each marked as belonging to one of two categories, an SVM training algorithm builds a model that assigns new examples into one category or the other. An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall on[11][12].

E. Image Content Descriptors:

Generally speaking, image content may include both visual and semantic content. Visual content can be very general or domain specific. General visual content include color, texture, shape, spatial relationship, etc. Domain specific visual content, like human faces, is application dependent and may involve domain knowledge. Semantic content is obtained either by textual annotation or by complex inference procedures based on visual content. This chapter concentrates on general visual contents descriptions. Later chapters discuss domain specific and semantic contents. A good visual content descriptor should be invariant to the accidental variance introduced by the imaging process (e.g., the variation of the illuminant of the scene)[6].

However, there is a trade-off between the invariance and the discriminative power of visual features, since a very wide class of invariance loses the ability to discriminate between essential differences. Invariant description has been largely investigated in computer vision (like object recognition), but is relatively new in image retrieval. A visual content descriptor can be either global or local. A global descriptor uses the visual features of the whole image, whereas a local descriptor uses the visual features of regions or objects to describe the image content. To obtain the local visual descriptors, an image is often divided into parts first. The simplest way of dividing an image is to use a partition, which cuts the image into tiles of equal size and shape. A simple partition does not generate perceptually meaningful regions but is a way of representing the global features of the image at a finer resolution. A better method is to divide the image into homogenous regions according to some criterion using region segmentation algorithms that have been extensively investigated in computer vision. A more complex way of dividing an image, is to undertake a complete object segmentation to obtain semantically meaningful objects (like ball, car, horse). Currently, automatic object segmentation for broad domains of general images is unlikely to succeed. In this section, we will introduce some widely used techniques for extracting color, texture, shape and spatial relationship from images[7].

Color: Color is the most extensively used visual content for image retrieval. Its three-dimensional values make its

discrimination potentiality superior to the single dimensional gray values of images. Before selecting an appropriate color description, color space must be determined first.

Color Space: Each pixel of the image can be represented as a point in a 3D color space. Commonly used color space for image retrieval include RGB, Munsell, CIE L*a*b*, CIE L*u*v*, HSV (or HSL, HSB), and opponent color space. There is no agreement on which is the best. However, one of the desirable characteristics of an appropriate color space for image retrieval is its uniformity

Color Moments: Color moments have been successfully used in many retrieval systems (like QBIC), especially when the image contains just the object. The first order (mean), the second (variance) and the third order (skewness) color moments have been proved to be efficient and effective in representing color distributions of images. Mathematically, the first three moments are

$$\mu_1 = \frac{1}{N} \sum_{J=1}^{N} fij \qquad (1)$$

$$\sigma_i = \left(\frac{1}{N} \sum_{j=1}^{N} (fij - \mu_i)^2 \right)^{\frac{1}{3}} \qquad (2)$$

$$S_i = \left(\frac{1}{N} \sum_{J=1}^{N} (f_{ij} - \mu_i)^3 \right)^{\frac{1}{3}} \qquad (3)$$

where fij is the value of the i-th color component of the image pixel j, and N is the number of pixels in the image. Usually the color moment performs better if it is defined by both the L*u*v* and L*a*b* color spaces as opposed to solely by the HSV space Using the additional third-order moment improves the overall retrieval performance compared to using only the first and second order moments. However, this third-order moment sometimes makes the feature representation more sensitive to scene changes and thus may decrease the performance. Since only 9 (three moments for each of the three color components) numbers are used to represent the color content of each image, color moments are a very compact representation compared to other color features. Due to this compactness, it may also lower the discrimination power. Usually, color moments can be used as the first pass to narrow down the search space before other sophisticated color features are used for retrieval.

Color Histogram: The color histogram serves as an effective representation of the color content of an image if the color pattern is unique compared with the rest of the data set. The color histogram is easy to compute and effective in characterizing both the global and local distribution of colors in an image. In addition, it is robust to translation and rotation about the view axis and changes only slowly with the scale, occlusion and viewing angle. Since any pixel in the image can be described by three components in a certain color space (for instance, red, green, and blue components in RGB space, or hue, saturation, and value in HSV space), a histogram, i.e., the distribution of the number of pixels for each quantized bin, can be defined for each component.

Color Coherence Vector: In previous work a different way of incorporating spatial information into the color histogram, color coherence vectors (CCV), was proposed. Each histogram bin is partitioned into two types, i.e., coherent, if it belongs to a large uniformly-colored region, or incoherent, if it does not. Let αi denote the number of coherent pixels in the ith color bin and βi denote the number of incoherent pixels in an image. Then, the CCV of the image is defined as the vector <(α1, β1), (α2, β2), …, (αN, βN)>. Note that <α1+β1, α2+β2, …, αN+βN> is the color histogram of the image. Due to its additional spatial information, it has been shown that CCV provides better retrieval results than the color histogram, especially for those images which have either mostly uniform color or mostly texture regions.

Color Correlogram: The color correlogram was proposed to characterize not only the color distributions of pixels, but also the spatial correlation of pairs of colors. The first and the second dimension of the three-dimensional histogram are the colors of any pixel pair and the third dimension is their spatial distance.

Shape: Shape features of objects or regions have been used in many content-based image retrieval systems. Compared with color and texture features, shape features are usually described after images have been segmented into regions or objects. Since robust and accurate image segmentation is difficult to achieve, the use of shape features for image retrieval has been limited to special applications where objects or regions are readily available. The state-of-art methods for shape description can be categorized into either boundary-based (rectilinear shapes, polygonal approximation, finite element models, and Fourier-based shape descriptors or region-based methods (statistical moments). A good shape representation feature for an object should be invariant to translation, rotation and scaling. In this section, we briefly describe some of these shape features that have been commonly used in image retrieval applications. For a concise comprehensive introductory overview of the shape matching techniques [18].

III. RESULTS
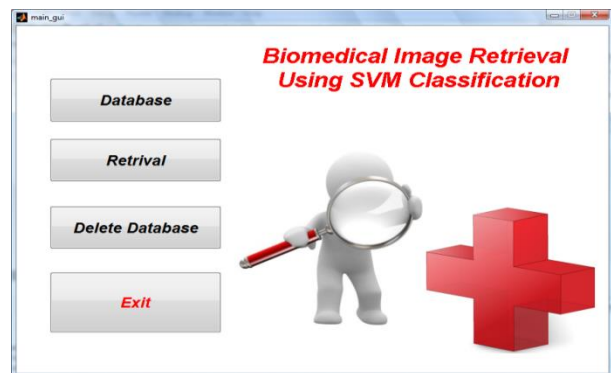
Fig 4: Initial GUI.
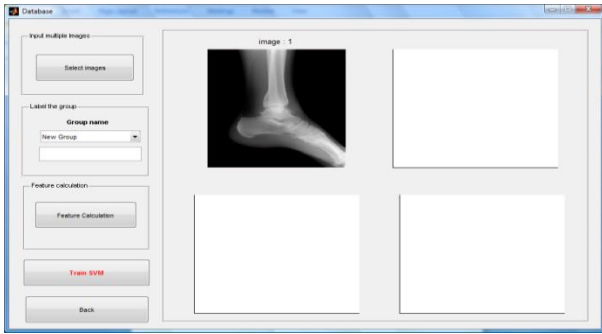
Fig 5: After Clicking Data Base.
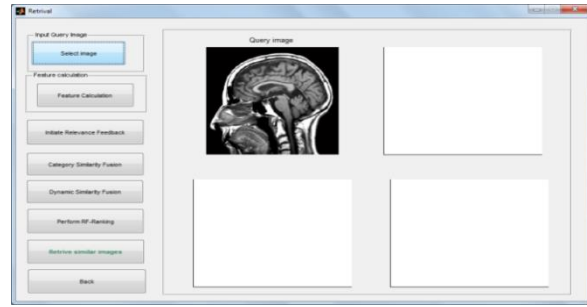
Fig.9: Input Image

Fig 6: Creation of Group
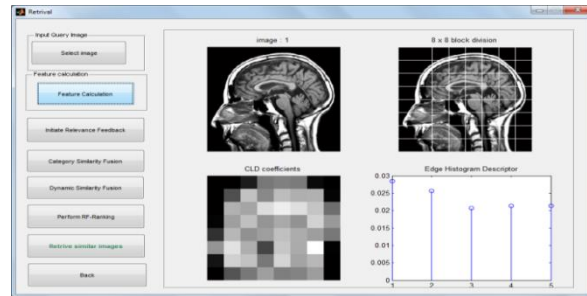
Fig.10: Estimation of Feature parameters
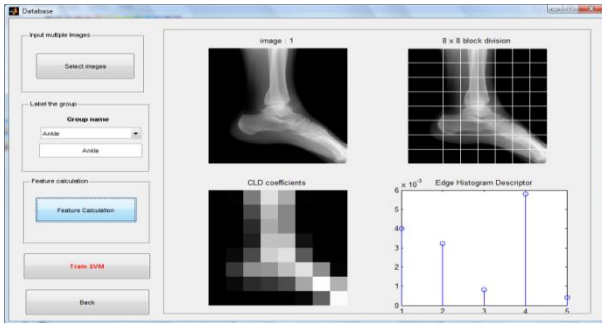
Fig 7: Feature Calculation
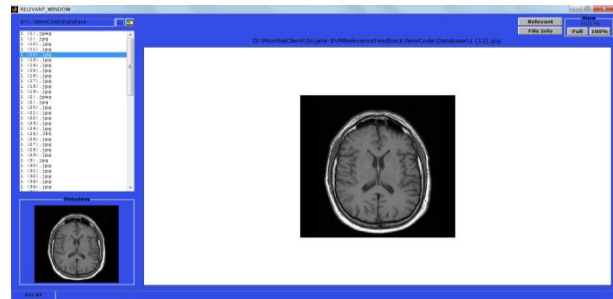
Fig.11: Relevant Selection Window for sample image-1
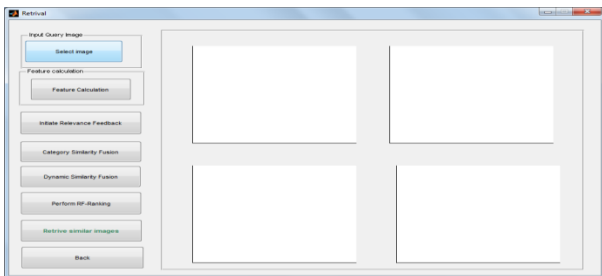
Fig 8: Retrieval window
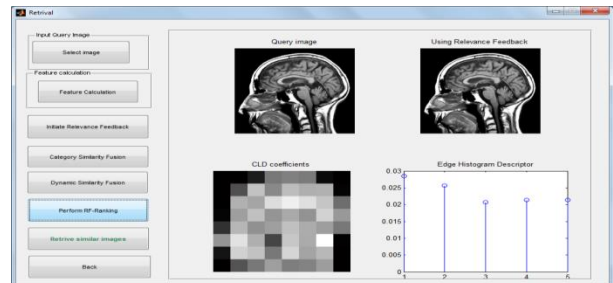
Fig. 14: Performing Final Similarity Match
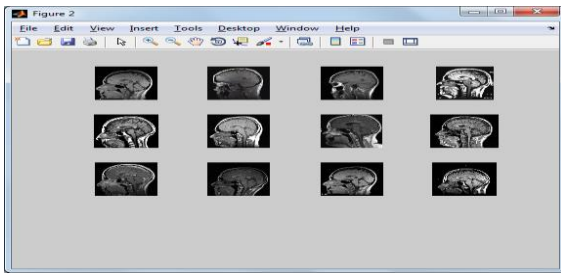
Fig.15: Final Output

IV. CONCLUSION

The goal of medical image databases is to provide an effective means for Organizing, searching, and indexing large collections of medical images. In this paper, a novel learning-based and classification-driven image retrieval framework is proposed for diverse medical image collections of different modalities. In our approach, we directly link classification to retrieval. In this framework, the image category information is utilized directly to filter out irrelevant images and adjust the feature weights in a linear combination of similarity matching. We use the RF-based technique to update the feature weights based on positive user feedback. Retrieval performance is promising and clearly shows the advantage of searching images based on similarity fusion and filtering in terms of effectiveness and efficiency. Overall, this retrieval framework is useful as a front end for large medical databases where a search can be performed in diverse images for teaching, training and research purposes.

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AUTHORS

First Author – Sukhada Aloni, B. Tech IT (ME Appeared), sukhada.aloni@gmail.com

Correspondence Author – Sukhada Aloni,, sukhada.aloni@gmail.com, +91 9920207720.

Double Diffusive Heat and Mass Transfer over a Vertical Plate in the Presence of Wall Suction and Chemical Reaction

Mangwiro Magodora[1], Kisswell Basira[2] , Precious Sibanda[3]

[1, 2] Department of Mathematics & Physics, Bindura University, P. Bag 1020, Bindura, Zimbabwe
[3] School of Mathematical Sciences, University of KwaZulu-Natal, P. Bag X01, Pietermaritzburg, Scottsville 3209, South Africa

Abstract- A steady incompressible boundary layer flow over a permeable vertical plate in the presence of a chemical reaction and wall suction is investigated. The governing fluid flow equations are transformed into a set of coupled ordinary differential equations with the help of similarity transformations and solved using asymptotic approximations in the presence of large buoyancy to obtain closed form solutions of the skin friction, Nusselt and Sherwood numbers. The effects of varying the buoyancy parameter on the velocity, concentration, temperature, skin friction and the rates of heat and mass transfer are determined and presented graphically, using MATLAB. Results indicate that an increase in buoyancy is accompanied by an increase in fluid velocity and a decrease in the fluid temperature and fluid concentration. Results also show that an increase in buoyancy is accompanied by an increase in skin friction, while the rates of heat and mass transfer fall rapidly from very large values close to the wall down to a minimum value and then start to increase as the buoyancy parameter becomes larger. It is also noticed that the increase of the rate of heat transfer is more pronounced than the rate of mass transfer as the buoyancy parameter is increased.

Index Terms- Double Diffusive Convection, Mixed Convection, Boundary Layer, Buoyancy, Wall Suction, Skin Friction.

Nomenclature

a	constant	Tw	temperature at the plate surface free stream temperature
C	concentration of chemical species	T∞	
Cw	concentration at the plate surface	u	velocity component along x-direction
C∞	free stream concentration	U∞	free stream velocity
D	diffusion coefficient	v	velocity component along y-direction
fw	transpiration rate	V0 (x)	wall suction
g	acceleration due to gravity	x	coordinate directed upward along the plate
Grx,c	Grashof number due to concentration	y	coordinate directed normal to the plate
Grx,t	Grashof number due to concentration	α	thermal diffusivity
kr	chemical reaction rate constant	βc	volumetric-expansion coefficient due to concentration
N	buoyancy ratio	βt	volumetric-expansion coefficient due to temperature
P r	Prandtl number	δ	boundary layer thickness
Rex	Reynolds number	ξ	dimensionless buoyancy parameter
Sc	Schimdt number	γ_ν	dynamic viscosity
T	fluid temperature	ψ	stream function

I. Introduction

The phenomenon of heat and mass transfer, also referred to as double diffusive convection, has attracted extensive research interest due to its many applications in science, engineering and technology. Heat and mass transfer involve buoyancy driven flows induced by a combination of temperature and concentration gradients. Many transport processes occur in nature and industrial applications in which combined heat and mass transfer takes place simultaneously due to combined effects of thermal diffusion and diffusion of chemical species. The phenomenon of heat and mass transfer is encountered in chemical process industries such as polymer production and food processing as well as in other fields such as oceanography, geology, biology, astrophysics. Heat and mass transfer processes are also observed in buoyancy induced motions in the atmosphere and in bodies of water. Atmospheric flows are driven appreciably by both temperature and concentration gradients while flows in bodies of water are driven by equally important effects of temperature, concentration of dissolved materials and concentration of suspended particulate matter.

The problem being investigated is a case of mixed convection, in which both free convection and forced convection are significantly present. Convective heat transfer is one of the

major modes of heat and mass transfer in fluids. Mixed convection flow finds application in several industrial and technological processes such as cooling of nuclear reactors, thermal pollution, dispersion of pollutants, cooling of electronic devices by electric fans and the use of heat exchange devices.

Several researchers have carried out studies on mixed convection boundary layer flow. Alam, Rahman and Samad [1] carried a numerical investigation of mixed convection boundary layer flow over a vertical plate in a porous medium with heat generation and thermal diffusion. Chamkha [6] carried out a study of the mixed convective flow of a Non-Newtonian power law fluid over a permeable wedge embedded in a porous media with variable wall temperature and concentration. They conducted a parametric study to illustrate the influence of the various physical parameters on temperature and concentration profiles as well as the local Nusselt and Sherwood numbers.

The effect of a chemical reaction on a moving vertical surface was investigated by Muthucurumaraswamy [20] while Muthucumaraswamy, Chandrakala and Raj [21] looked at effects of radiation on convective flow over a moving isothermal vertical plate in the presence of a chemical reaction.

Considerable research has been carried out to investigate the transfer of heat and mass in the last three decades. Makakula, Sibanda, Motsa and Shateyi [13] looked at new numerical techniques for the magnetohydrodynamic flow past a shrinking sheet with heat and mass transfer in the presence of a chemical reaction.

The phenomenon of combined heat and mass transfer was also studied by Hossain & Rees [11] when they considered natural convection flow over a vertical wavy surface. They used the implicit finite difference method with the Keller box approach to solve the transformed boundary layer equations. Other researches tackling mixed convection include those of

Bachok, Ishak and Pop [3], as well as that of Bachok and Ishak [4] and Gorla, Chamkha and Rashad [9].

Another notable contribution, which tackles similar problems, was made by Guria & Jana [10] when they studied the hydrodynamic effect on three-dimensional flow past a vertical porous plate. Approximate solutions were obtained by using perturbation techniques. They found out that fluid velocity increased with increase in Brandt number. They also observed that fluid velocity also increased with increase in suction parameter. They also found out that decreases with increase in either suction parameter or Prandtl number or frequency parameter.

More recent studies have seen contributions from eminent researchers who have also published widely in the area of boundary flow past a vertical plate. These researches include the work of Makinde and Sibanda [14], in which they investigated the effect of chemical reaction on the boundary layer flow past a vertical stretching surface in the presence of internal heat generation.

II. PROBLEM FORMULATION

The equations governing the heat and mass transfer over a vertical plate in the presence of wall suction and diffusion of chemical species emanate from the basic principles of mass conservation, momentum conservation, energy conservation and mass diffusion. We employ the Boussinesq and boundary layer approximations to obtain the following partial differential equations which, when taken together model the heat and mass transfer of the system under investigation:

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0 \quad , \tag{1}$$

$$u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} = \gamma\frac{\partial^2 u}{\partial y^2} + g\beta_t(T - T_\infty) + g\beta_c(C - C_\infty) \quad , \tag{2}$$

$$u\frac{\partial T}{\partial x} + v\frac{\partial T}{\partial y} = \alpha\frac{\partial^2 u}{\partial y^2} \quad , \tag{3}$$

$$u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} = D\frac{\partial^2 u}{\partial y^2} - k_r(C - C_\infty) \tag{4}$$

The boundary conditions for the system are:

$$u(x,0) = 0, \ v(x,0) = -V(x,0) \, , \ T(x,0) = T_w, \ T(x,\infty) = T_\infty \tag{5}$$

$$C(x,0) = C_w, \ C(x,\infty) = C_\infty \, , \ U(x,0) = U_\infty = ax \tag{6}$$

The governing equations (1) to (4) are transformed into dimensionless form by making use of the following similarity transformations:

$$\eta = \sqrt{\frac{a}{2\gamma}}\, y \quad , \quad \xi(x,y) = xf(\eta)\sqrt{2a\gamma} \quad , \quad \theta(x,y) = \frac{T - T_\infty}{T_w - T_\infty} \quad , \quad \phi(x,y) = \frac{C - C_\infty}{C_w - C_\infty} \quad , \quad \xi = \frac{Gr_{x,t}}{\mathrm{Re}_x^{\,2}} \tag{7}$$

$$Gr_{x,t} = \frac{g\beta_t x^3 (T_w - T_\infty)}{\gamma^2} \quad , \quad \mathrm{Pr} = \frac{\gamma}{\alpha} \quad Gr_{x,c} = \frac{g\beta_c x^3 (C_w - C_\infty)}{\gamma^2} \quad , \quad Sc = \frac{\gamma}{D} \quad , \quad N = \frac{Gr_{x,t}}{Gr_{x,c}} \,. \tag{8}$$

The model equations (1) to (4) reduce to the following set of three non-dimensional nonlinear ordinary differential equations (9) to (11) and their associated boundary conditions (12) to (13) as given below:

$$f''' + 2ff'' - 2(f')^2 + 2\eta(\theta + N\phi) = 0 \quad , \tag{9}$$

$$\phi'' + 2fSc\,\phi' - 2\lambda Sc\,\phi = 0 \quad , \tag{10}$$

$$\theta'' + 2f\,\mathrm{Pr}\,\theta' = 0 \quad , \tag{11}$$

$$f(\xi,0) = f_w \xi = \xi \quad , \quad f'(\xi,0) = 0 \quad , \quad f'(\xi,\infty) = 1 \quad , \tag{12}$$

$$\theta(\xi,0) = \phi(\xi,0) = 1 \quad , \tag{13}$$

where $f_w = \dfrac{V_0 x}{U_\infty \sqrt{2}}\dfrac{\sqrt{\mathrm{Re}_x}}{\xi}$.

The physical quantities of interest in the study are the skin friction coefficient C_f, the Nusselt number Nu_x and the Sherwood number Sh_x which are respectively defined as:

$$C_f = \frac{\tau_w}{(1/2)\rho U_\infty^{\,2}} \quad , \quad Nu_x = \frac{q_w x}{k_t (T_w - T_\infty)} \quad , \quad Sh_x = \frac{J_w x}{D(C_w - C_\infty)} \tag{14}$$

where ρ is the fluid density , k_t is the fluid thermal conductivity and τ_w, q_w and J_w are defined as

$$\tau_w = \mu \frac{\partial u}{\partial y}\bigg|_{y=0} \quad , \quad q_w = -k_t \frac{\partial T}{\partial y}\bigg|_{y=0} \quad J_w = -D\frac{\partial C}{\partial y}\bigg|_{y=0} \text{ and} \tag{15}$$
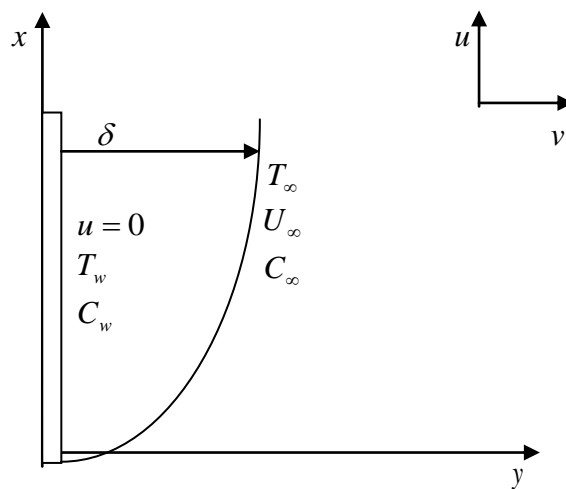
Figure 1: The coordinate system and flow configuration

III. PROBLEM SOLUTION

Asymptotic expansions in the limit where the buoyancy parameter ξ tends to infinity were used to find solutions of the governing equations (9) to (11). Analysis the orders of magnitude of the continuity and momentum equations and letting $u \sim \mathrm{O}\,(U_\infty)$ and $y \sim \mathrm{O}\,(\delta)$ yields $f \sim \dfrac{1}{\eta}$.

The boundary conditions (18) show that $f \sim \mathrm{O}\,(\xi)$ which in turn implies that $\eta \sim \xi^{-1}$. Assuming that both θ and ϕ remain O (1) as ξ becomes large, we define a function $Y \sim \mathrm{O}$ (1) and let

$$\eta = \xi^{-1} Y, \quad f(\eta,\xi) = \xi F(Y), \quad \theta(\eta,\xi) = G(Y), \quad \phi(\eta,\xi) = H(Y) \tag{16}$$

where
$$F(Y) = 1 + \xi^{-2} F_1(Y) + \xi^{-3} F_2(Y) + \dots \tag{17}$$

$$G(Y) = G_1(Y) + \xi^{-2} G_2(Y) + \xi^{-3} G_3(Y) + \dots \tag{18}$$

$$H(Y) = H_1(Y) + \xi^{-2} H_2(Y) + \xi^{-3} H_3(Y) + \dots \tag{19}$$

Now
$$f'(\eta,\xi) = \frac{df}{d\eta} = \xi^2 F'(Y), \quad f''(\eta,\xi) = \xi^3 F''(Y), \quad f'''(\eta,\xi) = \xi^4 F'''(Y). \tag{20}$$

Substituting for $F(Y),\ F'(Y),\ F''(Y)$ and $F'''(Y)$ in the equation $f(\eta,\xi) = \xi F(Y)$ and equations (20) results in the equations:

$$f(\eta,\xi) = \xi + \xi^{-1} F_1(Y) + \xi^{-2} F_2(Y) + \dots \tag{21}$$

$$f'(\eta,\xi) = F_1'(Y) + \xi^{-1} F_2'(Y) + \dots \tag{22}$$

$$f''(\eta,\xi) = F_1''(Y) + F_2''(Y) + \dots \tag{23}$$

$$f'''(\eta,\xi) = \xi^4 F_1'''(Y) + \xi F_2'''(Y) \dots \tag{24}$$

Similarly for θ and ϕ we obtain the following systems of equations:

$$\theta(\eta,\xi) = G_1(Y) + \xi^{-2} G_2(Y) + \dots \tag{25}$$

$$\theta'(\eta,\xi) = \xi G_1'(Y) + \xi^{-1} G_2'(Y) + \dots \tag{26}$$

$$\theta''(\eta,\xi) = \xi^2 G_1''(Y) + G_2''(Y) + \dots \tag{27}$$

$$\phi(\eta,\xi) = H_1(Y) + \xi^{-2} H_2(Y) + \dots \tag{28}$$

$$\phi'(\eta,\xi) = \xi H_1'(Y) + \xi^{-1} H_2'(Y) + \dots \tag{29}$$

$$\phi''(\eta,\xi) = \xi^2 H_1''(Y) + H_2''(Y) + \dots \tag{30}$$

We substitute equations (21) – (30) into equations (9) - (11) and compare coefficients to get the following system of ordinary differential equations:

$$F_1''' + 2F_1'' = 0, \tag{31}$$

$$F_2''' + 2F_2'' + 2G_1 + 2NH_1 = 0, \tag{32}$$

$$\mathrm{Pr}^{-1} G_1'' + 2G_1' = 0, \tag{33}$$

$$\text{Pr}^{-1} G_2'' + 2G_2' + 2F_1 G_1' = 0 , \tag{34}$$

$$Sc^{-1} H_1'' + 2H_1' = 0 , \tag{35}$$

$$Sc^{-1} H_2'' + 2H_2' + 2F_1 H_1' - \lambda H_1 = 0 . \tag{36}$$

The boundary conditions (12) and (13) imply that the associated transformed boundary conditions for the ordinary differential equations (31) to (36) are:

$$F(0) = 1 , \; F'(0) = 0 , \; F'(\infty) = \xi^{-2} , \; G(0) = 1 , \; G(\infty) = 0 , \; H(0) = 1 , \; H(\infty) = 0 . \tag{37}$$

Solving equations (31), (33) and (35) gives the solutions:

$$F_1(Y) = \delta_1 e^{-2Y} + \delta_2 Y + \delta_3 , \tag{38}$$

$$G_1(Y) = \alpha_1 e^{-2\text{Pr}Y} + \alpha_2 , \tag{39}$$

$$H_1(Y) = \beta_1 e^{-2ScY} + \beta_2 , \tag{40}$$

where δ_1, δ_2, δ_3, α_1, α_2, β_1 and β_2 are constants to be determined.

Now substituting for H_1 and G_1 in equations (32), (34) and (36) yields:

$$F_2''' + 2F_2'' = -2\alpha_1 e^{-2\text{Pr}Y} - 2N\beta_1 e^{-2ScY} - 2\alpha_2 - 2N\beta_2 , \tag{41}$$

$$\text{Pr}^{-1} G_2'' + 2G_2' = 4\text{Pr}\,\alpha_1 e^{-2\text{Pr}Y} (\delta_1 e^{-2Y} + \delta_2 Y + \delta_3) , \tag{42}$$

$$Sc^{-1} H_2'' + 2H_2' = 4Sc\beta_1 e^{-2ScY} (\delta_1 e^{-2Y} + \delta_2 Y + \delta_3) + \lambda\beta_1 e^{-2ScY} + \lambda\beta_2 . \tag{43}$$

Applying reduction of order to equation (41) – (43) gives the solutions of $F_2(Y)$, $G_2(Y)$ and $H_2(Y)$ as

$$F_2(Y) = \frac{\alpha_1}{4\text{Pr}^2(\text{Pr}-1)} e^{2\text{Pr}Y} + \frac{N\beta_1}{4Sc^2(Sc-1)} e^{-2ScY} - (\alpha_2 + N\beta_2)Y - \frac{\delta_4}{2} e^{-2Y} + \delta_5 , \tag{44}$$

$$G_2(Y) = \frac{\alpha_1 \delta_1 \text{Pr}^2}{\text{Pr}+1} e^{-2(\text{Pr}+1)Y} - 2\text{Pr}^2 \alpha_1 \delta_2 \left(\frac{Y^2}{2\text{Pr}} + \frac{Y}{2\text{Pr}^2} + \frac{1}{4\text{Pr}^3}\right) e^{2\text{Pr}Y}$$
$$- 4\text{Pr}^2 \alpha_1 \delta_3 \left(\frac{Y}{2\text{Pr}} + \frac{1}{4\text{Pr}^2}\right) e^{-2\text{Pr}Y} - \frac{\alpha_3}{2\text{Pr}} e^{-2\text{Pr}Y} + \alpha_4 , \tag{45}$$

$$H_2(Y) = \frac{\beta_1 \delta_1 Sc^2}{Sc+1} e^{-2(Sc+1)Y} - 2Sc^2 \beta_1 \delta_2 \left(\frac{Y^2}{2Sc} + \frac{Y}{2Sc^2} + \frac{1}{4Sc^3}\right) e^{2ScY}$$
$$- 4Sc^2 \beta_1 \delta_3 \left(\frac{Y}{2Sc} + \frac{1}{4Sc^2}\right) e^{-2ScY} - \frac{\beta_3}{2Sc} e^{-2ScY} + \frac{\beta_2}{2} \lambda Y + \beta_4 , \tag{46}$$

where α_3, α_4, β_3, β_4, δ_5 and δ_6 are new constants to be determined.

Considering boundary conditions (37) and comparing coefficients gives the values of all the required constants as:

$$\alpha_1 = 1 , \; \alpha_2 = 0 , \; \alpha_3 = \frac{\text{Pr}^3}{\text{Pr}+1} + \text{Pr}-1 , \; \alpha_4 = 0$$

$$\beta_1 = 1 , \; \beta_2 = 0 , \; \beta_3 = \frac{Sc^3}{Sc+1} + Sc - \frac{\lambda}{2} - 1 , \; \beta_4 = 0$$

$$\delta_1 = \frac{1}{2}, \ \delta_2 = 1, \ \delta_3 = -\frac{1}{2}, \ \delta_4 = \frac{1}{\Pr(1-\Pr)} + \frac{N}{Sc(1-Sc)}, \ \delta_5 = 0 \ \text{and} \ \delta_6 = \frac{1}{4\Pr^2} + \frac{N}{4Sc^2}.$$

Substituting these values in equations (38) – (40) and (44)-(46) and letting , $N = 1$ and $\lambda = 1$ equations (22), (25) and (28) imply that

$$f'(\eta) = 1 - e^{-2\xi\eta} + \frac{1}{2\Pr(1-\Pr)}e^{-2\Pr\xi\eta} + \frac{1}{2Sc(1-Sc)}e^{-2Sc\xi\eta} - \frac{1}{2\Pr(1-\Pr)}e^{-2\xi\eta} - \frac{1}{2Sc(1-Sc)}e^{-2\xi\eta},$$

$$\theta(\eta,\xi) = e^{-2\Pr\xi\eta} + \frac{\Pr^2}{2\xi^2(1+\Pr)}e^{-2(1+\Pr)\xi\eta} - [\eta^2\Pr + \frac{\eta}{\xi} - \frac{\eta}{\xi}\Pr + \frac{\Pr^2}{2\xi^2(1+\Pr)}]e^{-2\Pr\xi\eta},$$

$$\phi(\eta,\xi) = e^{-2Sc\xi\eta} + \frac{Sc^2}{2\xi^2(1+Sc)}e^{-2(1+Sc)\xi\eta} - [\eta^2 Sc + \frac{\eta}{\xi} - \frac{\eta}{\xi}Sc + \frac{Sc^2}{2\xi^2(1+Sc)} + \frac{\eta}{2\xi}]e^{-2Sc\xi\eta}.$$

Also note that $F_1''(0) = 1$, $F_2''(0) = \frac{1}{\Pr} + \frac{N}{Sc}$, $G_1'(0) = -2\Pr$, $G_2'(0) = -\frac{1}{1+\Pr}$, $H_1'(0) = -2Sc$

and $H_2'(0) = \frac{\lambda}{2} - \frac{1}{1+Sc}$.

By carrying out differentiation and making suitable substitutions, it can be shown that:

$$C_f = \frac{2}{\sqrt{2}}(\sqrt{\text{Re}_x})^{-1}f''(\xi,0), \ Nu_x = -\frac{2}{\sqrt{2}}(\sqrt{\text{Re}_x})\theta'(\xi,0), \ Sh_x = -\frac{2}{\sqrt{2}}(\sqrt{\text{Re}_x})\phi'(\xi,0) \quad (47)$$

$$f''(\xi,0) = 2\xi + \frac{1}{\Pr} + \frac{N}{Sc}, \ \theta'(\xi,0) = -2\xi\Pr - \frac{1}{\xi(1+\Pr)}, \ \phi'(\xi,0) = -2\xi Sc - \frac{1}{\xi(1+Sc)} - \frac{\lambda}{2\xi}. \quad (48)$$

Plotting the graph of $f'(\eta)$ against η for different values of ξ gives us the velocity profile while plotting the graph of θ and ϕ against η yields the temperature and concentration profiles respectively. As equations (47) and (48) suggest, plotting the graphs of $f''(\xi)$, $-\theta'$ and $-\phi'$ against ξ produce, respectively, the variation of the skin friction, rate of heat transfer and rate of mass transfer as the buoyancy parameter is increased.

Figure 2: Velocity profile

IV. RESULTS AND DISCUSSION

In this study, a Prandtl number P r = 0.71, which corresponds to air at 200 C and a Schmidt number Sc = 0.6 corresponding to water vapour diffusing in air were used for the reason that water vapour and air are the most commonly used fluids in industrial engineering and applications. A fixed buoyancy ratio N = 1 and a Grashof number Gr = 1 were also used. A Grashof number of unity was used in order to allow for both inertia and buoyancy forces to contribute to the flow.

Figure 3: Temperature Profile
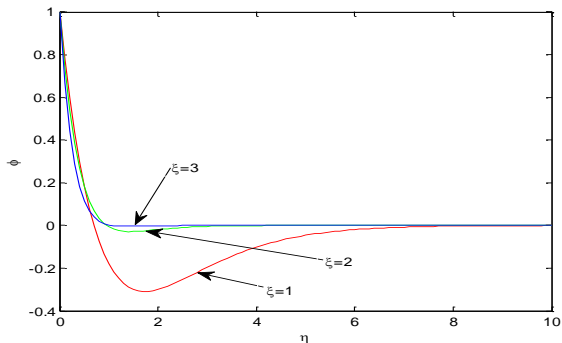
Figure 4: Concentration Profile

Figures 2 to 4 show profiles obtained for the velocity, temperature and concentration respectively. In the vicinity of the vertical wall, Figure 2 illustrates that increase in buoyancy is associated with a significant increase in velocity, as expected. However further away from the plate, there is a reduction in the velocity of the fluid. Figures 3 and 4 show that an increase in buoyancy is accompanied by a decrease in fluid temperature and concentration. Figures 2 to 4 also illustrate that the boundary layer is significantly reduced by increasing the buoyancy parameter ξ.

The decrease in the concentration of the chemical species can be attributed to diffusion of chemical species into the fluid and the increased velocity of the fluid as the buoyancy is increased. As the velocity of the fluid particles increases due to an increase in buoyancy, the particles of the diffusing fluid are immediately carried away, and that explains the reduced concentration close to the wall.
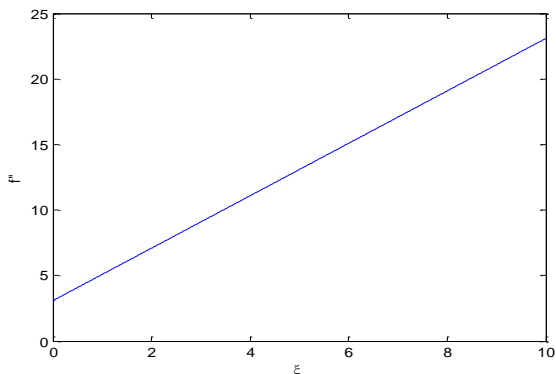
Figure 5: Variation of skin friction with buoyancy
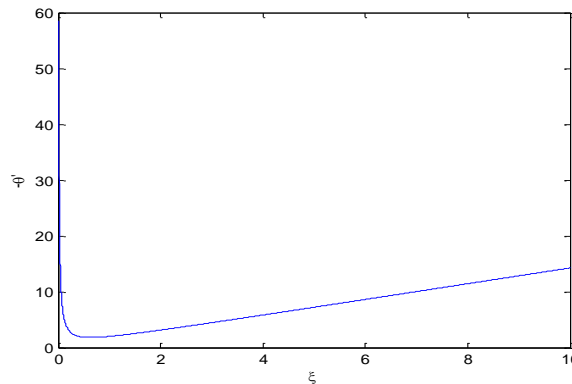
Figure 6: Variation of the rate of heat transfer with buoyancy
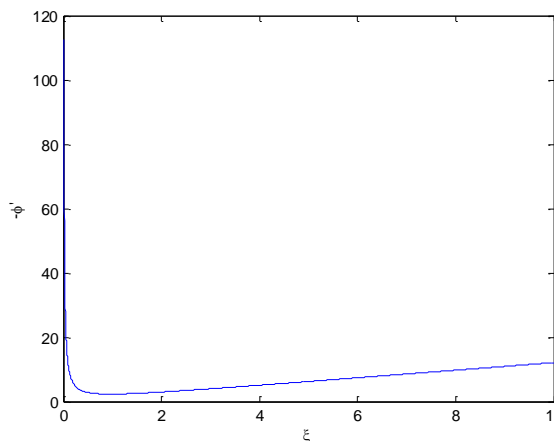
Figure 7: Variation of the rate of mass transfer with buoyancy

Figures 5 to 7 show the effects of varying the buoyancy on the skin friction and rates of heat and mass transfer. It is evident from the figures that an increase in buoyancy is accompanied by a linear increase in skin friction, while the rates of heat and mass transfer fall rapidly from very large values close to the wall down to a minimum value and then start to increase as the buoyancy parameter becomes larger. It is also noticed that the increase of the rate of heat transfer is more pronounced than the heat of mass transfer as the buoyancy parameter increases.

V. CONCLUSION

The study considered the double diffusive heat and mass transfer processes over a permeable vertical plate in the presence of wall suction and chemical reaction. The equations of flow were derived from the basic principles of mass conservation, energy conservation, heat and mass diffusion. The equations were non-dimensionalised by use of appropriate approximations and the resulting non-linear differential equations then solved by means of asymptotic expansions in the limit of large buoyancy. The variation of buoyancy with velocity, temperature, concentration, skin friction, rates of heat and mass transfer were presented graphically and analyzed.

Results obtained showed that in the vicinity of the plate wall, an increase in buoyancy causes an increase in the velocity of the fluid. Furthermore, the results indicate that the skin friction, heat and mass transfer rates are enhanced by an increase of buoyancy.

Profiles obtained also indicated that an increase buoyancy is accompanied by a decrease in fluid temperature as well as fluid concentration. It was also noticed that the concentration and thermal boundary layers are reduced as a consequence of increasing the buoyancy.

Results showed that even though an increase in buoyancy leads to a linear increase in skin friction, it was noted that an increase in buoyancy causes a sharp decrease in the rates of heat and mass transfer for very small values of the buoyancy parameter. However as the buoyancy parameter becomes larger, the rates of heat and mass transfer increase proportionally with the buoyancy.

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AUTHORS

First Author – Mangwiro Magodora, Department of Mathematics & Physics, Bindura University, P. Bag 1020, Bindura, Zimbabwe

Second Author – Kisswell Basira, Department of Mathematics & Physics, Bindura University, P. Bag 1020, Bindura, Zimbabwe

Third Author – Precious Sibanda, School of Mathematical Sciences, University of KwaZulu-Natal, P. Bag X01, Pietermaritzburg, Scottsville 3209, South Africa

Cytogenetic Profile of Monosomal Karyotype in Adult Acute Myeloid Leukemia

Yuet-Meng Chin, Puteri J Noor, Azli Ismail, Mohd Fadly Md Ahid, Zubaidah Zakaria

Hematology Unit, Cancer Research Centre, Institute for Medical Research, Kuala Lumpur, Malaysia

Abstract- Cytogenetic abnormalities at diagnosis are important prognostic indicators in acute myeloid leukemia (AML). AML is categorized into 3 risk groups according to cytogenetic abnormalities; favorable, intermediate, and unfavorable. A new cytogenetic risk group called the monosomal karyotype (MK) had been identified in AML in the unfavorable cytogenetic risk group. The MK was reported to be associated with a dismal prognosis. The objective of this retrospective study was to analyze the type of chromosomal abnormalities found in adult AML patients with MK at diagnosis. Conventional cytogenetic analysis using standard procedure was performed as a routine diagnostic test in all leukemia patients at presentation of the disease. We report here the cytogenetic profile of 11 adult AML patients (age: 24 to 77 years) with MK. The most frequent chromosome aberrations observed were -5 or/and del(5q) [54%], -7 (36%), and -16 (36%). Abn(17q) was observed in two out of 11 patients (18%). Out of 11 patients, nine had hypodiploidy (41-45 chromosomes), one had diploidy (46 chromosomes), and one had hyperdiploidy (47 chromosomes). Ten MK patients (91%) had complex karyotype with five to nine clonal abnormalities. MK+ AML patients have a very unfavorable outcome due to resistance against current treatment modalities. The diagnosis of MK in AML is important in the clinical management of these patients.

Index Terms- Monosomal karyotype (MK), Acute myeloid leukemia (AML)

I. Introduction

Acute myeloid leukemia (AML) is a heterogeneous group of hematological neoplasm with regard to clinical, genetic and molecular features. Cytogenetic studies had shown that more than 50% of AML patients had an abnormal karyotype at diagnosis (1). Cytogenetic abnormalities at diagnosis are important prognostic indicators in determining response to therapy and outcome in AML. Based on cytogenetic abnormalities, AML can be categorized into three cytogenetic risk groups, favorable (20%), intermediate (50%) and unfavorable (30%). The favorable risk group include t(15;17), and core binding factor (CBF) AML with t(8;21), inv(16) or t(16;16). The intermediate risk group include the normal karyotype, t(9;11), del(9q), del(7q), del(20q), -Y, +8, +11, +13, and +21. The unfavorable risk group include complex karyotype (CK), inv(3) or t(3;3), t(6;9), t(6;11), t(11;19), del(5q), -5, and -7 (2). In the United States, CK is defined as the presence of a clone with at least three unrelated cytogenetic abnormalities. CK in the United Kingdom (UK) is defined as five or more chromosomal

abnormalities. The UK Medical Research Council (MRC) group found that with each additional chromosomal abnormality, there was also an increase in the risk of failing to achieve a complete remission (hazard ratio [HR] = 1.42) as well as mortality (HR = 1.19) [3].

Breems *et al* (2008) [4] were the first to identify the monosomal karyotype (MK) in AML in the unfavorable cytogenetic risk group. MK is associated with a very unfavorable prognosis. In the unfavorable cytogenetic risk group, the 4-year overall survival (OS) of MK positive (+) patients with AML was 4% compared to 26% in the MK negative (-) patients. MK is defined as the presence of two or more distinct autosomal monosomies in the karyotype or a single autosomal monosomy in the presence of   one or more structural chromosome abnormalities (in the absence of t(15;17) and CBF AML). Loss of X or Y chromosome is excluded. In AML the frequency of MK increases with age, 4% in patients below 30 years, 6–10% in patients less than 60 years, and 13-20% in patients   above 60 years of age (5). The German-Austrian AML Study Group (6) revised the definition of MK (MK-R) to exclude cases with recurrent genetic abnormalities according to the World Health Organization (WHO) Classification of Myeloid Neoplasms and Acute Leukemia (7) and those with derivative chromosomes not leading to true monosomies. The MK-R group was also associated with a dismal prognosis. The prognostic significance of MK also depend on the treatment strategy used.

The objective of this study was to analyse the type of chromosome abnormalities found in adults with *de novo* AML having MK at presentation of the disease.

II. MATERIALS & METHODS

Patients

Cytogenetic studies are performed as a routine diagnostic test in our Cytogenetic Laboratory, Hematology Unit, Institute for Medical Research (IMR), Kuala Lumpur for all patients with hematological malignancies. The diagnosis of AML was according to the WHO classification. Patients with therapy-related AML (t-AML) and secondary AML after myelodysplastic syndrome (MDS) were excluded from this retrospective study. Eleven adult AML patients at presentation of the disease with MK were included in this study.

Cytogenetic studies

Conventional cytogenetic analysis was performed on the blood/ bone marrow aspirate of patients with hematological malignancies according to standard procedures. The chromosomes were G-banded and karyotype designation was

according to the International System for Human Cytogenetic Nomenclature (ISCN, 2009) [8] at the time of cytogenetic analysis. Abnormalities were considered clonal when at least two metaphases had the same type of aberration for a structural abnormality or an additional chromosome. For loss of a chromosome, it had to be present in at least three metaphase cells to be considered a clonal monosomy. CK was defined as the presence of a clone with three or more unrelated cytogenetic aberrations.

III. RESULTS

The cytogenetic findings of the 11 adult AML patients with MK are shown in Table 1. The age of the 10 patients with MK ranged from 24 to 77 years (median age: 62 years). Eight out of 11 patients with MK were elderly (age 60 years and above). The most frequent chromosome abnormalities observed were -5 or/and del(5q) [54%], -7 (36%), and -16 (36%). Abn(17p) [abnormal (17p)] was observed in 2 out of 11 patients (18%). Eight out of 11 patients (73%) had two or more monosomies, as well as two or more structural aberrations. Out of 11 patients, 9 had hypodiploidy (41 – 45 chromosomes), one had diploidy (46 chromosomes) and one had hyperdiploidy (47 chromosomes). Ten MK patients (91%) had CK as well with five to nine clonal cytogenetic abnormalities. Patient 11 did not have CK. Patient no.1 and Patient No. 5 had trisomy 3 and tetrasomy 8 respectively. Fig.1 shows the karyotype of a MK+ AML patient (Patient No. 6) with multiple cytogenetic abnormalities.

IV. DISCUSSION

In our study the most frequent chromosome abnormalities observed in MK+ AML patients were -5 or/and del(5q) [45%], -7 (36%), and -16 (36%). Abn(17p) was observed with a frequency of 18%. The most frequent autosomal monosomies reported in MK are -7, -5, -17, and -18. The six most frequent chromosome abnormalities reported in AML with MK were (in order of decreasing frequency) -5 or del(5q) [55%], -7 (45%), abn(17p) [41%], abn(12p) [24%], -20 or del(20q) [19%], and -18 or del(18q) [19%] (6). Deletions or mutations at 17p (which is frequently found in MK and CK) are associated with the loss or dysfunction of the tumor suppressor gene (TSG), *TP53* (9). These findings have led many to speculate the presence of TSGs on chromosomes 5 and 7, and that deletion of part or all of chromosomes 5 or/and 7 results in the pathogenesis of AML. However, no specific TSG has been identified and no simple explanation is available for the frequent losses involving these two chromosomes. Abn(17p), abnormalities in chromosomes 5 and 7, CK, and MK are found more frequently in t-AML than *de novo* AML (10). About 91% of our MK+ AML patients had CK, which was also similar to the study by Voutiadou *et al* (2013) [11].

MK is also found in MDS and primary myelofibrosis, and is associated with a very poor prognosis. MK is associated with prior chemotherapy or history of abnormal blood counts. Compared to MK- AML patients, MK+ AML patients were older in age, had lower hemoglobin levels, lower median white counts, lower percentage of blasts in bone marrow and peripheral blood.

AML with MK has a poor outcome in patients in any age group, with a poor complete remission (CR) rate and survival estimate, and is even worse in elderly patients. The poor prognosis of MK+ AML is due to resistance against conventional chemotherapy, thus resulting in a low CR rate. High and early relapse rates were seen in patients achieving CR after conventional induction chemotherapy with anthracyclin-cytarabine. (12). The 4-year OS after allogeneic hematopoietic stem cell transplantation (HSCT) was 52% for MK- AML patients with poor-risk cytogenetics while for AML MK+ patients it was only 28%. However, the outcome of HSCT was considerably better than conventional chemotherapy for MK+ AML patients. Clinical trials using high-dose cytarabine led to superior disease free survival and OS in patients with favorable-risk cytogenetics but not for patients with intermediate- or unfavorable-risk cytogenetics (10). The diagnosis of MK in AML which have a dismal prognosis is important in the clinical management of these patients. The development of suitable novel therapies is greatly warranted for MK+ AML patients.

ACKNOWLEDGEMENT

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AUTHORS

First Author – Yuet-Meng Chin, Hematology Unit, Cancer Research Centre, Institute for Medical Research, Kuala Lumpur, Malaysia

Second Author – Puteri J Noor, Hematology Unit, Cancer Research Centre, Institute for Medical Research, Kuala Lumpur, Malaysia

Third Author – Azli Ismail, Hematology Unit, Cancer Research Centre, Institute for Medical Research, Kuala Lumpur, Malaysia

Fourth Author – Mohd Fadly Md Ahid, Hematology Unit, Cancer Research Centre, Institute for Medical Research, Kuala Lumpur, Malaysia

Fifth Author – Zubaidah Zakaria, Hematology Unit, Cancer Research Centre, Institute for Medical Research, Kuala Lumpur, Malaysia

Correspondence Author – Yuet-Meng Chin, Hematology unit, Institute for Medical Research (IMR), Jalan Pahang, 50588 Kuala Lumpur, Malaysia, Tel: 603-26162711, Fax: 603-26162530, E-mail: chinym@imr.gov.my

Table 1: Chromosome abnormalities in acute myeloid leukemia (AML) patients with monosomal karyotype

AML Patients			Types of Chromosome Abnormalities			Total No. of Chromosomes
No	Age (Years)	Sex	Autosmal Monosomy/ monosomies	Structural abnormality/ abnormalities	Gain of whole chromosome/ chromosomes	
1	75	M	-8, -17	del(1p), +abn(2q), del(4q), abn(12), abn(15q),	+3	46
2	62	F	-7,-9, -16,-17	del(5q), add(12p), abn(19p)	-	42
3	64	M	-5,-7,17,-18	abn(14q), abn(20), +ring chr	-	42
4	59	F	-13, -18	+del(4p), del(5q), del(6p), del(7p), +abn(9q), abn(17p), abn(22p)	-	45
5	67	M	-15	del(6q), del(7q)	+8,+8	47
6	60	F	-9,-12,-16,-18,-20	t(5;7), abn(5q), abn(17p)	-	41
7	77	F	-13, -16, -21, -21	+del(3q),+del(5q)	-	44
8	76	M	-7, -16	add(1p), +ring chr	-	45
9	60	M	-4,-12,-20	del(4p), del(5q), add(7q),del(8q)	-	43
10	35	M	-3	del(5q), del(7q), del(11q), del(12p)	-	45
11	24	F	-7	t(3;3)	-	45

Legend

abn : Abnormal   minus sign (-) : Loss of part or whole chromosome
add : Additional chromosome material   plus sign (+) : Gain of part or whole chromosome
chr: Chromosome   p : Short arm of chromosome
del : Deletion   q : Long arm of chromosome
F: Female   t : Translocation
M : Male
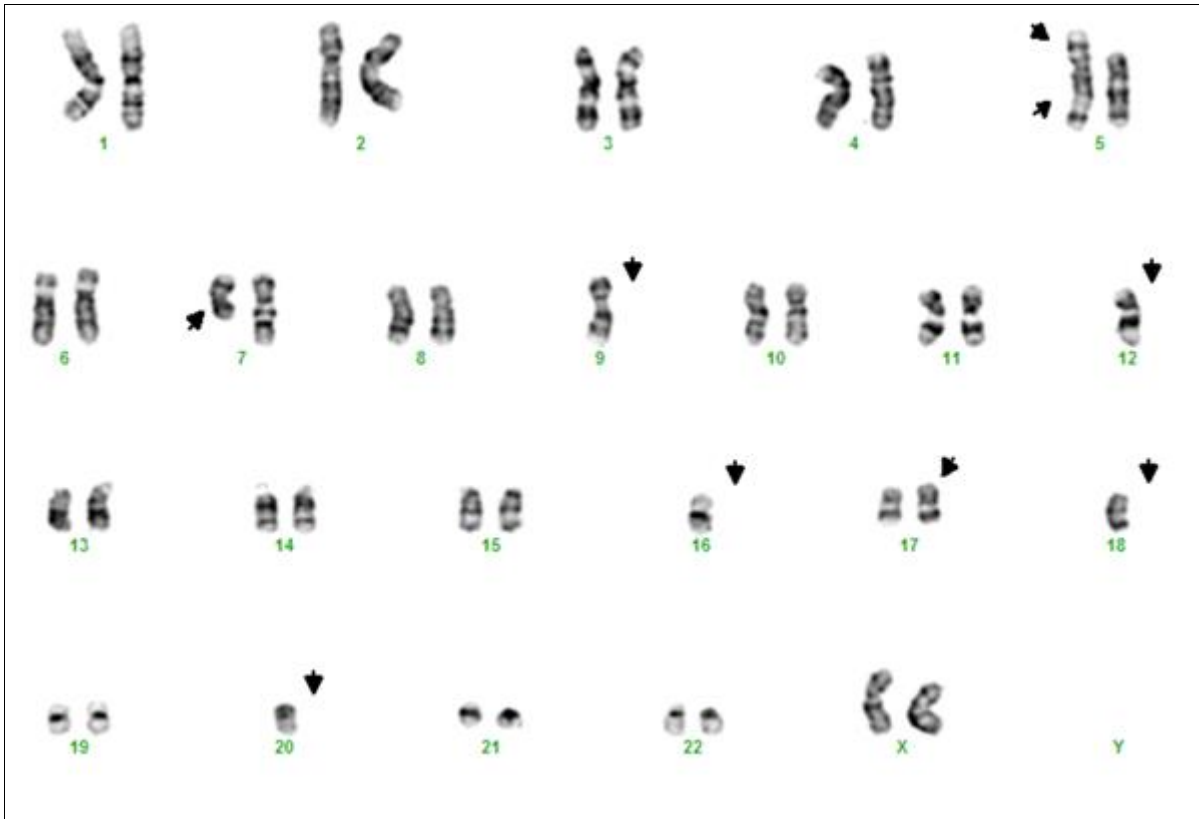
Fig. 1   41,XX,-9,-12,-16, 18,-20,t(5;7)(p13;q11.2),abn(5q),abn(17p)

Monosomal karyotype in AML showing monosomies of chromosomes 9,12,16,18,20; translocation between chromosomes 5 & 7; abnormal 5q and abnormal 17p

Error Tolerant Adder

Chetan Deo Singh, Yuvraj Singh

Student of Electrical and Electronics Engineering (SELECT, VIT University Vellore)

Abstract- The addition of two binary numbers is the most fundamental and widely used arithmetic operation. This operation is used in microprocessors, digital signal processors, data processing application specific integrated circuits and many more. There are many adders designed till now. ETA is one such efficient adder which speeds up binary addition. ETA is the Error Tolerant Adder which consumes less power and delay. Design of ETA is done using backend tool under real time simulation conditions. This paper compares the performance of the ETA in terms of accuracy, delay and power consumption with that of conventional adders.

Index Terms- Error Tolerant Adder (ETA), Accuracy, Power dissipation, Speed, Power Delay Product

I. INTRODUCTION

Arithmetic operations are performed frequently in microelectronics. Addition is the most basic operation from which other operations like subtraction, division and multiplication can be derived. So adders are considered as the most important part. Power is the most significant resource that should be saved while designing an adder. Speed also plays an important role in the performance of adder so it should be on the higher side. Designing a low power and high speed adder is the goal of many industries. Many different types of fast adders have been developed so far, such as the, carry-select adder (CSL) [6], carry-skip adder (CSK) [5] and carry-look-ahead adder (CLA) [7]. Also, there are many low-power adder design techniques that have been proposed [19]. However, there are always trade-offs between speed and power. In order to achieve that a special kind of adder called the Error Tolerant Adder (ETA) has come into the picture which sacrifices the accuracy for speed and low power dissipation. The power delay product which is the average of power consumed and worst case delay is improved by more than 65%. By reducing the power consumed, the battery life of any portable device can also be improved.

II. MATERIALS AND METHODS

There is a huge improvement in the power and speed when we use an ETA. For increasing the speed and decreasing the power dissipation, we use the logic that in an adder circuit the delay appears mainly because of the carry propagation and also there is a lot of power dissipation. So we try to eliminate this carry propagation by dividing the addition of two binary numbers into two parts namely accurate part and inaccurate part as shown below. The 4 MSB bits of both the numbers are the accurate part and the 4 LSB bits are the inaccurate part. In the accurate part the addition is performed in a conventional way from right to left starting from the demarcation line because the higher order bits play a greater role in the accuracy. In the inaccurate part, the addition is performed from left to right strarting from the demarcation line. When two 0s are there or a 0 and a 1 is there, the addition proceeds conventionally. As soon as two 1s in the input bits are seen, the checking stops and from this point onwards all the bits are set to 1 as shown below. This method is adopted in order to eliminate the time required for carry propagation and also to reduce the power consumption.

All bits are set to 1
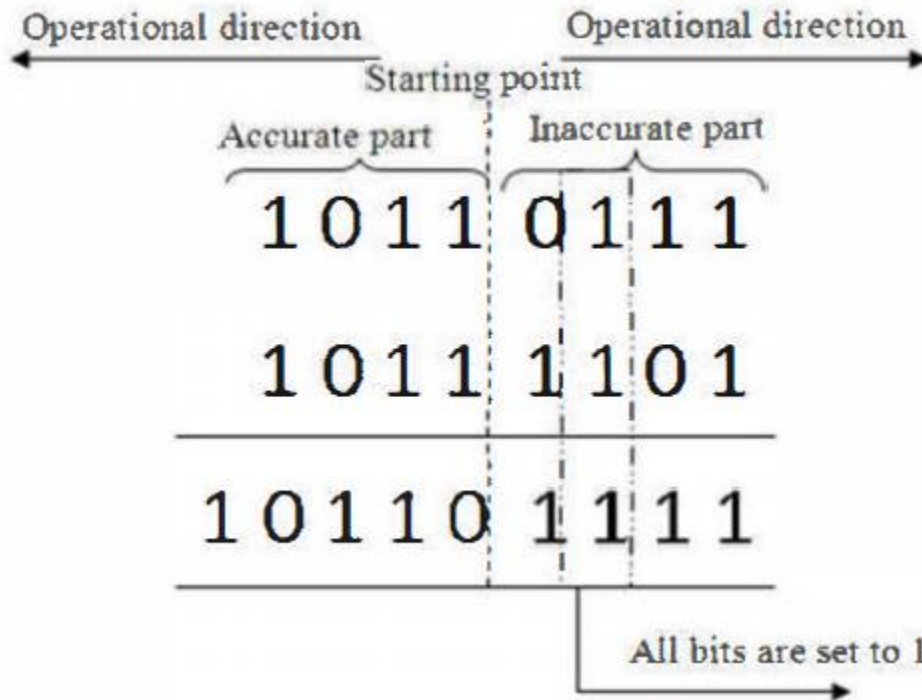
III. ARCHITECTURE

The accurate part consists of a conventional adder which performs normal addition. The inaccurate part consists of two parts namely the control block and carry free addition block. Bit $B0$ serves as the control bit for both accurate and inaccurate parts. If $B0$ is 1 adder performs the normal addition and if $B0$ is zero, the line from supply to ground is cut off and hence reducing the power dissipation.

A 10T conventional full adder is used in the accurate part. It is the inaccurate part that decides the speed, accuracy and the power consumption of the adder. The carry free addition block has 4 modified XOR gates to give sum bits for LSBs. The inaccurate part has a CTL which controls the output of carry free addition block. When both or one of the inputs is zero, CTL is off and as soon as both the inputs are '1' it goes to logic '1'. Hence after this at least one of the inputs is always '1' so we get '1' as the output for any input that comes after this.

Accurate Part   Inaccurate Part
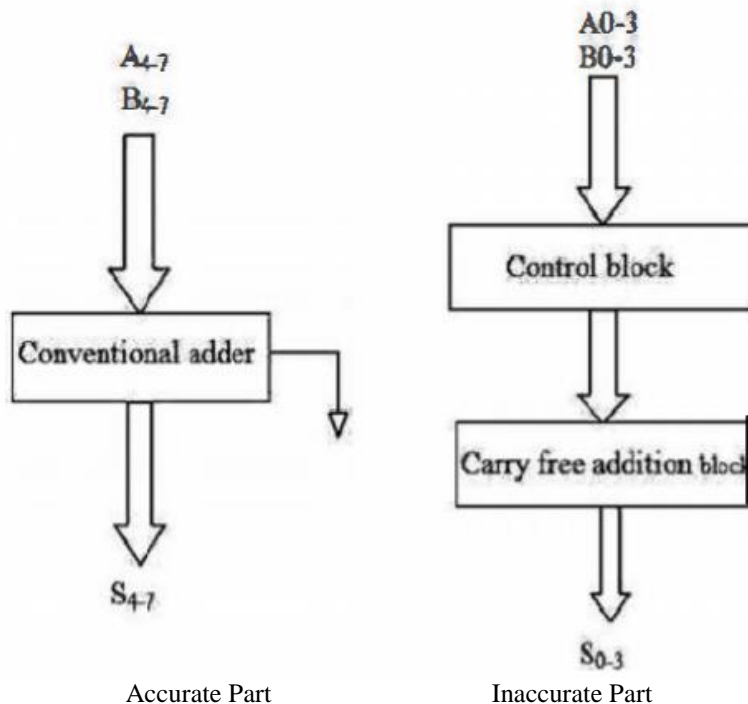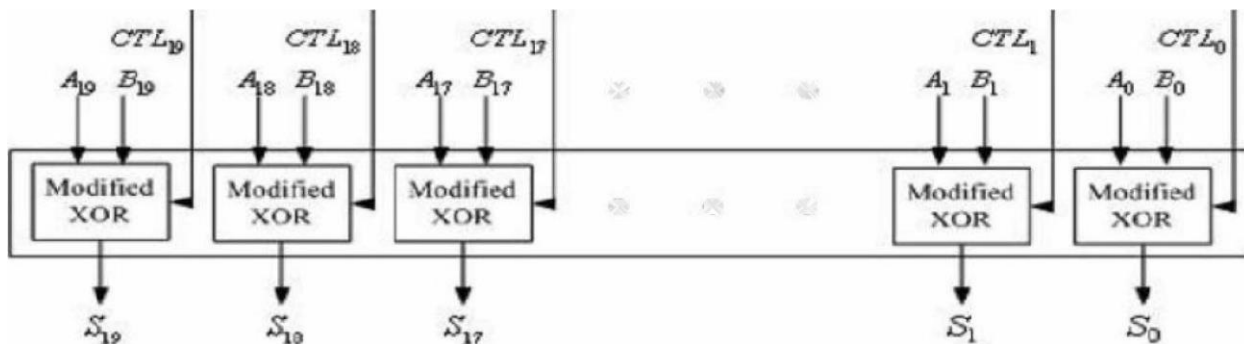
Block diagram of carry free addition of ETA

Modified XOR Gate
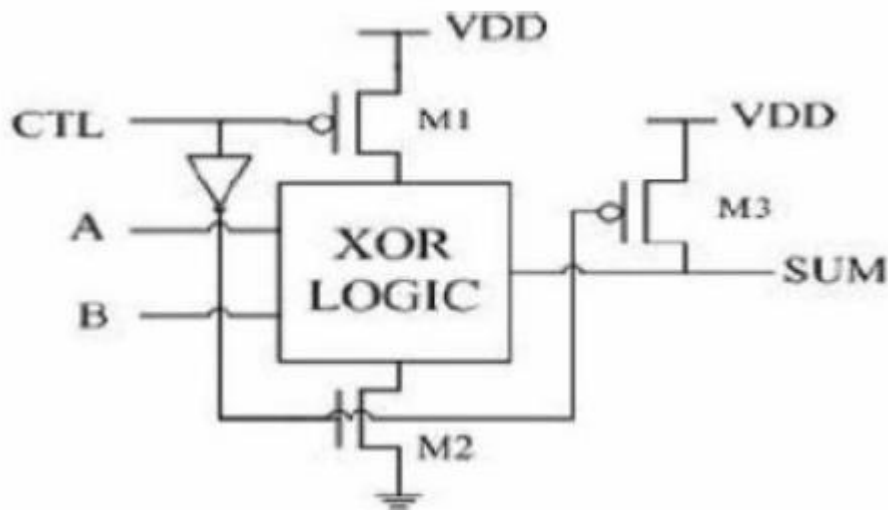
Modified XOR with control

Error Tolerant Adder is designed for the addition of two 8 bit inputs using the above logic with backend tools that use real time conditions.

IV. RESULT

The characteristics such as power consumption, power delay product and speed are studied and compared with other adders and it is observed that all the parameters are considerably improved while using an Error Tolerant Adder.

Type of Adder	Power (mW)	Delay (ns)	PDP (pJ)	PDP saving (%)	Transistor Count
RCA	0.22	4.04	0.89	66.29	896
CSK	0.46	2.90	1.33	77.44	1728
CSL	0.60	3.06	1.84	83.70	2176
CLA	0.51	2.37	1.21	75.21	2208
ETA	0.13	1.81	0.28	N.A.	996

Table comparing the characteristics of different adders
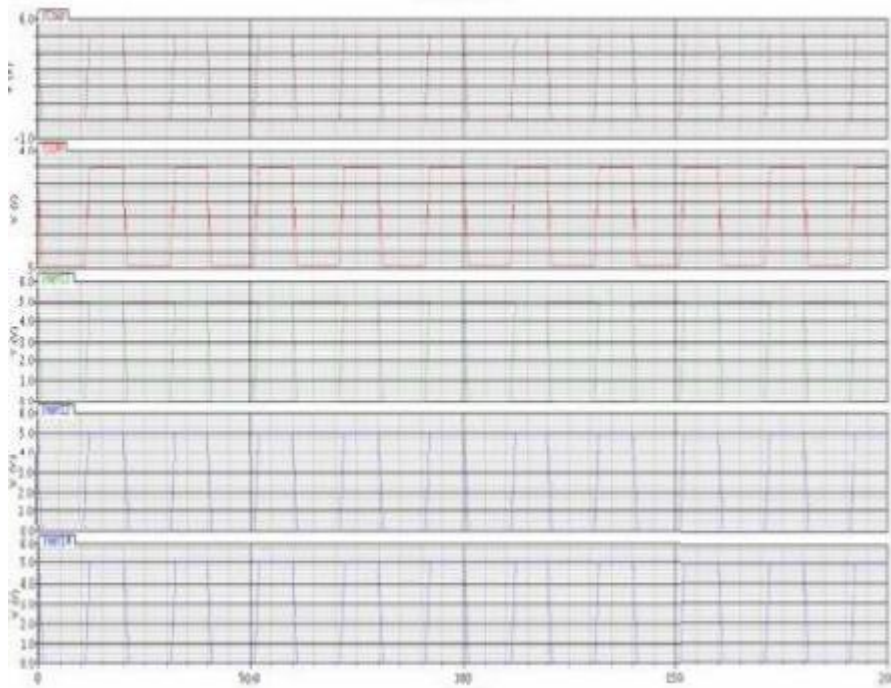
Output of the accurate part of the adder
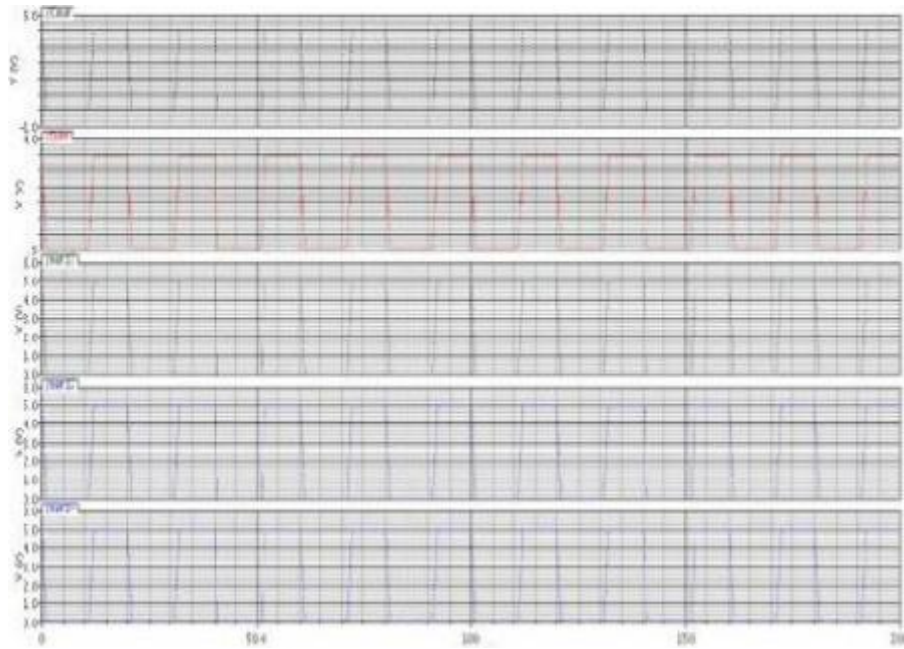
Output of the XOR Gate

V. CONCLUSION

From the above results following conclusions can be made:

- The Error Tolerant Adder has lower power consumption than any other adder.
- The delay is the least in ETA because of the elimination of carry propagation.
- The power delay product is also the least.

With the advent of portable gadgets, it is the need of the hour to design devices of smaller size, low power consumption and high speed. ETA is the answer to this. With high speed and low power consumption, the battery life of a device can be prolonged extensively.

This logic has the potential to be used in the multipliers as well in the future.

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AUTHORS

First Author – Chetan Deo Singh, Student of Electrical and Electronics Engineering (SELECT, VIT University Vellore), Email: mayoitechetan@gmail.com

Second Author – Yuvraj Singh, Student of Electrical and Electronics Engineering (SELECT, VIT University Vellore), Email: yuvrajsingh.rathore2011@vit.ac.in

Comparison of Image Registration Methods for Satellite Images

Rachna P. Gajre*, Dr. Leena Ragha**

* Computer Science, Ramrao Adik Institute of Technology
** Computer Science, Ramrao Adik Institute of Technology

Abstract- Although various Automatic Image Registration methods have been proposed in past few years, several drawbacks avoid their common use in practice. The recently proposed scale invariant feature transform approach has already revealed to be a powerful tool for the obtaining keypoints in general but it has a limited performance when directly applied to remote sensing images. In this paper, we are comparing work done on image registration methods on basis of technique used to register the images.

Index Terms- Automatic Image Registration, Centroids, Euclidean Distance, Image Segmentation, and Scale Invariant Feature Transform

I. INTRODUCTION

Image registration is the process of transforming different sets of data into one coordinate system, [01]. Data may be multiple photographs, data from different sensors, from different times, or from different viewpoints. It is used in computer vision, medical imaging, military automatic target recognition, compiling and analyzing images and data from satellites. Registration is necessary in order to be able to compare or integrate the data obtained from these different measurements.

Image registration is the process of overlaying two or more images of the same scene taken at different times, from different viewpoints, and/or by different sensors, [02]. It is also a classical problem encountered in image processing applications in which, the final information is gained from the combination of various data sources like in image fusion, change detection, multichannel image restoration and can be applied in the fields of change detection, cartography, medical imaging and photogrammetry.

Image registration is the process by which we determine a transformation that provides the most accurate match between two images. The search for the matching transformation can be automated with the use of a suitable metric, but it can be very time- consuming and tedious, [03]. Computational time becomes even more critical with the current increase in data. As a result, high performance image registration is needed, [04].

In remote sensing applications, generally manual registration used which is not feasible when large number of images need to be registered because of manual selection of control points. Therefore, it leads to the need of automatic image registration, [05]. Automatic image registration is to perform the image registration task without the guidance and intervention of users. The tremendous amount of incoming satellite images from the Earth Observing System (EOS) program and from new missions with hyperspectral instruments mandate the need for automatic image registration, [06].

The flow diagram for process of Image Registration is as shown in Figure 1.
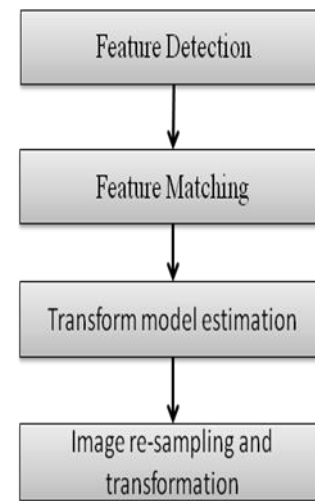
Figure 1: Flow Diagram of Process of Image Registration.

In general, we can describe the process of Image Registration in four steps as follows, [07]:

1. Feature detection: In image, we detect salient and distinctive objects such as closed-boundary regions, edges, contours, line intersections, corners, etc. in both reference and sensed images.
2. Feature matching: The correspondence between the features in the reference and sensed image established.
3. Transform model estimation: The type and parameters of the so-called mapping functions, aligning the sensed image with the reference image are estimated.
4. Image re-sampling and transformation: The sensed image is transformed by means of the mapping functions.

Image registration is widely used in remote sensing, medical imaging, computer vision etc. In general, its applications can be divided into four main groups according to the manner of the image acquisition, [08]:

1. Different viewpoints (multiview analysis): Images of the same scene are acquired from different viewpoints. The aim is to gain larger 2D view or a 3D representation of the

scanned scene. For example, Remote sensing—mosaicing of images of the surveyed area.

2. Different times (multitemporal analysis): Images of the same scene are acquired at different times, often on regular basis, and possibly under different conditions. The aim is to find and evaluate changes in the scene that appeared between the consecutive images acquisitions. For example, Computer vision — automatic change detection for security monitoring, motion tracking and Medical imaging—monitoring of the healing therapy, monitoring of the tumour evolution.

3. Different sensors (multimodal analysis): Different sensors acquire images of the same scene. The aim is to integrate the information obtained from different source streams to gain more complex and detailed scene representation. For example, Remote sensing—fusion of information from sensors with different characteristics like panchromatic images, offering better spatial resolution, color/multispectral images with better spectral resolution, or radar images independent of cloud cover and solar illumination.

4. Scene to model registration: Images of a scene and a model of the scene are registered. The model can be a computer representation of the scene, for instance maps or digital elevation models (DEM) in GIS, another scene with similar content (another patient) etc. The aim is to localize the acquired image in the scene and to compare them. For example, Medical imaging—comparison of the patient's image with digital anatomical atlases, specimen classification.

In this paper, we discussed general process of image registration in section I. In next section II we will be discussing methods of image registration and then work done by various authors in section III and comparison in table I in section IV.

II. IMAGE REGISTRATION METHODS

According to paper [08], various image registration methods are as follows:

1. Intensity-based and feature-based methods: Intensity-based methods compare intensity patterns in images via correlation metrics, while feature-based methods find correspondence between image features such as points, lines, and contours. Intensity-based methods register entire images or sub images.

2. Spatial and frequency domain methods: Spatial methods operate in the image domain, matching intensity patterns or features in images whereas Frequency domain methods find the transformation parameters for registration of the images while working in the transform domain. Such methods work for simple transformations, such as translation, rotation, and scaling.

3. Single and multi-modality methods: Single-modality methods tend to register images in the same modality acquired by the same scanner/sensor type, while multi-modality registration methods tended to register images acquired by different scanner/sensor types.

4. Automatic and interactive methods: Based on level of automation registration method provide they are classified as manual, interactive, semi-automatic, and automatic methods

have been developed. Manual methods provide tools to align. Interactive methods reduce user bias by performing certain key operations automatically while still relying on the user to guide the registration. Semi-automatic methods perform more of the registration steps automatically but depend on the user to verify the correctness of a registration. Automatic methods do not allow any user interaction and perform all registration steps automatically.

5. Similarity measures for image registration: Mostly, image similarity methods are being use in medical imaging. An image similarity measure quantifies the degree of similarity between intensity patterns in two images.http://en.wikipedia.org/wiki/Image_registration - cite_note-AG-2 The choice of an image similarity measure depends on the modality of the images to be registered.

III. LITERATURE SURVEY

In [05], registration method is perform by applying regions considered segmentation on the images with consideration of several attributes such as perimeter, fractal dimension and structural features. Initially the image undergoes through pre-processing stage after which features are extracted from the enhanced image, then matching is done using these features, and finally rotation differences are detected between the images that are to be registered. The purpose of this paper is to perform automatic image registration accurately through segmentation that leads to satisfaction of all the constraints present over image and thus can effectively improve the quality of registered images.

In [09], registration is perform by dividing image into regions and SIFT keypoints. Initially the real image is partitioned into four subregions and then SIFT keypoints are extracted from both real and reference images. After that we establish location constraint relation of keypoints in all four subregions of image i.e. constraint relations between all SIFT keypoints and their corresponding center points. In next step, SIFT matching is performed on real and reference images and mapping is done by calculating minimum distance. Based on these mapping we can correct corresponding coordinates in images in next step and finally in we get output of four center points and the target region. In this paper registration is done using multi-subregions and SIFT. Due to establishment of location constraints and mapping relationship, we get better performance.

In [10], using lake centroids as features automated image registration is done in dynamic lake rich environments. Initially histogram thresholding is applied to both master and slave images. The segmentation result is used to create training samples to classify lakes from the land background. The segmentation is further refined by supervised classification technique using multispectral bands. Areas where pixel values are less than mean value of the water body segment serve as the training set for water bodies. Similarly, pixels having values that are greater than the mean background value are the training set for the background class. Based on these two training sets, the classifier produces Lake Map from all four bands of slave image and master image is processed in same way to produce Lake Map. Now the centroids are calculated for lakes and these

centroids are used as tiepoints for image registration. The identical lakes in two images are associated by comparing the Euclidean distance between centroid points in two images. The lakes are said to be identical if their centroids are closet on image and the Euclidean distance is minimum. In this paper, the approach is automated and it achieves subpixel accuracy and is feasible way to register images for lake change detection.

In [11], image registration is done using SIFT and image segmentation. Initially the input image with multi spectral bands is transform to single band. To convert multiple spectral bands into single band, PCA method is used. The PCA image is segmented through threshold segmentation. Here threshold value is determined and according to that image is segmented into intersecting and non-intersecting areas. After segmentation SIFT, keypoints are calculated. After obtaining these SIFT keypoints they applied to bi-variant histogram. According to that algorithm, final set of key points will be obtained through which some evaluation metrics are calculated. For e.g., rms low, rms all etc. These are the key points used for analysis. In this paper, robust and efficient automatic image registration method is proposed in which pair of images with different pixel size, translation and rotation effects and to some extent with different spectral content is registered. This method also achieves subpixel accuracy. Only drawback exists is that the computation time required is more since we have to compare all the SIFT keypoints.

IV. COMPARISON OF WORK DONE BY AUTHORS ON IMAGE REGISTRATION

Table I - Comparison of workdone by various authors.

Authors	Yongwei Sheng et al	V. babyVennila et al	Wentao Lv et al	Hernâni Gonçalves et al
Image Type Used	LandSat	Satellite	SAR & RADARSAT	LandSat
Keypoint	Centroids	Objects	SIFT Keypoints	SIFT Keypoints
Method For Matching	Euclidian Distance	Object Matching	Euclidian Distance	Euclidian Distance
Segmentation Technique used	Histogram Thresholding	Feature Based Segmentation	Region Based Segmentation	Otsu's thresholding

Steps /Stages	Image Thresholding, Image Classification, Centroid Calculation and Image Registration.	Pre-processing, Region considered segmentation, Feature Extraction, Matching and rotation Estimation.	Segmentation of real image, Extraction of keypoints, Location constraints Establishment, SIFT Matching and Mapping.	Conversion to single band, Image Segmentation, SIFT keypoint, Obtention of Matching Candidates, Outliers Removal and Final Set of Tiepoints.

V. CONCLUSION

Various researches on automatic image registration in different fields such as remote sensing, medical, computer vision, etc. are performed. In this paper, we have compared work done by various authors on image registration of satellite images. From comparison, we can say that these methods are time consuming and depend on the size and resolution of the image, which can be overcomed further.

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AUTHORS

First Author – Rachna Gajre, M.E.Computer (pursuing), Ramrao Adik Institute of Technology, E-mail: rachi.g12@gmail.com.
Second Author – Dr. Leena Ragha, Ph.D (Computer Science & Engineering), Ramrao Adik Institute Technology, E-mail: leena.ragha@gmail.com.

Computing With DNA

Pratiyush Guleria

NIELIT, Chandigarh, Extension Centre, Shimla, Himachal Pradesh, INDIA

Abstract- This paper presents a DNA Computing potential in areas of encryption, genetic programming, language systems, and algorithms. DNA computing takes advantage of DNA or related molecules for storing information and biotechnological operations for manipulating this information. A DNA computer has extremely dense information storage capacity, provides tremendous parallelism, and exhibits extraordinary energy efficiency. DNA computing devices could revolutionize the pharmaceutical and biomedical fields. It involves application of information technology to the management of biological information. DNA Computing is brought into focus mainly because of three research directions. First, the size of semiconductor devices approaches the scale of large macromolecules. Second, the enviable computational capabilities of living organisms are increasingly traced to molecular mechanisms. Third, techniques for engineering molecular control structures into living cells start to emerge. Suggested Algorithm approach is used to find the Polypurines in the DNA Nucleotides Sequence. The proposed algorithm uses the concept of file handling which acts as a database to store the four nucleotides and Polypurines are searched in the database. The efficient advantage of this algorithm is that we can found the molecular strings pair from a large number of DNA molecular strands.

Index Terms- Polypurines, Nucleotides, Biotechnology, Genetic Programming.

I. INTRODUCTION

In 1994, Leonard M. Adleman solved an unremarkable computational problem with a remarkable technique. It took Adleman, however, seven days to find a solution. Nevertheless, this work was exceptional because he solved the problem with DNA. It was a landmark demonstration of computing on the molecular level. The type of problem that Adleman solved is a famous one. It's formally known as a directed Hamiltonian Path (HP) problem, but is more popularly recognized as a variant of the so-called "travelling salesman problem." In Adleman's version of the travelling salesman problem, or "TSP" for short, a hypothetical salesman tries to find a route through a set of cities so that he visits each city only once. As the number of cities increases, the problem becomes more difficult until its solution is beyond analytical analysis altogether, at which point it requires brute force search methods.TSPs with a large number of cities quickly become computationally expensive, making them impractical to solve on even the latest super-computer. Adleman's demonstration only involves seven cities, making it in some sense a trivial problem that can easily be solved by inspection. Nevertheless, his work is significant for a number of reasons. It illustrates the possibilities of using DNA to solve a class of problems that is difficult or impossible to solve using traditional computing methods. It's an example of computation at a molecular level, potentially a size limit that may never be reached by the semiconductor industry. It demonstrates unique aspects of DNA as a data structure. It demonstrates that computing with DNA can work in a massively parallel fashion. In 2001, scientists at the Weizmann Institute of Science in Israel announced that they had manufactured a computer so small that a single drop of water would hold a trillion of the machines. The devices used DNA and enzymes as their software and hardware and could collectively perform a billion operations a second. Now the same team, led by Ehud Shapiro, has announced a novel model of its bimolecular machine that no longer requires an external energy source and performs 50 times faster than its predecessor did. The Guinness Book of World Records has crowned it the world's smallest biological computing device. Many designs for minuscule computers aimed at harnessing the massive storage capacity of DNA has been proposed over the years. Earlier schemes have relied on a molecule known as ATP, which is a common source of energy for cellular reactions as a fuel source. But in the new set up, a DNA molecule provides both the initial data and sufficient energy to complete the computation. Knapsack problems are classical problems solvable by this method. It is unrealistic to solve these problems using conventional electronic computers when the size of them gets large due to the NP-complete property of these problems.DNA computers can solve substantially large size problems because of their massive parallelism.DNA computer is a collection of DNA strands that have been specially selected to aid in the search of solutions for some problems. DNA is source code to life, instructions for building and regulating cells. Cellular machinery (enzymes) translates DNA into proteins, duplicates; repairs etc. We can consider enzymes as hardware, DNA as software. DNA is composed of four nucleotides i.e. A-Adenine, T-Thymine, C-Cytosine, G-Guanine. There are bonds in pair between A-T; C-G.DNA is the only molecule, which has capacity to replicate itself. DNA can be used to solve complex mathematical problems (Dr. Leonard Adleman, 1994).DNA has computational potential to solve mathematical problems like the directed Hamilton Path problem also Known as the "travelling salesman problem". Logic Gates are a vital part of how our computers carries out functions that we command it to do [1]. These gates convert binary code moving through the computer into a series of signals that the computer uses to perform operations. Currently logic gates interpret input signals from silicon transistors and convert those signals into an output signal that allows the computer to perform complex functions.DNA logic gates are the first step towards creating a computer that has a structure similar to that of an electronic PC.Instead of using electrical signals to perform

logical operations, these DNA logic gates rely on DNA code(University of Rochester developed logic gates made of DNA).They detect fragments of genetic material as input, splice together these fragments and form a single output. These logic gates might be combined with DNA microchips to create a breakthrough in DNA computing. Researches in DNA Computing composed of enzymes and DNA molecules instead of silicon microchips (Weizmann Institute of Science in Rehovot, Israel). (Ehud Shapiro, Yaakov Benenson et al., 2004) at the Weizmann Institute announced in the journal Nature that they had constructed a DNA computer. This was coupled with an input and output molecule and is capable of diagnosing cancerous activity [2].

II. TECHNOLOGIES RELATING TO DNA COMPUTING

Nanotechnology:

Nanotechnology comprises near-term and molecular nanotechnology. Near-term nanotechnology aims at developing new materials and devices taking advantage of the properties operating at the nanoscale. For instance, nanolithography is a top-down technique aiming at fabricating nanometre-scale structures. Nanotechnology focuses on the design, synthesis, characterization, and application of materials and devices at the nanoscale. Molecular nanotechnology aims at building materials and devices with atomic precision by using a molecular machine system. Nobel Prize-winner R. Feynman in 1959 was the first who pointed towards molecular manufacturing in his talk "There's plenty of room at the bottom". The term nanotechnology was coined by N. Taniguchi in 1974, while in the 1980s E. Drexler popularized the modelling and design of nanomachines, emphasizing the constraints of precision, parsimony, and controllability, performing tasks with minimum effort. Nanotechnology relies on the fact that material at the nanoscale exhibits quantum phenomena, which yield some extraordinary bonuses. This is due to the effects of quantum confinement that take place when the material size becomes comparable to the de Broglie wavelength of the carries (electrons and holes behaving as positively charged particles), leading to discrete energy levels. For instance, quantum dots are semiconductors at the nanoscale consisting of 100 to 100,000 atoms. Quantum dots confine the motion of (conduction band) electrons and (valency band) holes in all three spatial directions. Quantum dots are particularly useful for optical applications due to their theoretically high quantum yield (i.e., the efficiency with which absorbed light produces some effect).When a quantum dot is excited, the smaller the dot, the higher the energy and intensity of its emitted light. These optical features make quantum dots useful in biotechnological developments as well.

Biotechnology:

Modern biotechnology in the strong sense refers to recombinant DNA technology, the engineering technology for bio-nanotechnology. Recombinant DNA technology allows the manipulation of the genetic information of the genome of a living cell. It facilitates the alteration of bio-nanomachines within the living cells and leads to genetically modified organisms.

Bio-Nanotechnology:

Today, many working examples of bio-nanomachines exist within living cells. Cells contain molecular computers, which recognize the concentration of surrounding molecules and compute the proper functional output. Cells also host a large collection of molecule-selective pumps that import ions, amino acids, sugars, vitamins and all of the other nutrients needed for living. As a consequence of the evolution of life, all living organisms on earth are made of four basic molecular building blocks: proteins, nucleic acids, polysaccharides, and lipids. Proteins and nucleic acids are built in modular form by stringing subunits (monomers) together based on genetic information. The principles of protein structure and function may yield insight into Nanotechnological design and fabrication. Proteins are synthesized in a modular and information-driven manner by the translation machinery of the cell, and the design of proteins is limited by a dedicated modular plan given by the genetic code. Proteins can aggregate in larger complexes due to errors in the protein-synthetic machinery or changes in the environmental conditions, so the size of proteins that may be consistently synthesized is limited.

DNA Nanotechnology

DNA nanotechnology was initiated by N. Seeman in the 1980s. It makes use of the specificity of Watson-Crick base pairing and other DNA properties to make novel structures out of DNA. The techniques used are also employed by DNA computing and thus DNA nanotechnology overlaps with DNA computing. A key goal of DNA nanotechnology is to construct periodic arrays in two and three dimensions. For this, DNA branched junctions with specific sticky ends are designed that self-assemble to stick figures whose edges are double-stranded DNA. Today, this technology provides cubes, truncated octahedrons, and two-dimensional periodic arrays.

Computing

A digital computer can be viewed as a network of digital components such as logic gates. The network consists of a finite number of components and the components can take on a few states. Thus, the network has only a finite number of states, and hence any realizable digital computer is a finite state machine, although with a vast number of states. Today, these machines are realized by digital electronic circuits mainly relying on transistor technology. The success of digital electronic circuits is based on low signal-to-noise ratio, inter-connectability, low production costs, and low power dissipation. Digital computers excel in many areas of applications, while other interesting information processing problems are out of reach. The limitations are of both a theoretical and physical nature. Theoretical limitations are due to the nature of computations. The first model of effective computation was introduced by the Turing machine, which is essentially a finite state machine with an unlimited memory. A machine capable of carrying out any computation is called a universal machine. Universal Turing machines exist, and every personal computer is a finite-state approximation of a universal machine. A general result in computability reveals the existence of problems that cannot be computed by a universal machine despite potentially unlimited resources. Efficient computations can be carried out on practical computers in polynomial time and

space. However, there are computational problems that can be performed in exponential time and it is unknown whether they can be performed in polynomial time and space.

Biomolecular Computing

Current attempts to implement molecular computing fall into two categories. In the first are studies to derive molecular devices that mimic components of conventional computing devices. Examples are transistors from carbon-based semiconductors and molecular logic gates. The second includes investigations to find new computing paradigms that exploit the specific characteristics of molecules. Examples that fall into this category are computations based on diffusion-reaction or self-assembly. A physical computation in a digital computer evolves over time. Information is stored in registers and other media, while information is processed by using digital circuits. In Biomolecular computing, information is stored by biomolecules and processing of information takes place by manipulating biomolecules.

III. APPLICATION OF INFORMATION TECHNOLOGY IN DNA COMPUTING

DNA computing involves application of information technology to the management of biological information.DNA can help in secure transmission of huge amount of data and also process it to compute the output through the massive parallelism and powerful search functions.DNA is made up of repeating molecules called NUCLEOTIDES. DNA has specific pairing between the nitrogen bases:

ADENINE – THYMINE
CYTOSINE - GUANINE

DNA is made of 2 long stands of nucleotides arranged in a specific way called the "Complementary Rule".

A. *Nitrogenous Bases are mentioned below:*
PURINES

- Adenine (A)
- Guanine (G)

PYRIMIDINES

- Thymine (T)
- Cytosine (C)

With the help of Information Technology, we can have better management of biological information. For Example:

- By developing algorithms in programming languages we can find out the Polypurines which are continuous sequence of purines in a protein. A Purine is a heterocyclic aromatic organic compound.
- Fusion of DNA Computing and Artificial Intelligence could results into an expert system which is shown in Fig I.
- The regions of DNA lying between genes may be powerful triggers for diseases and may hold the key for potential cures.
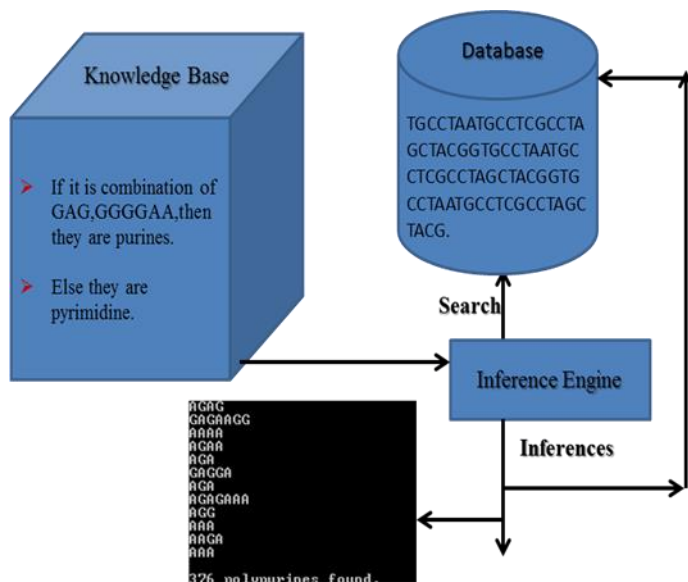
Fig. I

B. *DNA Computing Devices:*

- Could revolutionize the pharmaceutical and biomedical fields.
- Could lead to development of Face Recognition Systems.

C. *Advantages of DNA Computing:*

- In terms of speed and size, however, DNA computers surpass conventional computers.DNA strands produce billions of potential answers simultaneously.
- Search problems can be solved in parallel using a very large number of molecules.
- There is no scarcity of DNA.
- Its environment friendly

IV. NON-AUTONOMOUS DNA MODELS

These models generate large combinatorial libraries of DNA to provide search spaces for parallel filtering algorithms. These DNA models of computation help for solving complex computational problems. The idea of performing massively parallel computations in nanotechnology was first stated by R. Feynman in the late 1950s. In 1994, L.Adleman was the first to demonstrate by a DNA experiment that Biomolecular computations are feasible. In this seminal experiment, Adleman solved a small instance of the Hamiltonian path problem. For this, DNA molecules are used as a medium for information storage and this information is manipulated by standard biotechnological operations. Adleman's first experiment consists of a directed graph G.

A. *Proposed Algorithm To Find Out The Polypurines:*

DNA is composed of four nucleotides, also called bases: adenosine (A), cytidine(C), guanosine (G), and thymidine (T),

each of which consists of a phosphate group, a sugar (deoxyribose), and a nucleobase (pyrimidine – thymine and cytosine, or purine – adenine and guanine). The nucleotides are covalently linked through the sugar (deoxyribose) and phosphate residue and form the backbone of one DNA strand. These two different elements (sugar and the phosphate group) alternate in the backbone and determine the directionality of the DNA: the end with the exposed hydroxyl group of the deoxyribose is known as the 3' end; the other end with the phosphate group is termed the 5' end. Two single DNA strands assemble into a double-stranded DNA molecule, which is stabilized by hydrogen bonds between the nucleotides. The chemical structure of the bases allows an efficient formation of hydrogen bonds only between A and T or G and C; this determines the complementarily principle, also known as Watson-Crick base-pairing of the DNA double helix. The A and T base pair aligns through a double hydrogen bond and the G and C pair glues with a triple hydrogen bond, which is the reason for the higher stability of the G–C Watson-Crick base pair over the A–T Watson-Crick base pair. The overall stability of the DNA molecule increases with the increase of the proportion of the G–C base pairs. The two single DNA strands are complementarily aligned in a reverse direction: the one, called also a leading strand, has a 5' to 3' orientation, whereas the complementary strand, called lagging strand, is in the reverse 3' to 5' orientation. By using proposed algorithm in Table I we can find out the Polypurines and it can be helpful in the field of Bioinformatics. Polypurines are continuous sequence of purines in a protein. A purine is a heterocyclic aromatic organic compound.

Table I

Step I	Create a text file or file consisting of random sequence of DNA molecules and save it in any drive of computer.
Step II	Through program enter the filename and verify whether the file specified is there or not. This file acts as the database for the Polypurines.
Step III	Then enter the length of sequence to retrieve sequence of "A" and "G" from file.
Step IV	Then we will iterate to find out the sequence of "A" and "G".If found the sequence of "A" and "G" in a file, then it will print the sequences and count the number of Polypurines.

V. RESULTS AND CONCLUSIONS

The algorithm is designed in "C" language. Experimental results are shown in Fig.II.On applying this algorithm the filtered sequences of "A" and "G" can be found along with the total Polypurines found. This algorithm is vital in the field of Bioinformatics as it helps in finding the large sequences of molecules in a database and gets the result. In place of textfiles we can take some other databases for storing large sequences and issues related to pattern matching can be resolved. Better

database storage of molecules of DNA is required. It involves application of information technology to the management of biological information. Biotechnology has provided law enforcement professionals with another way of placing a suspect at the scene of a crime. This area of study, called forensic biotechnology uses a method called DNA fingerprinting.DNA Computing devices could revolutionize the pharmaceutical and biomedical fields. Fusion of DNA Computing and Artificial Intelligence could results into an expert system. A massive international study of the human genome has caused scientists to rethink some of the most basic concepts of cellular function.Genes,it turns out, may be relatively minor players in genetic processes that are far more subtle and complicated than previously imagined. Among the critical findings: A huge amount of DNA long regarded as useless-and dismissively labelled "junk DNA"-now appears to be essential to the regulatory processes that control cells.Also,the regions of DNA lying between genes may be powerful triggers for diseases and may hold the key for potential cures. While biotechnology companies have their own research teams and often contract with other companies for specialized work, much of the research that drives industrial progress is carried out in universities by academic scientists. Once a promising idea is generated, it is refined and made practical in a process known as product development.

The work highlighted in this paper is also useful for researchers working in this field as many issues still remain to be explored in the future.

Fig. 2 Output of Algorithm

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AUTHORS

First Author – Pratiyush Guleria, NIELIT, Chandigarh, Extension Centre, Shimla, Himachal Pradesh, INDIA, pratiyushguleria@gmail.com

Asynchronous Microprocessor

Sanskriti Pahinkar, Harshita Negandhi

Electronics Department, D.J Sanghvi College of Engineering

Abstract- In today's fast growing world, efficiency and speed plays an important role. Asynchronous design has been proposed to overcome various problems incurred due to synchronous architectures. This thesis starts with comparing synchronous and asynchronous designs and further describes different asynchronous process designs.

Index Terms- asynchronous design, clock skew, handshaking, micro-pipeline, synchronous processor.

I. INTRODUCTION

As technology evolves into submicron level, synchronous circuits which are based on a single global clock have incurred problems of clock skew, design complexity and electromagnetic compatibility. This little device-a clock, can increase the circuit silicon and power dissipation, which can lead to overheating and in turn affect power supplies. In an attempt to overcome these limitations, researchers are actively considering asynchronous processor design. Globally Asynchronous Locally Synchronous (GALS) scheme, in which all communications between clock domains are handled using dedicated communication channels, is widely used. These communication channels use asynchronous handshaking protocols to transfer information between clock domains. Thus instead of a global clock when data can be moved from one unit to another, asynchronous units employ local handshake over asynchronous channels [Hau95, Sei80].

II. SYNCHRONOUS V/S ASYNCHRONOUS PROCESSORS

In this fast moving technological world, synchronous processors are made of hundreds of millions of transistors with clock rates up to several giga hertz. These high clock rates only imply that millions of transistors switch several billion times a second, regardless of the work to be done or not. This leads to tremendous power loss which can be eliminated with the help of an asynchronous processor.

Another major problem revolving around a synchronous process is the clock skew. A lot of efforts are required in distributing clock pulses throughout the chip in a manner such that it reaches all sinks at exactly the same point in time. This can sometimes be eliminated using additional wires at the cost of chip size and energy distribution.

Speed of a synchronous processor can be improved by optimizing the critical path. This is done either by optimizing the elements or more than one clock cycle need to be accounted, which is definitely not desired.

On the flip side, in asynchronous processors, there are several starting points. Each optimized element can speed up the processor. Thus, unlike synchronous architectures, only the frequently used elements are optimized, thus improving the average speed of the processor.

III. ASYNCHRONOUS PROCESSOR DESIGN

In a synchronous system, a clock is used to define points in time where all elements will have valid and stable data at their interfaces. The output signal may make several transitions between two clock pulses and none of them has to be valid and it has no successor. To overcome this, a technique called handshaking is used in asynchronous processors.

Signalling Protocol:

Handshaking is the one of the most important concepts of an asynchronous design. It transfers data quickly without taking into account the slowest link in the chain. Thus, there is no critical path which will determine the minimum cycle time.
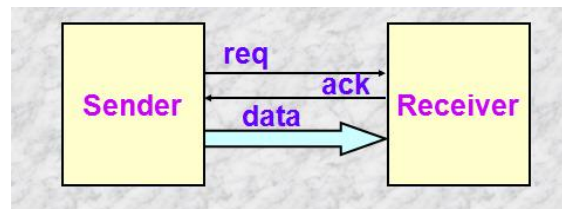
Figure 1: req: initiate an action, ack: signal completion of that action

There are different types of signalling protocols:
- a) Control Signalling
  - Two Phase Handshaking Protocol
  - Four Phase Handshaking Protocol
- b) Data Signalling
  - Bundled data with
    - Two-phase HP's
    - Four-phase HP's
  - Dual Rail Data with
    - Two-phase HP's
    - Four-phase HP's

III.a.1 Four Phased Handshaking Protocol

Figure 2: 4-phase Asynchronous Signalling Protocol

Four phased handshaking protocol, also known as 4-cycle, RZ (return to zero), and level signalling protocol, is one the most widely used protocols because of its ease of implementation. 4-phase signalling requires 4 control signal transitions (request rising, acknowledgement rising, request falling, and acknowledgement falling) per data transfer. In this protocol there are typically 4 transitions, 2 on the request and 2 on acknowledge, which are required to complete a particular event transaction. However, this sequence can cause a degradation in the overall system performance in a global interconnect assuming relatively long distance communications.

III.a.2 Two Phase Handshaking Protocol

This is one of the pervasive choices for asynchronous design. This protocol is also named as 2-cycle and NRZ (non-return to zero) protocol.
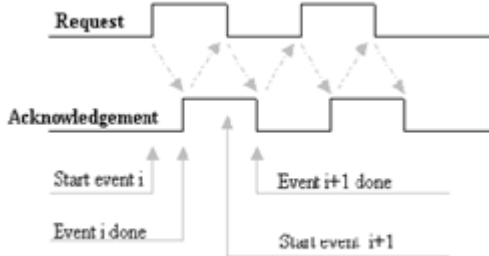
Figure 3: Two phase Asynchronous Signalling Protocol

Every transition on the request line falling and rising indicates a start of new event (request). The same is true for the transitions on the request on acknowledge line. Unlike four-phase signalling protocol, two-phase signalling reduces the transitions by half, it is more effective in terms of performance and power consumption. For this reason, despite its design complexity, two-phase signalling is recommended as an implementation method for asynchronous global interconnects.

III.b.1 Bundled Data Handshaking Protocols

These protocols are called as single-rail though bundled-data is used to describe the
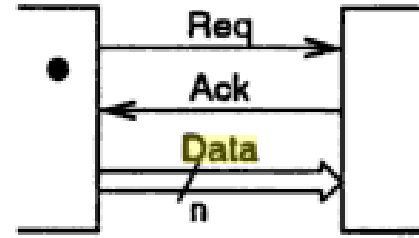
Figure 4: Bundled data (push) channel

simultaneous transmission of control and data signals, whereas single rail describes usage of one wire for each data bit. Bundled-data refers to a situation where the data signals use normal Boolean levels to encode information, and where separate request and acknowledge wires are bundled with data signals.

III.b.1.i Four phase bundled-data protocol

The term four-phase refers to the number of communication actions. First, the sender issues data and sets request high, followed by the receiver absorbing the data and setting acknowledge high. Next, the sender responds by taking request low and the receiver acknowledges this by taking acknowledge low. At this point, the sender may initiate the next communication cycle.
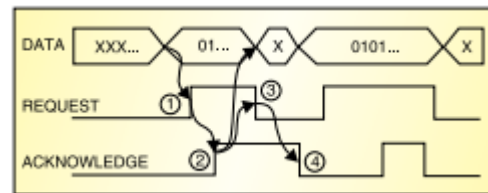
Figure 5: 4-phase Bundled-data Protocol

This type of protocol has relatively more switching activity, which may lead to slower and more energy consuming circuits.

III.b.1.ii Two phase bundled-data protocol

A four-phase bundled data protocol has a disadvantage in superfluous return-to-zero transitions that cost unnecessary time and energy. This is overcome by a two-phase bundled data protocol.

Figure

Figure 6: 2-phase Bundled-data Protocol

The information on request and acknowledge wires is now encoded as signal transitions on the wires and there is no difference between a 0 to 1 or a 1 to 0 transition as they both represent a "signal event". Ideally, a two-phase bundled data protocol is faster than a four-phase protocol.

This protocol is efficient in both time and energy because of its very little switching activity. Components sensitive on transitions are more complex than elements, which just react to signal levels.

Two-phase protocol is widely used in AMULET3 and is often referred to as 'Micro-pipeline'.

When the sender is the active party that initiates the data transfer over the channel, it is known as push-channel. On the other hand, the receiver asking for new data is also possible and is known as pull-channel. In the latter case, directions of request and acknowledge are reversed and validity of data is indicated in the acknowledge signal going from sender to the receiver.

III.b.2   Dual-Rail Protocol

A dual-rail protocol is a more sophisticated protocol that is robust to wire delays.

III.b.2.i   Four-phase Dual-rail Protocol

A four-phase dual-rail protocol encodes the request signal into data signals using two wires per bit of information that has to be communicated.
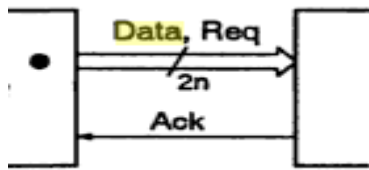
Figure 7.a
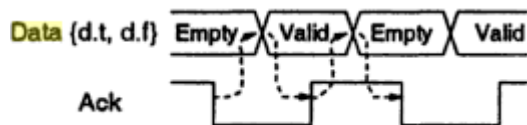
Figure 7.b

In actuality, it is a four-phase protocol using two request wires per bit of information *d*; one wire *d.t* is used for signalling a logic 1 i.e true, and another wire *d.f* is used for signalling logic 0 i.e false.

	d.t	d.f
Empty ("E")	0	0
Valid "0"	0	1
Valid "1"	1	0
Not used	1	1

Figure 7.c
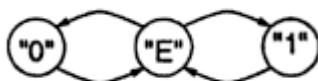
Figure 7: 4-phase dual rail (push) channel

Thus, a sequence of four-phase handshakes are seen, where the request signal in any handshake signal can be either *d.t* or *d.f*. In this type of protocol, two parties can communicate reliably

regardless of the delay in the wires connecting the two parties, which makes this protocol delay insensitive.

IV.   PIPELINING

A technique used in advanced microprocessors where the microprocessor begins executing a second instruction before the first has been completed.

Pipelining is an implementation technique that exploits parallelism among instructions in sequential instruction stream.
A conventional computer pipeline is a synchronous pipeline which is controlled by a global clock. In synchronous system each operation of an arithmetic has to be finished within a given time slot by overall clock signal. Data signals have to be stable at latching time. The clock period of synchronous pipeline is limited to a minimum of time taken for slowest pipeline stage to complete its processing.

By contrast an asynchronous pipeline does not have any global clock, hence every stage can take a variable time to finish and can work independently. Therefore the next stage can begin after the previous stage has finished which theoretically makes asynchronous pipeline faster than synchronous pipeline.
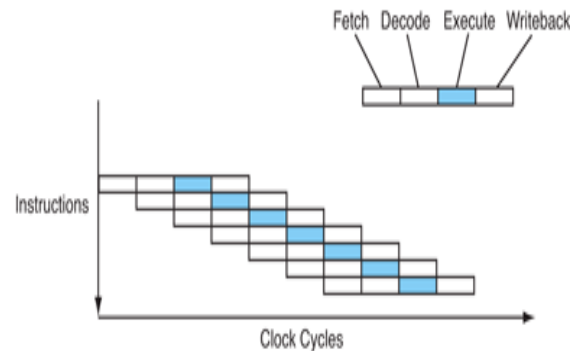
Figure 8: 4 stage pipeline
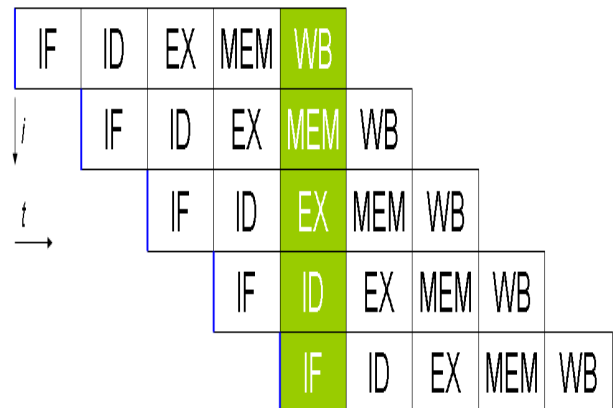
Figure 9: 5 stage pipeline

V. DRAWBACKS

The handshaking mechanism, which introduces overhead may slow down the circuit or even cost more energy than it saves.

Secondly, there is lack of a proper computer-aided design (CAD) tool.

Sometimes, it is difficult to exchange information between pipeline stages, which results in redundant data storage.

Furthermore, the control logic for asynchronous processors is more complex than synchronous processors, which leads to comparatively high energy consumption.

VI. CONCLUSION

On a whole, asynchronous processors have specific advantages like low power consumption and good electromagnetic compatibility. Asynchronous methodology can exploit the simplicity provided by sequential computation while attaining performance benefits by beginning the next computation as soon as the previous one is completed, instead of having to wait for the next clock pulse. In the future, asynchronous processors may also benefit from techniques developed for synchronous architectures, like lowering the supply voltage, which is easy to implement in an asynchronous system due to handshaking which provides the necessary flexibility.

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AUTHORS

First Author – Sanskriti Pahinkar, pursuing B.E in Electronics, Dwarkadas J. Sanghvi College of Engineering, email id: sanskriti.pahinkar@gmail.com

Second Author – Harshita Negandhi, pursuing B.E in Electronics, Dwarkadas J. Sanghvi College of Engineering, email id: hrn0502@gmail.com

Adapting a Ranking Model for Domain-Specific Search

M.Sirisha [*], **Sanjeeva Rao Sanku**[**]

[*] Pursuing M.Tech in Computer Science and Engineering from Nagole Institute of Technology and Science, JNTUH, A.P, INDIA.
[**] Assoc. Prof. Dept. CSE, M.Tech,CSE(from JNTU Kakinada

Abstract- An adaptation process is described to adapt a ranking model constructed for a broad-based search engine for use with a domain-specific ranking model. It's difficult to applying the broad-based ranking model directly to different domains due to domain differences, to build a unique ranking model for each domain it time-consuming for training models. In this paper,we address these difficulties by proposing algorithm called ranking adaptation SVM (RA-SVM), Our algorithm only requires the prediction from the existing ranking models, rather than their internal representations or the data from auxiliary domains The ranking model is adapted for use in a search environment focusing on a specific segment of online content, for example, a specific topic, media type, or genre of content. a domain-specific ranking model reduces search results to the data from a specific domain that are relevant with respect to the search terms input by the user. The ranking order may be determined with reference to a given numerical score, an ordinal score, or a binary judgment such as "relevant" or "irrelevant".

Index Terms- broad based search, Domain Adaptation, Support Vector Machines.

I. INTRODUCTION

LEARNING to rank is a kind of learning based information retrieval techniques, specialized in learning a ranking model with some documents labelled with their relevancies to some queries, where the model is hopefully capable of ranking the documents returned to an arbitrary new query automatically. Based on various machine learning method, Ranking the learning to rank algorithms have already shown their promising performances in information retrieval, especially Web search. However, as the emergence of domain-specific search engines, more attentions have moved from the broad based search to specific verticals, for hunting information constraint to a certain domain. Different vertical search engines deal with different topicalities, document types or domain-specific features. For example, a medical search engine should clearly be specialized in terms of its topical focus, whereas a music, image or video search engine would concern only the documents in particular formats.

Since currently the broad-based and vertical search engines are mostly based on text search techniques, the ranking model learned for broad-based can be utilized directly to rank the documents for the verticals. For example, most of current image search engines only utilize the text information accompanying images as the ranking features, such as the term frequency (TF) of query word in image title, anchor text, alternative text, surrounding text, URL and so on. Therefore, Web images are actually treated as text-based documents that share similar ranking features as the document or Web page ranking, and text based ranking model can be applied here directly. However, the broad-based ranking model is built upon the data from multiple domains, and therefore cannot generalize well for a particular Domain with special search intentions.

II. RANKINGADAPTATION

We define the ranking adaptation problem formally as follows: for the target domain, a query set $Q = \{q1, q2, . . . , qM\}$ and a document set $D = \{d1, d2, . . . , dN\}$ are given. For each query $qi \in Q$, a list of documents $di = \{di1, di2, . . . , di,n(qi)\}$ are returned and labeled with the relevance degrees $yi = \{yi1, yi2, . . . , yi,n(qi)\}$ by hu- man annotators. The relevance degree is usually a real value, i.e., $yij \in R$, so that different returned documents can be compared for sorting an ordered list. For each query document pair $< qi, dij >$, an s-dimensional query dependent feature vector $\varphi(qi, dij) \in Rs$ is extracted, e.g., the term frequency of the query keyword qi in the title, body, URL of the document dij. Some other hyperlink based static rank information is also considered, such as Page rank, HITS and so on. $n(qi)$ denotes the number of returned documents for query qi. The target of learning to rank is to estimate a ranking function $f \in Rs \to R$ so that the documents d can be ranked for a given query q according to the value of the prediction $f(\varphi(q, d))$. In the setting of the proposed ranking adaptation, both the number of queries m and the number of the returned documents $n(qi)$ in the training set are assumed to be small. They are insufficient to learn an effective ranking model for the target domain. However, an auxiliary ranking model $f a$, which is well trained in another domain over the labeled data Qa and Da, is available. It is assumed that the auxiliary ranking model $f a$ contains a lot of prior knowledge to rank documents, so it can be used to act as the base model to be adapted to the new domain. Few training samples can be sufficient to adapt the ranking model since the prior knowledge is available.Before the introduction of our proposed ranking adaptation algorithm, it's important to review the formulation of Ranking Support Vector Machines (Ranking SVM),which is one of the most effective learning to rank algorithms, and is here employed as the basis of our proposed algorithm.

A. Ranking SVM

Similar to the conventional Support Vector Machines (SVM) for the classification problem,the motiva- tion of Ranking SVM is to discover a one dimensional linear subspace, where the points can be ordered into the optimal ranking list under some criteria. Thus, the ranking function takesthe form of the linear model $f(\varphi(q, d)) = wT \varphi(q, d)$, where the bias parameter is

ignored, because the final ranking list sorted by the prediction f is invariant to the bias. The optimization proble for Ranking SVM is defined as follows:

$$\min_{f,\xi_{ijk}} \frac{1}{2}\|f\|^2 + C\sum_{i,j,k}\xi_{ijk}$$
$$\text{s.t.} \quad f(\phi(q_i, d_{ij})) - f(\phi(q_i, d_{ik})) \geq 1 - \xi_{ijk}$$
$$\xi_{ijk} \geq 0,$$
$$\text{for} \quad \forall i \in \{1, 2, \ldots, M\},$$
$$\forall j \forall k \in \{1, 2, \ldots, n(q_i)\} \text{ with } y_{ij} > y_{ik}, \quad (1)$$

where C is the trade-off parameter for balancing the large-margin regularization $\|f\|^2$ and the loss term $\sum_{i,j,k}\xi_{ijk}$ Because f is a linear model , we can derive that f (φ(qi , dij))−f (φ(qi , dik)) = f (φ(qi , dij)−φ(qi , dik)), with φ(qi , dij)−φ(qi , dik) denoting the difference of the feature vectors between the document pair dij and dik . If we further introduce the binary label sign(yij − yik) for each pair of documents dij and dik , the above Ranking SVM problem can be viewed as a standard SVM for classifying document pairs into positive or negative, i.e., whether the document dij should be ranked above dik or not. Since the number of labeled samples for the new domain is small, if we train the model using only the samples in the new domain, it will suffer from the insufficient training sample problem, which is ill-posed and the solution may be easily overfitting to the labelled samples with low generalization ability. Moreover, the current SVM solver requires super-quadratic computational cost for the training, as a consequence, it is quite time-consuming and nearly infeasible to train models using the training data from both the auxiliary domain and the target domain. This problem is more severe for the ranking SVM since the training are based on pairs and so the problem size is quadratic to the sample size. In the following, we will develop and algorithm to labelled in the new domain. By model adaption, both the effectiveness of the result ranking model and the efficiency of the training process are achieved.

B. Ranking Adaptation SVM

It can be assumed that, if the auxiliary domain and the target domain are related, their respective ranking func- tions f a and f should have similar shapes in the function space Rs → R. Under such an assumption, f a actually provides a prior knowledge for the distribution of f in its parameter space. The conventional regularization framework, such as Lp -norm regularization, manifold regularization designed for SVM,regularized neural network and so on, shows that the solution of an ill-posed problem can be approximated from variational principle, which contains both the data and the prior assumption.Consequently, we can adapt the regularization framework which utilizes the f a as the prior information, so that the ill-posed problem in the target domain, where only few query document pairs are labeled, can be solved elegantly. By modeling our assumption into the regularization term, the learning problem of Ranking Adaptation SVM (RA-SVM) can be formulated as:

$$\min_{f,\xi_{ijk}} \frac{1-\delta}{2}\|f\|^2 + \frac{\delta}{2}\|f - f^a\|^2 + C\sum_{i,j,k}\xi_{ijk}$$
$$\text{s.t.} \quad f(\phi(q_i, d_{ij})) - f(\phi(q_i, d_{ik})) \geq 1 - \xi_{ijk}$$
$$\xi_{ijk} \geq 0,$$
$$\text{for} \quad \forall i \in \{1, 2, \ldots, M\},$$
$$\forall j \forall k \in \{1, 2, \ldots, n(q_i)\} \text{ with } y_{ij} > y_{ik}. \quad (2)$$

The objective function (2) consists of the adaptation regularization term ∥f − f a∥2 , which minimizes the dis-tance between the target ranking function and the auxil-iary one in the function space or the parameter space, to make them close; the large-margin regularization ∥f ∥2 ; and the loss term Pi,j,k ξijk . The parameter δ ∈ [0, 1] is a trade-off term to balance the contributions of large- margin regularization ∥f ∥2 which makes the learned model numerically stable, and adaptation regularization ∥f − f a∥2 which makes the learned model similar to the auxiliary one. When δ = 0, Problem (2) degrades to the conventional Ranking SVM (1), in other words, RA-SVM is equivalent to directly learning Ranking SVM over the target domain, without the adaptation of f a. The parameter C is the same as in Ranking SVM, for balanc-ing the contributions between the loss function and the regularization terms. It can be observed that when C = 0 and δ = 1, Eq. (2) actually discards the labeled samples in the target domain, and directly output a ranking function with f = f a. This is sometimes desirable, since if the labeled samples in the target domain are unavailable or unusable, f a is believed to be better than random guess for ranking the documents in the target domain,as long as the auxiliary domain and the target domain are related.

C.Optimization Methods

To optimize Problem (2), we briefly denote xijk = φ(qi , dij) − φ(qi , dik) and introduce the Lagrange multi- pliers to integrate the constraints of (2) into the objective function, which results in the primal problem:

$$L_P = \frac{1-\delta}{2}\|f\|^2 + \frac{\delta}{2}\|f - f^a\|^2 + C\sum_{i,j,k}\xi_{ijk}$$
$$\vdash \sum_{i,j,k}\mu_{ijk}\xi_{ijk} - \sum_{i,j,k}\alpha_{ijk}(f(\mathbf{x}_{ijk}) - 1 + \xi_{ijk}). \quad (3)$$

Taking the derivatives of LP w.r.t. f , and setting it to zero, we can obtain the solution as:

$$f(\mathbf{x}) = \delta f^a(\mathbf{x}) + \sum_{i,j,k}\alpha_{ijk}\mathbf{x}_{ijk}^T\mathbf{x}. \quad (4)$$

Denoting $\Delta f(x) = \sum_{i,j,k}\alpha_{ijk}x^T$ Viewed as the part of support vectors learned from the target domain, we can derive from (4) that the final ranking function f , which we would like to achieve for the target domain, is a linear combination between the auxiliary function f a and the target part Δf , and the parameter δ controls the contribution of f a .In addition to (4), the optimal solution of problem (2) should satisfy the Karush-Kuhn-Tucker (KKT) con-ditions, which are composed of:

$\alpha_{ijk} (f(x_{ijk}) - 1 + \xi_{ijk}) = 0$

$\alpha_{ijk} \geq 0$

$f(x_{ijk}) - 1 + \xi_{ijk} \geq 0$

$\mu_{ijk} \xi_{ijk} = 0$

$\mu_{ijk} \geq 0$

$\xi_{ijk} \geq 0$

$C - \alpha_{ijk} - \mu_{ijk} = 0.$ (5)

Substituting (4) and (5) back into (3), we can derive the dual problem formulation as:

$$\max_{\alpha_{ijk}} -\frac{1}{2} \sum_{i,j,k} \sum_{l,m,n} \alpha_{ijk}\alpha_{lmn} x_{ijk}^T x_{lmn}$$
$$+ \sum_{i,j,k} (1 - \delta f^a(\mathbf{x}_{ijk}))\alpha_{ijk}$$
$$\text{s.t. } 0 \leq \alpha_{ijk} \leq C,$$
$$\text{for } \forall i \in \{1,2,\ldots,M\},$$
$$\forall j \forall k \in \{1,2,\ldots,n(q_i)\} \text{ with } y_{ij} > y_{ik}. \quad (6)$$

The above problem is a standard Quadratic Programming(QP) problem, and any standard QP solvers, e.g. over fitting problem can be overcome by utilizing the prior information from the auxiliary model.

D. Discussions

The proposed RA-SVM has several advantages, which makes our algorithm highly applicable and flexible when applied to the practical applications. We'll give more discussions of the characteristics of RA-SVM in the following.

- Model adaptation: the proposed RA-SVM does not need the labeled training samples from the auxil-iary domain, but only its ranking model f a . Such a method is more advantageous than data based adaptation, because the training data from auxiliary domain may be missing or unavailable, for the copy- right protection or privacy issue, but the ranking model is comparatively easier to obtain and access.
- Black-box adaptation: The internal representation of the model f a is not needed, but only the prediction of the auxiliary model to the training samples from the target domain f a(x) is used. It brings a lot of flexibilities in some situations where even the auxiliary model itself may be unavailable. Also, in some cases, we would like to use a more advanced algorithm for learning the ranking model for the new target domain, than the one used in the old auxiliary domain, or in other cases, the algorithm used in the old domain is even unknown to us. By the black-box adaptation property, we don't need to have any idea on the model used in the auxiliary do- main, but only the model predictions are required.
- Reducing the labelling cost: by adapting the auxiliary ranking model to the target domain, only a small number of samples need to be labelled,In Section 5,

we'll experimentally demonstrate the proposed RA-SVM model is quite robust and well-performed, even with only a small number of training samples labeled.
- Reducing the computational cost: It has been shown that our ranking adaptation algorithm can be trans-formed into a Quadratic Programming(QP) problem, with the learning complexity directly related to the number of labeled samples in the target domain.

III. EXPLORE RANKING ADAPTABILITY

Though the ranking adaptation can mostly provide ben- efits for learning a new model, it can be argued that when the data from auxiliary and target domains share little common knowledge, the auxiliary ranking model can provide little help or even negative influence, to the ranking of the documents in the target domain. Consequently, it is imperative to develop a measure for quantitatively estimating the adaptability of the auxiliary model to the target domain. However, given a ranking model and a dataset collected for a particular target domain, it's nontrivial to measure their correlations di- rectly, because neither the distribution of the ranking model nor that of the labeled samples in the target domain is trivial to be estimated. Thus, we present some analysis on the properties of the auxiliary model,based on which the definition of the proposed adaptability is presented.

A.Auxiliary Model Analysis

We analyze the effects of auxiliary models through the loss constraint in the formulation of our RA-SVM. By substituting (4) into (2), we can obtain that:

$\sum f a(x_{ijk}) + \Delta f(x_{ijk}) \geq 1 - \xi_{ijk}$

with $y_{ij} > y_{ik}$, and $\xi_{ijk} \geq 0$,   (9)

where, as defined before, $x_{ijk} = \varphi(q_i, d_{ij}) - \varphi(q_i, d_{ik})$ and $\Delta f = \Sigma_{i,j,k} \alpha_{ijk} x_k^T x$. Thus, in order to minimize the ranking error ξ_{ijk} for the document pair d_{ij} and d_{ik}, we hope to get a large prediction value on the left-hand side of the first inequation in (9). For a given auxiliary ranking function f a, a comparatively large f a(x_{ijk}) suggests that f a can correctly judge the order for the document pair d_{ij} and d_{ik}, and vice versa. According to the constraints (9), if f a is capable of predicting the order of the documents correctly, we can correspondingly lower the contribution of the part of the ranking function learned in the target domain, i.e., Δf. At an extreme case, if f a is able to predict all pairs of documents correctly in the target domain, namely it can give perfect ranking lists for all the labeled queries, we may derive that f should be applied to the target domain directly with only small modifications, i.e., satisfying the "large margin"requirement in the target domain. On the other hand,if f cannot give a desirable ordering of the document pairs, we have to rely on Δf more to eliminate the side effects of f a , so that the ranking error over labelled samples is reduced. Consequently, the performance of f a over the labeled document pairs in the target domain can greatly boost the learning of RA-SVM for the ranking adaptation.

B.Ranking Adaptability

Based on the above analysis of f a , we develop the *ranking adaptability* measurement by investigating the correlation between two ranking lists of a labeled query in the target domain, i.e., the one predicted by f a and the ground-truth one labeled by human judges. Intuitively,if the two ranking lists have high positive correlation,the auxiliary ranking model f a is coincided with the distribution of the corresponding labeled data, therefore we can believe that it possesses high ranking adaptability towards the target domain, and vice versa. This is because the labeled queries are actually randomly sampled from the target domain for the model adaptation,and can reflect the distribution of the data in the target domain.

The proposed *ranking adaptability* measures the corelation between the ranking lists sorted by auxiliary model prediction and the ground truth, which in turn gives us an indication of whether the auxiliary ranking model can be adapted to the target domain, and how much assistance it can provide. Based on the *ranking adaptability*, we can perform automatic model selection for determining which auxiliary models will be adapted.

IV. PROCEDURE

This paper is integrated with following Modules:
A. Ranking Adaptation Module.
B. Explore Ranking adaptability Module.
C. Ranking adaptation with domain specific search Module.
    D. Ranking Support Vector Machine Module.

A. Ranking adaptation Module

Ranking adaptation is closely related to classifier adaptation, which has shown its effectiveness for many learning problems. Ranking adaptation is comparatively more challenging. Unlike classifier adaptation, which mainly deals with binary targets, ranking adaptation desires to adapt the model which is used to predict the rankings for a collection of domains. In ranking the relevance levels between different domains are sometimes different and need to be aligned. We can adapt ranking models learned for the existing broad-based search or some verticals, to a new domain, so that the amount of labeled data in the target domain is reduced while the performance requirement is still guaranteed and how to adapt the ranking model effectively and efficiently .

B.Explore Ranking adaptability Module

Ranking adaptability measurement by investigating the correlation between two ranking lists of a labeled query in the target domain, i.e., the one predicted by fa and the ground-truth one labeled by human judges. Intuitively, if the two ranking lists have high positive correlation, the auxiliary ranking model fa is coincided with the distribution of the corresponding labeled data, therefore we can believe that it possesses high ranking adaptability towards the target domain, and vice versa. This is because the labeled queries are actually randomly sampled from the target domain for the model adaptation, and can reflect the distribution of the data in the target domain.

C. Ranking adaptation with domain specific search Module

Data from different domains are also characterized by some domain-specific features, e.g., when we adopt the ranking model learned from the Web page search domain to the image search domain, the image content can provide additional information to facilitate the text based ranking model adaptation. In this section, we discuss how to utilize these domain-specific features, which are usually difficult to translate to textual representations directly, to further boost the performance of the proposed RA-SVM. The basic idea of our method is to assume that documents with similar domain-specific features should be assigned with similar ranking predictions. We name the above assumption as the consistency assumption, which implies that a robust textual ranking function should perform relevance prediction that is consistent to the domain-specific features. The basic idea of our method is to assume that documents with similar domain-specific features should be assigned with similar ranking predictions.

D. RankingSupportVector Machines Module

Ranking Support Vector Machines (Ranking SVM), which is one of the most effective learning to rank algorithms, and is here employed as the basis of our proposed algorithm, the proposed RA-SVM does not need the labeled training samples from the auxiliary domain, but only its ranking model fa. Such a method is more advantageous than data based adaptation, because the training data from auxiliary domain may be missing or unavailable, for the copyright protection or privacy issue, but the ranking model is comparatively easier to obtain and access.

V. RELATED WORK

We present some works that closely relate to the concept of ranking model adaptation here. To create a ranking model that can rank the documents according to their achine learning techniques have been proposed. Some of them transform the ranking problem into a pairwise classification problem, which takes a pair of documents as a sample, with the binary label taken as the sign of the relevance difference between the two documents, e.g. Ranking SVM,RankBoost, RankNet and etc. Some other methods including ListNet,AdaRank,PermuRank,LambdaRank and etc., focus on the structure of ranking list and the direct optimization of the objective evaluation measures such as Mean Average Precision (MAP) and Normalized Discounted Cumulative Gain (NDCG). In this paper, instead of designing a new learning algorithm, we focus on the adaptation of ranking models across different domains based on the existing learning to rank algorithms.A lot of domain adaptation methods have also been proposed to adapt auxiliary data or classifiers to a new domain. Daume and Marcu proposed a statistical formulation in terms of a mixture model to address the domain distribution differences between training and testing set. A boosting framework was also presented for the similar problem . For natural language processing, Blitzer and et al introduced a structural correspondence learning method which can mine the correspondences of features from different domains. For multimedia application, Yang and et al.proposed Adaptive SVM algorithm for the cross-domain video concept detection problem. However, these works are mainly designed for

classification problems, while we focused on the domain adaptation problem for ranking in this paper.

VI. FURTURE ENHANCEMENT

Every application has its own merits and demerits. The project has covered almost all the requirements. Further requirements and improvements can easily be done since the coding is mainly structured or modular in nature. Changing the existing modules or adding new modules can append improvements. Further enhancements can be implemented in this project. Since this project is concerned with a specific domain "languages" it can be further extended to various domains. Image search, document retrieval, map search can also be implemented in this.

VII. CONCLUSION

As various vertical search engines emerge and the amount of verticals increases dramatically, a global ranking model, which is trained over a dataset sourced from multiple domains, cannot give a sound performance for each specific domain with special topicalities, document formats and domain-specific features. Building one model for each vertical domain is both laborious for labeling the data and time-consuming for learning the model.

In this paper, we propose the ranking model adaptation, to adapt the well learned models from the broad-based search or any other auxiliary domains to a new target domain. By model adaptation, only a small number of samples need to be labeled, and the computational cost for the training process is greatly reduced. Based on the regularization framework, the Ranking Adaptation SVM algorithm is proposed, which performs adaptation in a black-box way, only the relevance predication of the auxiliary ranking models is needed for the adaptation.

Based on, two variations called margin rescaling slack rescaling are proposed to utilize the domain specific features to further facilitate the adaptation, by assuming that similar documents should have consistent rankings, and constraining the margin and loss of RA-SVM adaptively according to their similarities in the domain-specific feature space. Furthermore, we propose *ranking adaptability*, to quantitatively measure whether an auxiliary model can be adapted to a specific target domain and how much assistance it can provide

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AUTHORS

First Author – 1.M.Sirisha is pursuing M.Tech in Computer Science and Engineering from Nagole Institute of Technology and Science, JNTUH, A.P, INDIA. Her research areas include data mining, wireless mobile communication and network security

Second Author – SANJEEVA RAO SANKU ,Assoc. Prof. Dept. CSE, M.Tech,CSE(from JNTU Kakinada Campus,Completed in 2006)B.Tech(from Mahatma Gandi Institute of Technology, completed in 2003)Experience: 9+ years Interesting areas: Data warehousing and Data Minig, Computer Networks, Image Processing   Attended number of workshops in various engineering colleges and universities. Conducted number of workshops in various colleges.number.

Analysis of S-shape Microstrip Patch Antenna for Bluetooth application

Mohammad Aneesh[*]**, J.A Ansari**[**]**, Ashish Singh**[**]**, Kamakshi**[**]**, S.S Sayeed**[**]

[*] Department of Electronics & Communication,
J.K Institute of Applied Physics & Technology
University of Allahabad, Allahabad-211002, U.P, India

Abstract- In this paper, S-shape microstrip patch antenna is investigated for wideband operation using circuit theory concept based on modal expansion cavity model. It is found that the antenna resonates at 2.62 GHz. The bandwidth of the S-shape microstrip patch antenna 21.62 % (theoretical) and 20.49% (simulated). The theoretical results are compared with IE3D simulation as well as reported experimental results and they are in close agreement.

Index Terms- Microstrip Patch Antenna (MSA), Notch, Wireless, Bluetooth.

I. INTRODUCTION

The rapid development of wireless communication urges the need of wide and dualband antennas. Microstrip patch antennas (MSA) have found wide spread application in wireless communication industry due to their various advantages such as low cost ease fabrication, linearly and circularly polarization. Due to these advantages, many researchers worked on MSA; firstly, it was reported by Deschamp [1] while first experimental MSA was reported by Howell [2], and till now rapid development have been reported in the field of MSA. Further several designs of microstrip patch antennas are reported in this field, Deshmukh and Ray reported Analysis of Broadband Psi (Ψ)-Shaped Microstrip Antennas[3], Simulated and measured results for a S-shaped monopole patch antenna on a BiNbO4 layer[4], A compact microstrip slot antenna with novel E-shaped coupling aperture[5], Analysis of an H-shape cross slotted aperture-coupled microstrip patch antenna[6], FDTD analysis of a compact, H-shaped microstrip patch antenna[7], H-shaped microstrip patch antenna using L-probe fed for wideband applications[8], Design of an H-shape cross slotted aperture-coupled microstrip patch antenna[9], A tri-band H- Shaped microstrip patch antenna for DCS and WLAN applications[10], stacked H shaped microstrip patch antenna[11], experimental study of microstip patch antenna with an L-shaped probe[12], Compact and Broadband Microstrip Stacked Patch Antenna With Circular Polarization for 2.45-GHz Mobile RFID Reader[13]. Above reported papers lack theoretical analysis for S-shape notch loaded MSA and they have not compared theoretical and simulated results, these papers also lack equivalent circuits.

In this paper, the theoretical results of S-shape notch loaded MSA are compared with theoretical and simulated results. Details of the antennas design, theoretical, and simulated results are also presented and discussed.

II. ANTENNA DESIGN AND ITS EQUIVALENT CIRCUIT

The geometry of proposed S-shape microstrip patch antenna is shown in Fig. 1. The proposed antenna is loaded with two notches. The design specification of antenna is given in the Table 1. The microstrip patch is considered as a parallel combination of resistance (R_I), inductance (L_I) and capacitance (C_I) as shown in Fig. 2(a). The values of R_I, L_I, and C_I can be calculated as:

(a)

(b)
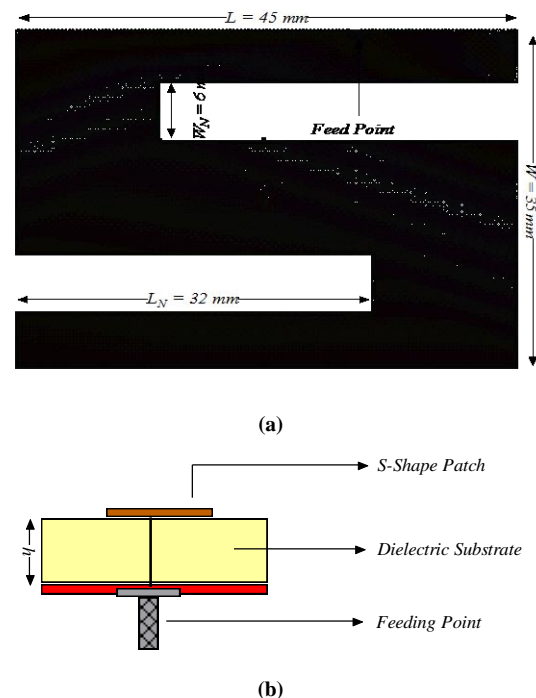
Figure 1. S-Shape notch loaded patch antenna (a) Top view (b) Side View

Table 1: Design specifications for different configuration of S shape MSA

Length of the rectangular patch (L)	45.00 mm
Width of the rectangular patch (W)	35.00 mm
Substrate Thickness (h)	10.50 mm
Length of the notch (L_N)	32.00 mm
Width of the notch (W_N)	06.00 mm
Dielectric constant of the material (ε_r)	1.07
Feed point location(x_o, y_o)	(8,17)

$$R_1 = \frac{Q_T}{\omega C_1} \tag{1}$$

$$L_1 = \frac{1}{\omega^2 C_1} \tag{2}$$

$$C_1 = \frac{\varepsilon_0 \varepsilon_e L W}{2h} \cos^{-2}(\frac{\pi y_0}{L}) \tag{3}$$

where L, W is the length and width of the rectangular patch respectively. $y_0 =$ feed point location, $h=$ thickness of the substrate material.

$$Q_T = \frac{c\sqrt{\varepsilon_e}}{4fh} \tag{5}$$

where $c=$ velocity of light, f=the design frequency, ε_e is effective permittivity of the medium which is given by [14]

$$\varepsilon_e = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}(1 + \frac{10h}{W})^{-\frac{1}{2}} \tag{6}$$

where ε_r is relative permittivity of the substrate material.

Therefore, the impedance of the rectangular patch can be calculated from Fig. 2(a) as

$$Z_P = \frac{1}{(\frac{1}{R_1} + \frac{1}{j\omega L_1} + j\omega C_1)} \tag{7}$$

In this rectangular patch two notches $(L_n \times W_n)$ are loaded, which cause the flow of two currents in the patch, one is the normal patch current which causes the antenna to resonate at the design of frequency of the initial patch; however, the other current flows around the notch resulting into second resonance frequency. Discontinues due to notch incorporated in the patch are considered in terms of an additional series inductance (ΔL) and series capacitance (ΔC) that modify the equivalent circuit of the RMSA as shown in Fig. 2(b), in which ΔL and ΔC can be calculated as [15]-[16]

$$L_2 = L_1 + 2\Delta L \tag{8}$$

$$C_2 = \frac{C_1 \Delta C^2}{\Delta C^2 + 2C_1 \Delta C} \tag{9}$$

The value of the R_1 after cutting the notch is calculated by [17]. It may be noted that the two resonant circuits, rectangular patch and notch loaded patch are coupled through mutual inductance (L_M) and mutual capacitance (C_M). Thus the notch loaded patch can be considered as fig 2(c).

(a)

(b)

(c)
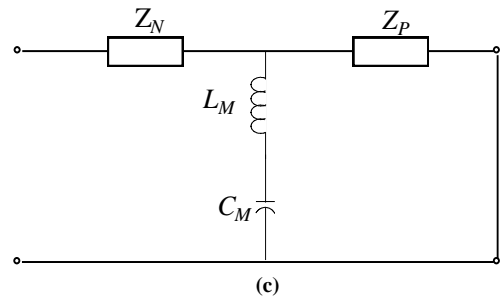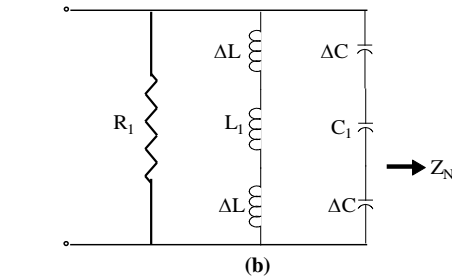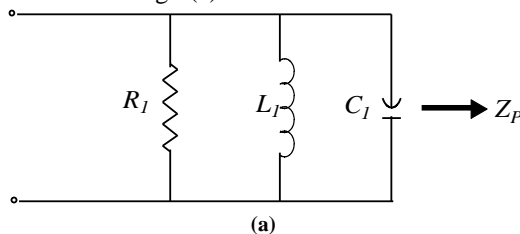
Figure 2. (a)   Equivalent circuit of patch
(b)   Equivalent circuit of notch
(c)   Equivalent circuit of coupled S-Shape notch loaded patch antenna

The total input impedance of the S-shape notch loaded patch

$$Z_T = Z_N + \frac{Z_M Z_P}{Z_M + Z_P} \tag{10}$$

III.   RESULTS AND DISCUSSION

Figure 3(a) shows the comparison between theoretical and simulated results for S-shape antenna and they are found in close agreement. Figure 3(b) shows the variation of reflection coefficient with frequency for different length (L_n) of S-shape antenna. On increasing the length of notch from 32 to 40 mm lower and higher resonance frequencies shift towards lower side. Figure 3(c) shows the variation of reflection coefficient with frequency for different width of notch. On increasing the width from 6 to 8 mm, wideband is obtained and frequencies are shifted to lower resonance side, while for the notch width 7 mm to 7.5 mm lower and higher resonance frequencies having no significant change.

Figure 3(d) shows the variation of reflection coefficient with frequency for different height (h) of the substrate of S shape antenna. On increasing the height (h) of the substrate from 10.5 to 13.5 mm lower frequencies shifted towards lower side and higher resonance frequencies shifted towards higher side. Figure 3(e) shows the gain plot with frequency. The maximum gain of the antenna is obtained at center frequency 2.62 GHz is 8.1 dBi and 8.2 dBi theoretical and simulated values respectively. Which are found in close agreement with each other. Figure 3(f) shows the efficiency plot with frequency, it is found that theoretical and simulated maximum efficiency is 91.75 and 92.04 % respectively, which is obtained at center frequency 2.62 GHz.
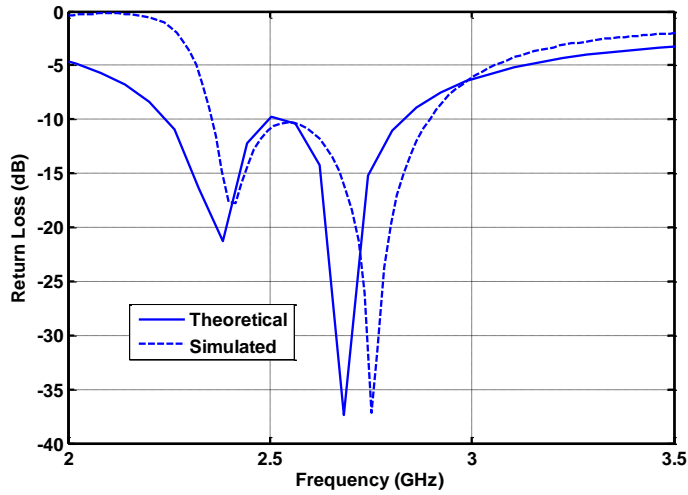
Fig. 3(a) Comparative plot of theoretical and simulated results for antenna
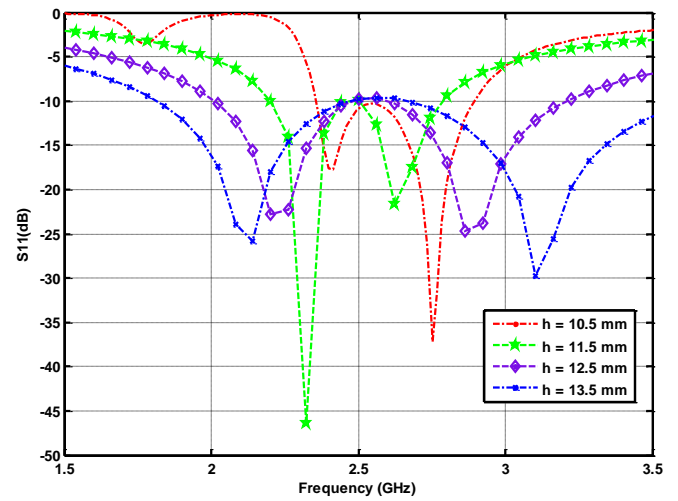
Fig. 3(d) Variation of reflection coefficient with frequency for different height of the substrate (*h*)
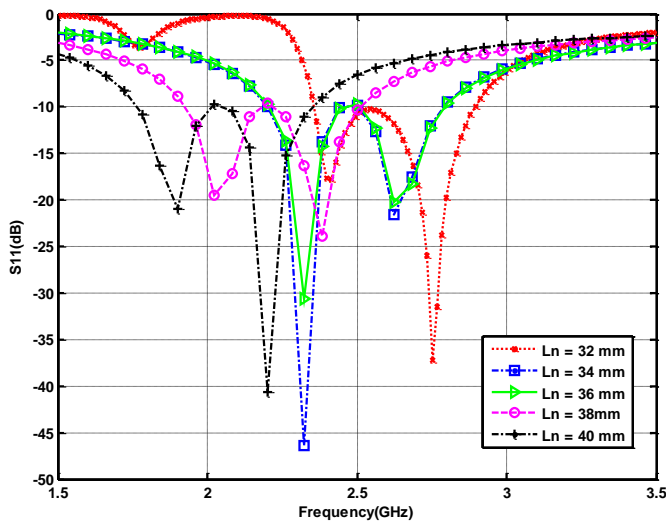
Fig. 3(b) Variation of reflection coefficient with frequency for different length of notch (*Ln*)
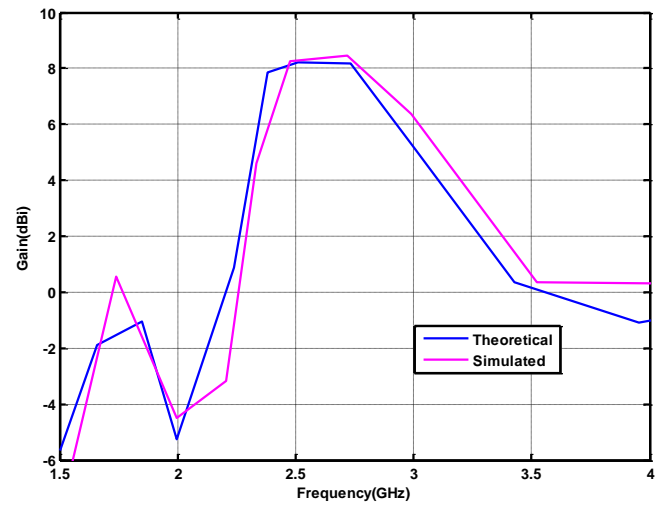
Fig. 3(e) Comparative plot of gain with frequency
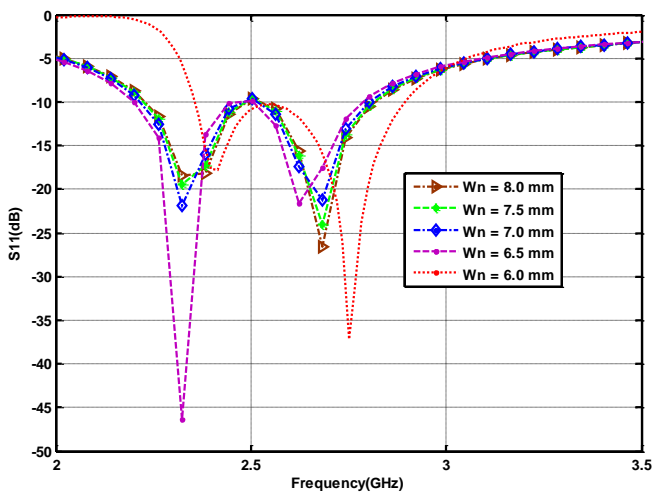
Fig. 3(c) Variation of reflection coefficient with frequency for different width of notch (Wn)
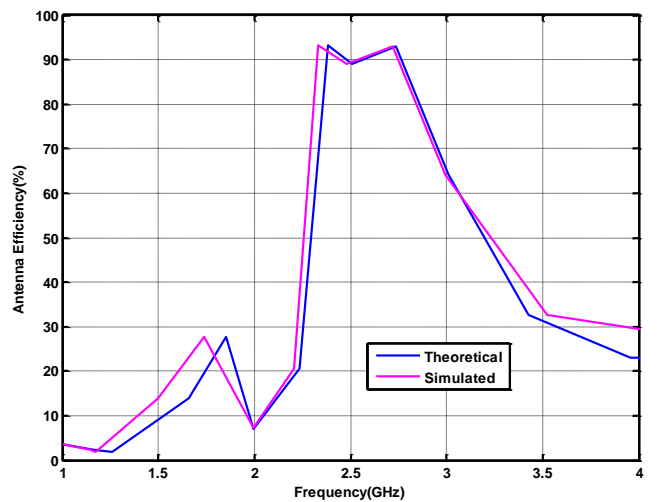
Fig. 3(f) Comparative plot of antenna efficiency vs frequency

IV. CONCLUSION

An analysis of S-shape MSA has been carried out. The S-shape MSA parameters depend on length of notch, width of the notch and height of the substrate. The theoretical and simulated results are in close agreement of S-shape MSA which has center frequency at 2.62 GHz and suitable for broadband operation with sufficient bandwidth and moderate gain, this antenna can be utilized in various wireless communication systems.

ACKNOWLEDGMENT

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AUTHORS

First Author – Mohammad Aneesh, Research Scholar, University of Allahabad, aneeshau14@gmail.com.

Second Author – J.A Ansari, Ph.D, University of Allahabad, jaansari@rediffmail.com

Third Authors – Ashish Singh, Kamakshi, S.S Sayeed, Research Scholars, University of Allahabad.

Correspondence Author – Mohammad Aneesh, Research Scholar, University of Allahabad, aneeshau14@gmail.com, +919415325401

Proactive condition Monitoring Systems for Power Plants

Shameer V. Hameed[*], **Shameer K. M**[**]

[*] Department of Mechanical Engineering, S.C.M.S School of Engineering and Technology, karukutty-683582
[**] Research at Bharathiar University, Coimbatore

Abstract- **Power** plant condition monitoring systems are pervasive around the industrial space of mechanical systems due to the ever-increasing demand for improved reliability and fail proof operation. Much of the downtime can be obviated with proactive maintenance by measuring vital machine parameters to discover imminent failures. The condition of the turbine and the generator are monitored using the characteristic signatures present in the Acoustic Emanations generated by the vibrating components of the reciprocating parts. The feeble noise of the malfunctioning components will not be detectable at the beginning stages as they are often buried in the noise floor and this creates a major challenge in prognostic reporting of the events that could lead to a catastrophic failure. In this paper an attempt is made to lift and isolate the fault signatures that are hidden behind the noise floor by utilizing Digital Signal Processing Source separation techniques, which is then compared with a pre-collected data base of the different fault stages of the turbine and generator that helps in prognostic report making which in turn eliminates the need of trained professionals for condition monitoring. Implementation of this prototype system will effectively reduce the downtime of power generation along with the elimination of expensive human professional. The collected acoustic data are simulated in MATLAB.

Index Terms- Proactive condition monitoring, Noise floor, Classifier, Neural networks.

I. INTRODUCTION

Power plants productivity depends profoundly on turbines and generators. In order to maximize the power plant efficiency, the rotating parts of the turbines and generators should work with less downtime and maximum throughput. Rotating parts of the power plants passed through a series of subsequent stages before catastrophic failure occurs. The reciprocating parts of the generators produce acoustic emanations during it operations and it varies as it goes through different stages of its lifetime, which is being utilized for monitoring the moving parts of the power plant. Proactive monitoring systems continuously listen to the acoustic emanations of the interested bearings and shafts and helps in making prognostic report for taking necessary actions, which leads to fail proof operation of the plant.

The proposed system acquire signals from the power generating machine trains that often buried in the noise floor which is then separated and elevated from the noise using blind source separation, a digital signal processing technique. The source separated fault signals are classified in to corresponding class and the fault stage preceding to failure are identified that gives way for a mechanical engineer to prepare timely report for

proactive maintenance. Based on the report the malfunctioning components of the plant can be identified at each stage before it stops and appropriate maintenance schedule can be prepared and carried out without affecting the overall productivity of the plant.

Power generation efficiency of a plant is an interesting problem and a lot of capital and human effort is spend on this for maximum fail proof operation. By the implementation of the prototype system human effort in diagnosing, the faulty stages are being reduced drastically. Automated monitoring helps in recognizing the malfunctioning parts at an earlier stage with great accuracy and to eliminate the expense in maintaining an expert engineer for the purpose.

II. METHODOLOGY

Acoustic emanations from the vibrating parts of the power plant machinery of monitoring interest are acquired, preprocessed and source separated from the background mixture using BSS a signal processing technique. The decomposed signal contains the independent acoustic sources from the entire vibrating components of the power plants being made utilized for the proactive monitoring. The source-separated signals, includes bearing noise, rotor, shaft, piston slap, turbine noise etc. are classified into corresponding class labels using an artificial neural network classifier with the help of pretrained database of the interested components. Classifier with prior knowledge of various fault stages of the components to be monitored categorizes each stage of a component from its normal operation to fault and the present stage of the monitoring component is indicated, which helps in preparing the prognostic report for scheduling the maintenance task that constructively brings down catastrophic failure and down times, resulting in improved performance and efficiency of the power plant. Block diagram of the prototype system is depicted in figure 1.

III. SOURCE SEPARATION

Sensors attached to the interested parts of the power plant to be monitored, consists of an exotic ensemble of background noises emanating from all parts, that should be source separated for further classification and fault detection. Acoustic emissions from each parts of the machinery have a unique feature set that reveals its identity among the noise mixture are extracted, after the mixture being source separated. Separation of the interested signal sources were accomplished by component analysis for estimating the individual signals. The composite signal mixture observed from the sensors are decomposed into its independent components using statistical technique by applying linear transformations to co-ordinates for extracting the machine modeling signals below the noise floor. ICA method works on

certain assumptions that the source components are independent and have non-Gaussian distributions
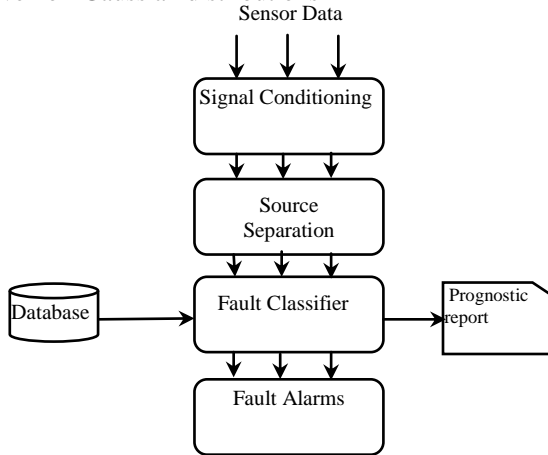
Figure 1. Block diagram of prototype system

.   ICA decomposes the simultaneous signals from various sensors attached to the generator and power train assembly of the turbines of the power plant. The process of decomposition of these simultaneous independent signals starts with a signal pre-whitening stage followed by an optimization stage, which retrieves the independent source signals.[1],[5-7] ICA isolates and extracts the vital signals buried under the noise floor. The decomposed independent signals are feature extracted and then recognized with an artificial neural network classifier.

IV.   MEL FREQUENCY FEATURE EXTRACTION

Among the set of spectral features generally used for acoustic feature extraction, Mel Frequency Cepstral Coefficients (MFCC) has a special position due to its simplicity and robustness. MFCC represents the signal as a sequence of compact Mel Frequency Spectral Coefficients or feature vectors, which could effectively reduce the computational complexity of the subsequent stages. The MFCC feature estimation process divides the incoming signal stream into finite width frames and a windowing function (Hamming window) is used to remove the effect of frame discontinuities. The frames are converted into frequency domain using a DFT function. The frequency domain frames are transformed into the mel pitch scale and the frequency scale-warping converts it into the cepstrum domain. By taking the inverse DFT of the converted scale, the signal is restored again into the time domain.The mathematical abstraction of the process can be described as follows:
The DFT of the input signal $x(n)$ is given by:

$$X(k) = \sum_{n=0}^{N-1} x(n) \exp\left(-\frac{j2\pi nk}{N}\right) \qquad (1)$$

$$k = 0,1,2,\ldots\ldots\ldots N-1$$

 Each Fourier Transform magnitude coefficient $X(k)$ is multiplied by a sequence of triangular gain filters and the results are accumulated. The Mel-frequency filter bank [132], [133] comprises of p filters with the energy in each band given by mj (j=1, 2,…,p), and is computed as:

$$m_j = \sum_{k=0}^{N-1} |X_{(k)}|^2 \, H_j(k) \qquad 0 \leq j \leq p \qquad (2)$$

where   Hj (k) is the transfer function of jth filter. The Mel-frequency cepstrum is then the discrete cosine transform [55] of the p filter outputs and is represented as

$$c_i = \sqrt{\frac{2}{N}} \sum_{j=1}^{p} m_j \cos\left(\frac{\pi ij}{p}\right) \qquad (3)$$

 Where ci is the ith MFCC coefficient.
A series of equal area triangular filters are designed to achieve the filtering process happens in ear preceded by the cepstral step where the mel frequency coefficients are converted back to time domain.

V.   DEFECT IDENTIFICATION AND CLASSIFICATION

Fault identification of the interested bearing is based on the classification of input signals into its corresponding faulty stage with a classifier. Classifier identifies the component malfunctioning stages, by utilizing the prerecorded trained database. Artificial neural network classifiers are used for the defect identification task, as it acts as a basic background techniques for pattern recognition. Probabilistic neural networks (PNN) are a type of ANN which uses probabilistic approaches for the statistical inference of the fault stage identification. A neural network consists of an interconnected group of artificial neurons,   and   it   processes   information   using a connectionist approach   to computation.   The   fundamental processing element of a neural network is a neuron. This building block   of   human   awareness   encompasses   a   few   general capabilities. Basically, a biological neuron receives inputs from other sources, combines them in some way, performs a generally nonlinear operation on the result, and then outputs the final result.
PNN is a multilayer perceptron consisting of an input layer, output layer and intermediate layers, which perform activation function and weight adjustment for training the network for a particular output. PNN that is widely accepted as a classifier, proposed for the classification due to the advantage of faster training process compared to back propagation algorithms and its flexibility to add or remove training samples without extensive retraining.   Probabilistic   neural   network   is   a computational simulation of a biological neural network, an implementation of a statistical algorithm called kernel discriminant analysis in which the operations are organized into a multilayered feed forward network with four layers such as Input layer, Pattern layer, Summation layer and Output layer. PNN offers a cost-effective and reliable approach to condition monitoring. Using artificial neural networks, collected data regarding the condition of the machinery can be classified and trained in order to generalize a method for data analysis at any time of the measurement. The general architecture of PNN is depicted in figure dddd
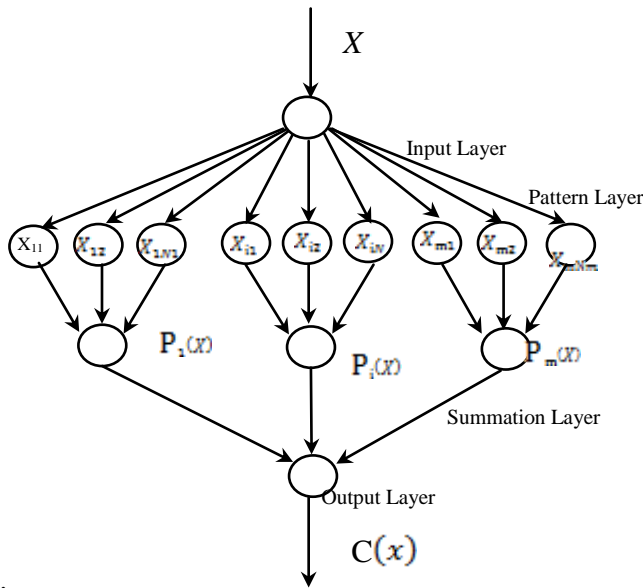
Figure 2. The general architecture of PNN

VI.PROGNOSTIC REPORT MAKING

To reduce repair costs and minimize losses in productivity, more manufacturing operations are turning from preventive maintenance (maintenance based on a fixed schedule) to proactive maintenance and predictive maintenance (maintenance based on objectively determined need) in order to protect their high-value assets. Condition monitoring of crankcase, hydraulic, motor bearings and gear lubricants plays an important role in the maintenance of equipment including heavy machinery and plant equipment .Prognostic report making includes the making of report after the testing phase; the report shows the actual stage of the bearing and this report help the maintenance engineer in charge to arrange the maintenance properly without sudden breakdown.   relatively low failure rate of mechanical components compared to electrical components, failures of mechanical components in drive trains often create high repair costs and revenue loss due to long down times.

Two major issues concerning machine condition monitoring are machine fault diagnosis and prognosis. Diagnosis refers to the determination of the current "health" status or working condition of the machine being monitored, whereas prognosis refers to the prediction of the remaining service life in the machine. Reliable diagnosis and prognosis techniques not only reduce the risks of unexpected machine breakdowns, but also help in prolonging machine life. Due to these reasons, the current trend in the maintenance industry is increasingly shifted towards condition-based, preventative, and proactive maintenance

To avoid this sudden failure the prognostic report plays an important role. With the help of condition monitoring system the mechanical engineer in charge can understand the actual stage of the bearing as per the stored data, thereby preplan the maintenance considering the seriousness of the present condition of the bearings.

VII.RESULTS AND DISCUSSIONS

A typical scenario of a bearing malfunction and its evolution through different states has been selected for evaluating the system performance and simulated in Mat lab. The ICA algorithms are able to separate these weak signals that are hidden below the noise floor. The component signals are assumed to have different origins and a priori knowledge is needed to identify the components to which these signals correspond. Supervised learning classifiers have the ability to incorporate a priori knowledge. Because of its ability to recognize subtle patterns in the input data even in presence of noise, PNN classifiers trained with exemplar data have been used to detect and categorize the fault signatures. The prognostic fault stages are enlisted in Table 1.

Table 1 .fault stages

FAULT STAGES	
Fault Stage	Fault Rigorousness
0	Normal functioning
1	Minor Defect
2	Attention required
3	Critical.
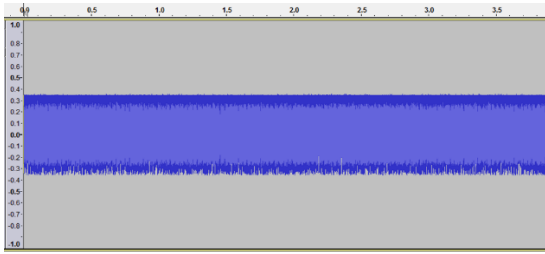
Figure 3. Bearing normal operation
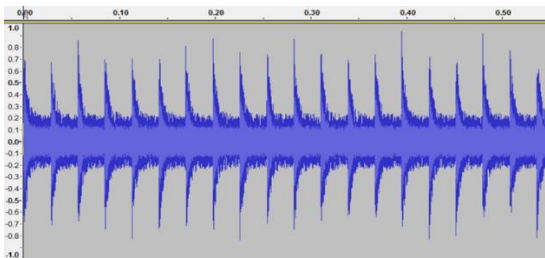
Figure 4. Bearing Stage-2 minor fault
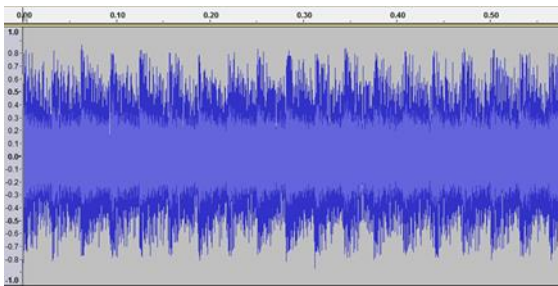
Figure 5. Bearing Stage-3 major fault
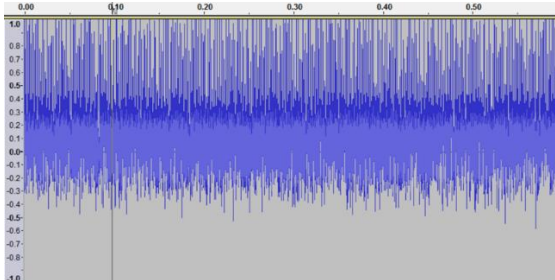
Figure 6. Bearing Stage-4 Faulty

Figure 7.Classifier output

Acoustic signals from a bearing under its different stages of operation are plotted and demonstrated. The normal operation emits acoustics, which gradually varies during its course of operation until it reaches a stage where catastrophic failure occurs. The below shown waveforms gives the clear idea about the variation of sounds according to the conditions of the bearings, from which the sound is collected.

Fig 3. To fig 6 shows the waveforms of different condition of bearings. Fig 7 shows the classifier output, which gives the clear idea about the classification done by the classifier. The output also shows the success rate of the classifier. From this output the maintenance engineer can prepare the prognostic report and thus help to plan the preventive maintenance accurately to avoid sudden failure of the plant.

VI. CONCLUSION

The prototype system shows the effectiveness of ANN in condition monitoring of power plant machineries. By using this method we can detect the fault much faster and helps to take necessary steps for maintenance, thereby reducing the downtime significantly. Implementation of this prototype system in DSP as hardware in power plants helps in real time proactive maintenance.

VII. ACKNOWLEDGMENT

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[13]

AUTHORS

First Author – Shameer V. Hameed, B.Tech , Department of Mechanical Engineering, S.C.M.S School of Engineering and Technology, saajan.hameed@gmail.com.
Second Author – Shameer K. M., M. Tech, Bharathiar University, Coimbatore.

Radical scavenging activity of vanilla (Vanilla fragrans) pods and commercial vanilla essence

Krishnasree V and Andallu B

Sri Sathya Sai Institute of Higher Learning, Anantapur campus, Anantapur-515 001, A.P., India.

Abstract- Methanolic extract (Me) of vanilla pods and commercial vanilla, hexane (He), benzene (Be), ethyl acetate (Ea), n-butanol (nBu) and aqueous (Aq) fractions of methanolic extract of vanilla pods and commercial vanilla essence were analyzed for radical scavenging activities viz. DPPH radical, hydroxyl radical, superoxide radical and nitric oxide radical scavenging activities to screen the best fraction of the methanolic extract (Me) of the samples that posses the highest free radical scavenging activity. All the fractions and methanolic extract of both the samples have individualized and concentration dependent activities. Methanolic extract, benzene, ethyl acetate and aqueous fractions of vanilla pods showed comparatively better scavenging activities with IC_{50} values ranging from 64-485µg/ml in various assays conducted whereas, of vanilla essence, ethyl acetate, hexane, n-butanol and benzene fractions were better with IC_{50} values ranging from 61-489µg/ml. The correlation between each fractions of samples were carried out using ANOVA at a level of $p< 0.05$ and $p<0.001$.

Index Terms- Methanolic extract (Me), hexane (He), benzene (Be), ethyl acetate (Ea), n-butanol (nBu) and aqueous (Aq) fraction.

I. Introduction

The irony of life in this planet is that molecule that sustains aerobic life, oxygen, is not only essential for energy metabolism and respiration, but it has been implicated in many diseases and degenerative conditions. At low or moderate concentrations, reactive oxygen species (ROS) and reactive nitrogen species (RNS) are necessary for the maturation process of cellular structures and can act as weapons for the host defense system. When the equilibrium between a free radical / reactive oxygen species formation and endogenous antioxidant defense mechanisms, get disturbed, it can produce oxidative stress (Pani *et al.*, 2000). Hence, reactive oxygen species and reactive nitrogen species at low or moderate levels are vital to human health can be fatal at higher levels.

Oxidative stress can result from a decrease in antioxidant levels, e.g. mutations decreasing the levels of Mn-SOD, depletion of dietary antioxidants and other essential dietary constituents (e.g. copper, iron, zinc, and magnesium) (Halliwell and Gutteridge, 2006). Phytochemicals are found ubiquitously in plants, they have demonstrated potent antioxidant activity mainly due to its redox properties, which allow them to act as reducing agents, singlet oxygen quenchers, hydrogen donors, and chelators of metal ions. These phytochemicals have wide range of biochemical and pharmacological functions and present almost in all spices which make them antioxidative, antidiabetic, anti-inflammatory, anticarcinogenic, antilithogenic and antimutagenic agents (Rice- Evans *et al.*, 1995).

Vanilla fragrans is one of such dynamic spices with its multibeneficial effects. The plant has its functions ranging from flavouring agent to a potent antioxidant, antimutagen etc. *Vanilla fragrans,* an important spice, an orchid belongs to the family orchidaceae. It is cultivated for its beans, which have a sweet scent aroma and a pleasant flavor. Vanilla is the costliest spice in the spice horizon, the important source of vanillin, which is used to flavor ice-cream, chocolates beverages, cakes, custards and other confectionery and also being exploited in perfumery and medicine.

The chief constituents of vanilla beans, in addition to natural vanillin (1.3-3.8%) are resins, fat, glucose, fructose, about 26 volatile constituents as well as 144 other volatile compounds and moisture, "vanilla sugar" obtained from the beans, is used in the manufacturer of chocolates (Korthou and Verpoorte, 2007). The characteristic aroma of vanilla flavor is due to a wide variety of non-volatile constituents like tannins, polyphenols, free amino acids and resins (Rao and Ravishankar, 2000) and volatile constituents like acids, ethers, alcohols, acetals, heterocyclics, phenolics, hydrocarbons, esters and carbonyls (Klimes and Lamparsky, 1976). The other major constituents of vanilla aroma are vanillin (4 hydroxy 3 methoxy benzaldehyde) (2-2.8%), accompanied by minor amounts of p-hydroxy benzaldehyde (0.2%), vanilla (0.2%), p-hydroxy benzyl ether (0.02%) and acetic acid (0.2%) (Anklam,1993). Vanilla is known for its various health benefits and the heroic action of the plant is because of the presence of its principle constituent, vanillin, which has structural similarities with other antioxidant compounds such as eugenol, zingerone and capsaicin. Vanillin posses antioxidant (Naqeb *et al.*, 2010), antineoplastic activities (Mc Cann *et al.,* 2007) and could potentially prevent some types of cancers (Lirdprapamongkol *et al.*, 2005). It can inhibit peroxynitrite-mediated reactions (Kumar *et al.*, 2004) important in several neurodegenerative diseases such as Alzheimer's and Parkinson diseases.

Recent reports have explained the cholesterol lowering effect of vanilla. The activity is either due to its hypotriglyceridemic effect or its regulatory effect on the genes involved in cholesterol metabolism including low density lipoprotein receptor (LDLR) and 3-hydroxy-3-methylglutaryl-coenzyme A reductase (HMG Co A reductase-HMGCR) genes. Vanillin has been reported to possess anticarcinogenic activity against a variety of chemical and physical agents (Akagi *et al.*, 1995).

Studies have indicated that vanillin has antisickling activity due to its ability to react covalently with sickle celled

hemoglobin. An additional function of vanillin is its antimicrobial activity where the compound exhibited inhibitory activity against bacterial strains like *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus cereus*, *Escherichia coli* and *Yersinia enterocolitica* with lower minimum inhibitory concentration (MIC) (Mourtzinos *et al.*, 2009).

Keeping in view of the harmful effects of free radicals on human health, detrimental effects of synthetic drugs as well as synthetic antioxidants, and the medicinal properties especially the antioxidant potential of vanilla, present investigation was undertaken with an objective to screen the most potent free radical scavenging fraction of vanilla pods and vanilla essence and to compare the antioxidant potential of both vanilla pods and vanilla essence.

II. MATERIALS AND METHODS

2.1. Procurement of vanilla samples and chemicals

Vanilla pods (*Vanilla planifolia*) purchased from spices board of India, Calicut branch, Kerala and commercial vanilla essence purchased from Tharakan and Company, Kottayam, Kerala were used for this study. All the chemicals and solvents were of analytical grade.

2.2. Preparations of methanolic extract and various fractions of methanolic extract of natural vanilla pods and commercial vanilla

Vanilla pods

Vanilla pods were split length wise and the split beans were again cut into finer pieces and extracted with 80% methanol (Me), thrice (1:1, w/v) at room temperature (Petra *et al.*, 1999). The combined extract was concentrated by evaporation and the residue was dissolved in water and fractionated successively with the solvents of increasing polarity [hexane (He), benzene (Be), ethyl acetate (Ea),n-butanol (nBu) and water (Aq)]and each extract was evaporated to dryness and weight of each residue was noted. Before use, a small quantity of each fraction was re-dissolved in a suitable solvent at different concentrations (Hashim *et al.*, 2005) and diluted further to obtain various concentrations i.e. 100µg-500µg/ml.

Vanilla essence

Vanilla essence after dilution (1:1) with 80% (v/v) methanol, was fractionated successively as mentioned above using hexane (He), benzene (Be), ethyl acetate (Ea), n-butanol (nBu) and each extract was evaporated to dryness and weight of each residue was noted. Various concentrations i.e. 100µg-500µg/ml were prepared. During sequential extraction, separate aqueous layer was not formed and hence, testing could not be possible for aqueous fraction.

2.3. Evaluation of in vitro antioxidant efficacy

2.3.1. Determination of DPPH radical scavenging activity

DPPH radical scavenging activity of vanilla extract was determined according to the method given by Sreejayan and Rao (1996). The absorbance of the test mixture was read at 517nm using, Cyberlab, a double beam spectrophotometer. The percentage scavenging of DPPH radical was calculated by comparing the result of the test with that of control (methanol and 1 ml DPPH) using the formula (Schlesier *et al.*, 2002):

$$\text{Percentage scavenging activity} = \frac{(\text{Absorbance of control} - \text{Absorbance of test})}{\text{Absorbance of control}} \times 100$$

2.3.2. Determination of hydroxyl radical scavenging activity

The Hydroxyl radical scavenging activity (HRSA) of the sample was determined by the method given by Klein *et al.,* (1991). The intensity of the color formed was measured at 412 nm against reagent blank using spectrophotometer. The percentage hydroxyl radical scavenging activity was calculated by the following formula:

$$\% \text{ HRSA} = 1\text{-}(\text{Absorbance of sample} / \text{Absorbance control}) \times 100$$

2.3.3. Determination of superoxide radical scavenging activity

Superoxide radical scavenging activity was measured according to the method of Robak and Gryglewski (1998). Absorbance was measured at 560nm against butylated hydroxy toluene as positive control (0.2mg/ml), which was taken in different volumes (200-1000µl) to obtain different concentrations and treated in a similar way. The percentage scavenging activity was calculated using the formula:

$$\text{Percentage scavenging activity} = \frac{\text{Absorbance of control} - \text{Absorbance of test}}{\text{Absorbance of control}} \times 100$$

2.3.4. Determination of nitric oxide radical scavenging activity

Nitric oxide radical scavenging activity was estimated by the method given by Sreejayan and Rao (1997) and Marcocci *et al.*, (1994). Nitric oxide (NO) radicals were generated from sodium nitroprusside solution at physiological pH. Absorbance was read at 546nm and percentage scavenging activity was calculated using the formula:

$$\text{Percentage scavenging activity} = \frac{\text{Absorbance of control} - \text{Absorbance of test}}{\text{Absorbance of control}} \times 100$$

2.4. Statistical analysis

Results are presented as mean ± standard error of means (SEM). Statistical analyses between the experimental samples were carried out using ANOVA. Pre-assigned levels of significant differences were considered at a level of $p < 0.05$ and $p < 0.001$.

III. RESULTS AND DISCUSSION

Vanilla pods constitute vanillin, O-vanillin and these compounds have phenolic group – OH, which is responsible for the free radical scavenging activity. The main factor responsible for their radical scavenging ability is the reduction potential or the energy required for the conversion of vanillin/O-vanillin to its oxidized form. The presence of ortho phenolic hydroxyl group would result in intramolecular hydrogen bonding, making the O-

H bond more stretched and hence it breaks easily (Kumar *et al.*, 2002).

Me-Methanolic extract, He-Hexane fraction, Be- Benzene fraction, Ea- ethyl acetate, nBu- n-butanol fraction, Aq- Aqueous fraction
and Quer- Quercetin
Values are mean ± SEM of three replicates (p<0.001)

fig. 1. DPPH radical scavenging activity of methanolic extract and various fractions of vanilla pods

Me-Methanolic extract, He-Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction
and Quer- Quercetin
Values are mean ± SEM of three replicates (p<0.001)

Fig. 2. DPPH radical scavenging activity of methanolic extract and various fractions of vanilla essence

Higher DPPH radical scavenging activity exhibited by vanilla pods is due to different flavonoids present in various fractions as well as in methanolic extract. Higher % activity shown by methanolic extract of vanilla pods than that of quercetin (**Fig.1**) is also due to a number of antioxidant compounds present in vanilla pods viz. catechin, eugenol, tannins, vanillic acid etc. (www.ars_grin.gov/duke) which is probably a result of synergistic action of number of compounds extracted into methanolic extract. As shown in **Fig.2**, ethyl acetate fraction of vanilla essence exhibited better activity than the other fractions, but is lesser than that of quercetin and that of vanilla pods reflecting lesser amount of bioactive compounds in the vanilla essence as a result of processing given to vanilla pods.

Me-Methanolic extract, He-Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction
Values are mean ± SEM of three replicates (p<0.05)

Fig.3. Hydroxyl radical scavenging activity of methanolic extract and various fractions of vanilla pods

Me-Methanolic extract, He-Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction
Values are mean ± SEM of three replicates (p<0.05)

Fig. 4. Hydroxyl radical scavenging activity of methanolic extract and various fractions of vanilla essence

Methanolic extract and all the fractions of vanilla pods as well as vanilla essence exhibited hydroxyl radical scavenging activity in proportion to the concentration (**Fig.3** and **4**). Among the fractions, benzene and ethyl acetate fractions of vanilla pods exhibited maximum hydroxyl radical scavenging activity with IC_{50} value of 485μg/ml and 489μg/ml respectively, followed by aqueous, hexane fractions, methanolic extract and n-butanol fraction. The trend was different with vanilla essence in which hexane fraction exhibited maximum activity followed by methanolic extract, benzene, n-butanol and ethyl acetate fractions. Both vanilla pods and vanilla essence showed lesser activity than trolox, a commercial standard antioxidant (IC_{50} value 288 μg/ml). The hydroxyl radical scavengers in vanilla are p- hydroxy benzoic acid and vanillin, the scavenging activity of which can be further supported by a study wherein vanillin and p-hydroxy benzoic acid inhibited iron dependent lipid peroxidation in rat brain homogenate, microsomes and mitochondria (Liu and Mori, 1993). The activity exhibited by vanilla essence can be attributed to the cold extraction process which would have released compounds responsible for hydroxyl radical scavenging activity from their complexes.

Me-Methanolic extract, He- Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction
and Quer- Quercetin
Values are mean ± SEM of three replicates (p<0.05)

Fig. 5. Superoxide radical scavenging activity of methanolic extract and various fractions of vanilla pods

Me-Methanolic extract, He- Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction
and Quer- Quercetin
Values are mean ± SEM of three replicates (p<0.05)

Fig. 6. Superoxide radical scavenging activity of methanolic extract and various fractions of vanilla essence

Among the various fractions, aqueous fraction of vanilla pods exhibited maximum superoxide radical scavenging activity with an IC_{50} value of 80µg/ml, while benzene fraction of essence had better superoxide radical scavenging activity than the other fractions of vanilla essence (**Fig. 5 and 6**). Very high IC_{50} values for superoxide radical scavenging activity shown by the fractions of vanilla essence indicate lesser efficiency in scavenging superoxide radicals than that of vanilla pods. Fractions of vanilla

pods had better scavenging potential than that of synthetic antioxidant BHT which exhibited an IC_{50} value of 277µg/ml.

The least superoxide radical scavenging activity by vanilla essence is a reflection of lesser amount of phenolics present in essence as compared to vanilla pods conforming that radical scavenging activities depend on the flavonoids present in i.e. vanilla pods, the material under investigation.

Table I: Nitric oxide radical scavenging activity of methanolic extract and various fractions of vanilla pods

Conc (µg/ml)	Me	He	Be	Ea	nBu	Aq	BHT
100	53.1±1.9	54.1±3.5	78.5±2.1	74.9±2.1	70.5±0.5	76.9±0.8	28.3±0.4
200	59.5±0.3	56.7±0.2	81.9±1.1	81.1±0.2	76.6±0.6	1.6±0.4	36.5±0.9
300	68.1±0.3	65.7±0.6	84.8±0.3	82.9±0.5	80.9±0.3	82.3±0.2	52.1±1.7
400	74.8±0.39	74.6±0.36	85.2±0.48	82.8±0.62	81.2±0.2	83.8±0.1	6.5±1.4
500	81.5±0.80	78.4±0.43	85.1±0.45	83.4±0.56	86.1±0.6	85.9±0.7	85.4±0.6
IC_{50} (µg/ml)	94	92	64	67	71	65	288

Values are mean ± SEM of three replicates
Me-Methanolic extract, He-Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction

Table II: Nitric oxide radical scavenging activity of methanolic extract and various fractions of vanilla essence

Conc (µg/ml)	Me	He	Be	Ea	nBu	BHT
100	69.4±0.73	81.6±0.34	78.8±0.27	68.3±0.61	71.7±0.8	28.3±0.4
200	77.9±1.43	81.5±0.71	81.9±0.62	81.2±0.16	78.4±0.35	36.5±0.9
300	80.8±0.33	85.8±0.37	83.3±0.56	81.5±0.41	80.9±0.41	52.1±1.7
400	81.5±0.36	85.3±0.62	84.3±0.23	81.6±0.84	82.3±0.86	76.5±1.4
500	81.1±0.15	84.2±1.26	84.1±1.25	83.6±0.41	89.1±0.28	85.4±0.6
IC_{50} (µg/ml)	72	61	63	73	70	288

Values are mean ± SEM of three replicates
Me-Methanolic extract, He-Hexane fraction, Be- Benzene fraction, nBu- n-butanol fraction, Aq- Aqueous fraction

All the fractions and methanolic extract of vanilla pods and vanilla essence exhibited concentration dependent nitric oxide radical scavenging activity ($p<0.001$)(**Table 1 and 2**).Both vanilla pods and vanilla essence had similar effects with an IC_{50} value ranging from 64-92 µg/ml and 61-73 µg/ml respectively. At 500 µg/ml, n-butanol fraction showed highest activity in both the samples, followed by aqueous, benzene, ethyl acetate, methanolic extract and hexane fractions in case of vanilla pods and hexane, benzene, ethyl acetate and methanolic extract in case of vanilla essence. BHT examined as positive control in the same study, exhibited the radical scavenging activity ranging from 29%-84% with an IC_{50} value of 289µg/ml.

The data obtained in the present study, indicates that vanilla pods and essence obtained from pods possessed better NO$^{\bullet}$ scavenging activity than BHT with lesser IC_{50} value, indicating more potency against NO$^{\bullet}$ radicals. It is assumed that vanillin, a potent radical scavenger reacts with radicals via adduct formation or self-dimerization (Tai *et al.*, 2011).

IV. Conclusions

Methanolic extract and all the fractions of methanolic extract of vanilla pods scavenged radicals inan individualized and concentration dependent manner. However, methanolic extract scavenged most efficiently DPPH radical, while benzene and ethyl acetate fractions scavenged most efficiently hydroxyl radicals and nitric oxide radicals and aqueous fraction scavenged most efficiently superoxide radicals.

Different fractions of vanilla essence had shown maximum activity in various assays. With respect to DPPH, ethyl acetate fraction, hydroxyl radical scavenging activity, hexane fraction, nitric oxide radical scavenging, n-butanol fraction, superoxide radical scavenging assay benzene fraction had shown the highest activity.

Methanolic extract and various fractions of methanolic extract of vanilla essence had lesser radical scavenging efficiency indicating lesser biochemicals and phytochemicals than in vanilla pods owing to the loss of phytochemicals during processing.

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AUTHORS

First Author – Krishnasree V, Sri Sathya Sai Institute of Higher Learning, Anantapur campus, Anantapur-515 001, A.P., India. krishna.sree372@gmail.com
Second Author – Dr. Andallu B, Associate professor, Sri Sathya Sai Institute of Higher Learning, Anantapur campus, Anantapur-515 001, A.P., India.

Anaerobic Digestion of Kitchen Wastes: "Biogas Production and Pretreatment of Wastes, A Review"

N.H.S.Ray[1], M.K.Mohanty[2], R.C.Mohanty[3]

[1]Faculty, Dept.of Mech.Engg.GEC, BBSR.
[2]Associate Professor, FMP, CAET, OUAT, BBSR.
[3]Associate Professor, Dept.of Mech.Engg.CUTM, BBSR.

Abstract- Currently, much of our biodegradable wastes such as kitchen wastes, agricultural wastes & animal wastes are used to produce Biogas, a powerful greenhouse gas. Anaerobic digestion (AD) is a treatment that composts these wastes in the absence of oxygen, producing a biogas that can be used to generate Heat & Power. Producing renewable energy from our biodegradable wastes helps to tackle the energy crisis. It is effectively a controlled and enclosed version of the anaerobic breakdown of organic wastes which releases methane. AD produces a biogas made up of around 60 per cent methane and 40 per cent carbon dioxide (CO_2). As well as biogas, AD produces a solid and liquid residue called digestate which can be used as a soil conditioner to fertilise land. The amount of biogas and the quality of digestates obtained will vary according to the feedstock used. More gas will be produced if the feedstock is more liable to decompose.

Index Terms- Anaerobic digestion, kitchen wastes, Hydrolysis, VFA,

I. INTRODUCTION

Anaerobic digestion (AD) is historically one of the oldest processing technologies used by mankind. Until the 1970s, it was commonly used only in the wastewater treatment plants waste management (Palmisano at al. 1996). The amount of generated waste continuously increases and due to the large environmental impacts of its improper treatment, its management has become an environmental and social concern. Rapid biodegradation of the organic waste is of key importance to identify environmental more responsible way to process it rather than land filling or composting it. Anaerobic digestion has the advantage of biogas production and can lead to efficient resource recovery and contribution to the conservation of non-renewable energy sources. Even though proven to be effective for treating organics, anaerobic digestion plants are facing difficulties in obtaining fairly clean feedstock that results in technical difficulties with the equipment and poor compost quality. In this study we have reviewed the anaerobic digestion reactions, biogas production, challenges & management of kitchen wastes,

II. ANAEROBIC DIGESTION

Anaerobic Digestion (AD) is a biological process that happens naturally when bacteria breaks down organic matter in environments in the absence of oxygen. Anaerobic digestion (AD) is a microbial decomposition of organic matter into methane, carbon dioxide, inorganic nutrients and compost in oxygen depleted environment and presence of the hydrogen gas. This process is also known as bio-methanogenesis for rapid and controlled decomposition of organic wastes i.e. kitchen wastes and biomass feedstock to methane, carbon dioxide and stabilized residue. In the generalized scheme of the anaerobic digestion, the feedstock is collected, coarsely shredded and placed into a reactor with active inoculums of methanogenic microorganisms. Since the methane is a significant greenhouse gas, anaerobic digestion has higher control over the methane production and contributes to lower the carbon foot print of the kitchen waste management in the way that the fugitive emissions are lower than then the emissions in the cases of the land filling and aerobic composting.

Generally three main reactions occur during the entire process of the anaerobic digestion to methane: hydrolysis, acid forming and methanogenesis. Although AD can be considered to take place in three stages all reactions occur simultaneously and are interdependent.

2.1- Hydrolysis.

Hydrolysis is a reaction that breaks down the complex organic molecules into soluble monomers (constituents) (Fig.1, Stage-1). This reaction is catalyzed by enzymes excreted from the hydrolytic and fermentative bacteria (cellulase, protease and lipase). End products of this reaction are soluble sugars, amino acids; glycerol and long- chain carboxylic acids (Ralph & Dong 2010).

The approximate chemical formula for organic waste is $C_6H_{10}O_4$ (Shefali & Themelis 2002)

Hydrolysis reaction of organic fraction is represented by following reaction:

$$C_6H_{10}O_4 + 2H_2O \rightarrow C_6H_{12}O_6 + 2H_2 \text{ (Ostrem \& Themelis 2004)}$$
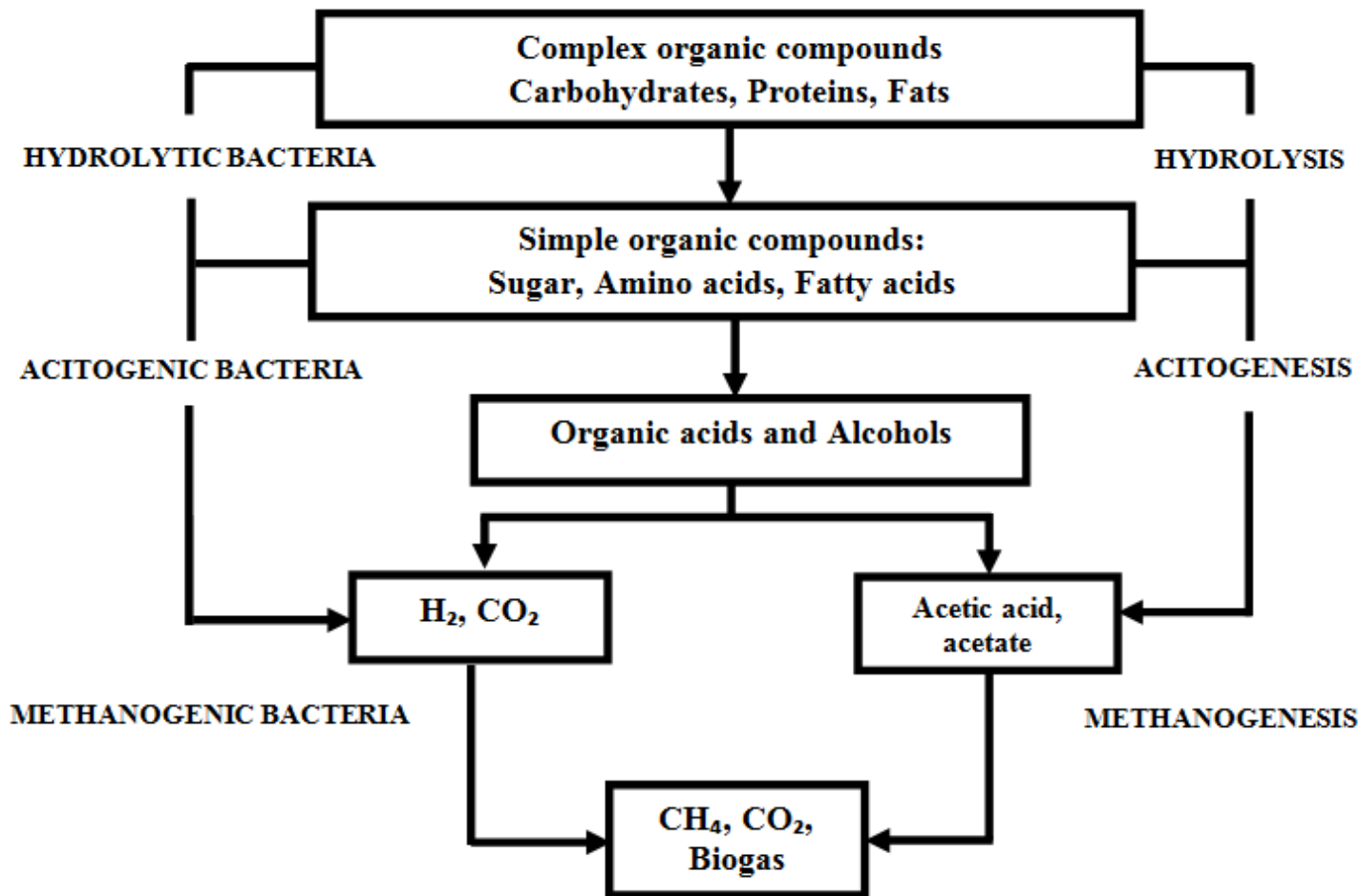
Figure 1: Overall process of anaerobic decomposition of kitchen wastes.

2.2- Acitogenesis.

This stage is facilitated by microorganisms known as acid formers that transform the products of the hydrolysis into simple organic acids such as acetic, propionic and butyricacid as well as ethanol, carbon dioxide and hydrogen. (Fig. 1, Stage- 2). Acid forming stage comprises two reactions, fermentation and the acetogenesis reactions. During the fermentation the soluble organic products of the hydrolysis are transformed into simple organic compounds, mostly volatile (short chain) fatty acids such as propionic, formic, butyric, valeric etc, ketones and alcohols. Typical reactions occurring at this stage are the following
- Conversion of the glucose to ethanol:
- Conversion of the glucose to propionate: (Ostrem & Themelis 2004)

The acetogenesis is completed through carbohydrate fermentation and results in acetate, CO_2 and H_2, compounds that can be utilized by the methanogens. The presence of hydrogen is critical importance in acetogenesis of compounds such as propionic & butyric acid. These reactions can only proceed if the concentration of H_2 is very low (Ralph & Dong 2010). Thus the presence of hydrogen scavenging bacteria is essential to ensure the thermodynamic feasibility of this reaction (Ostrem & Themelis 2004).

Important reactions during the acetogenesis stage are as follow (Ostrem & Themelis 2004)
- Conversion of glucose to acetate:
- Conversion of ethanol to acetate:
- Conversion of propionate to acetate:
- Conversion of bicarbonate to acetate:

2.3 –Methanogenesis.

Methanogenesis is a reaction facilitated by the methanogenic microorganisms that convert soluble mater into methane (Fig.1, stage-3). Two thirds of the total methane produced is derived converting the acetic acid or by fermentation of alcohol formed in the second stage such as methanol. The other one third of the produced methane is a result of the reduction of the carbon dioxide by hydrogen. Considering that the methane has high climate change potential the goal is to find an alternative in order to lower the environmental foot print of the organic waste treatment. Therefore this stage is avoided and instead of methane the production of volatile fatty acids is targeted.

The reactions that occur during this stage are as follows (Ostrem & Themelis 2004).
- Acetate conversion:

$$2CH_3CH_2OH + CO_2 \leftrightarrow 2CH_3COOH + CH_4$$

Followed by: $CH_3COOH \leftrightarrow CH_4 + CO_2$

- Methanol conversion:

$CH_3OH + H_2 \leftrightarrow CH_4 + H_2O$

- Carbon dioxide reduction by hydrogen

$CO_2 + 4H_2 \leftrightarrow CH_4 + H_2O$

III. COMPARATIVE PROPERTIES & COMPOSITION OF BIOGAS

The composition of biogas depends on a number of factors such as the process design and the nature of the substrate that is digested. The main components are methane and carbon dioxide, but several other components also exist in the biogas. The table-1 below lists the typical properties of biogas, landfill gas & natural gas. The table-2 shows the composition of Biogas in Anaerobic digestion.

Table 1: Properties of biogas, landfill gas & natural gas

Properties	Units	Landfill gas	Biogas	Natural gas
Lower calorific value	MJ/Nm3 kWh/Nm3 MJ/kg	16 4.4 12.3	23 6.5 20	39 11 48
Density	kg/Nm3	1.3	1.1	0.82
Relative density	-	1.1	0.9	0.63
Wobbe index, upper	MJ/Nm3	18	27	55
Methane number	-	>130	>135	73
Methane	Vol-%	45	65	90
Methane, range	Vol-%	35-65	60-70	85-92
Heavy hydrocarbons	Vol-%	0	0	9
Hydrogen	Vol-%	0-3	0	-
Carbon dioxide	Vol-%	40	35	0.7
Carbon dioxide, range	Vol-%	15-40	30-40	0.2-1.5
Nitrogen	Vol-%	15	0.2	0.3
Nitrogen, range	Vol-%	5-40	-	0.3-1.0
Oxygen	Vol-%	1	0	-
Oxygen, range	Vol-%	0-5	-	-
Hydrogen sulphide	Ppm	<100	<500	3.1
Hydrogen sulphide, range	Ppm	5	100	-
Total chlorine as Cl-	mg/Nm3	20-200	0-5	-

Sources: Energigaser och miljö, Svenskt Gastekniskt Center, 2006.
Energinet.dk, www.energinet.dk, 2011-02-15
Table 2: Approximate Biogas Composition in Anaerobic Digestion

Gas	Concentration %
CH_4	50-70
CO_2	25-30
N_2	0-10
H_2O	0-5
H_2S	0-3
O_2	0-3
C_xH_y	0-1
NH_3	0-0.5
R_2SiO	0-50 mg/m3

IV. PARAMETERS AFFECTING THE ANAEROBIC DIGESTION OF KITCHEN WASTES

4.1- pH value.

The pH value of the reacting material is a pivotal factor in the AD of kitchen waste. The importance of the pH is due to the fact that methanogenic bacteria are very sensitive to acidic conditions and their growth and methane production are inhibited in acidic environment. In batch reactors pH value is closer dependent of the retention time and loading rate.

Different stages of the AD process have different optimal pH values. Also the pH value changes in response to the biological transformations during different stages of AD process. Production of organic acids during the acetogenesis can lower the pH below 5 what is lethal for methanogens and cause decrease in the methanogens population. Consequently this would lead to acid accumulation, since the methanogens are responsible for the consumption of the formed acids, and digester failure. Constant pH is crucial in the start-up phase because fresh waste has to go first thru the stage of hydrolysis and acidogenesis before any methane can be formed, which will lower the pH. In order to keep the value of pH on the equilibrium buffer has to be added into the system, such as calcium carbonate or lime.

4.2 -Composition of the kitchen waste.

It is important to know the composition of the kitchen waste in order to be able to predict both the bio-methanization potential and most efficient AD facility design. The bio-methanization potential of the waste depends on the concentration of four main components: proteins, lipids, carbohydrates, and cellulose. This is due to different bio-chemical characteristics of these components (Nerves et al. 2007)

The highest methane yields have systems with excess of lipids but with longest retention time. The methanization of the reactors with excess of cellulose and carbohydrates respectively. The lowest rates of the hydrolysis are with an excess of lipids and cellulose, indicating that when these components are in excess, a slower hydrolysis is induced (Nerves et al. 2007).

4.3- Loading rate.

Organic loading rate is a measure of the biological conversion capacity of the AD system. It determines the amount of feedstock feasible as an input in the AD system. Overloading of the system can results in low biogas yield. This happens due to accumulation of inhibiting substances such as fatty acids in the digester slurry (Vandevivere et al. 1999). The events that would occur in the case of overloading the system, it would cause proliferation of the acidogenic bacteria further decreasing the pH in the system and disturbing the population of the methanogenic

bacteria. Also there is a definite relationship between the biogas yield and loading rate. This is the concept that we have to use in the design of this study. The loading rate is at the point in favour of the acidogenesis avoiding the methane production and maximizing the VFA production in it.

4.4- Retention time.

Retention time in the AD reactors, refers to the time that feedstock stays in the digester. It is determined by the average time needed for decomposition of the organic material, as measured by the chemical oxygen demand (COD) and the biological oxygen demand (BOD) of the influent and the effluent material. The longer the substrate is kept under proper reaction conditions, the more complete its degradation will be. However, the rate of the reaction decreases with longer residence time, indicating that there is an optimal retention time that will achieve the benefits of digestion in a cost effective way (Viswanath et al. 1991). The appropriate time depends on the type of feedstock; environmental conditions and intended use of the digested material (Ostrem & Themelis 2004)

4.5- Operating temperature.

Operating temperature is the most important factor determining the performance of the AD reactors because it is an essential condition for survival and optimum thriving of the microbial consortia. Despite the fact that they can survive a wide range of temperatures, bacteria have two optimum ranges of temperature, defined as mesophilic and thermophilic temperature optimum. Mesophilic digesters have an operating temperature 25- 40 °C and thermophilic digesters have operating temperature range of 50-65C.

Thermophilic digesters allow higher loading rate and yield higher methane production, substrate degradation and pathogen destruction. Also, the higher temperature shortens the required retention time because it speeds up the reactions of degradation of the organic material. However, the thermophilic anaerobic bacteria are very sensitive to toxins and small environmental changes. Furthermore, bacteria needs more time (over a month) to develop redox population. These systems are harder to maintain and are less attractive for commercial application because they require additional energy input for self heating.

Mesophilic AD reactors operate with robust microbial consortia that tolerate greater changes in the environment and are more stable and easier to maintain. Another advantage is that usually these systems do not need any additional energy input for heating the system. On the other hand, the disadvantages of the mesophilic AD systems are longer retention time and lower biogas production. However due to the fact that they are easier to operate and maintain, as well as the lower investment cost, they are more attractive for commercial scale points.

V. PRE-TREATMENT METHODS TO ENHANCE ANAEROBIC DIGESTION

Anaerobic digestion (AD) is more favorable than composting, due to its high energy recovery and limited environmental impacts. AD is a well studied biological process, and it is matured in many technical aspects whereas most sustainable alternative of the process in terms of environmental

and economical aspects is still being studied. One of the major concerns of AD is the long retention time, which is due to the rate limiting factor, hydrolysis of complex polymeric substances. In this regard, to enhance the biogas yield and reduce the retention time and volume of digesters, extensive research has been conducted on various pre-treatment methods.

Nevertheless, among the numerous studies, fewer studies are available on the effects of pre-treatment methods on AD of kitchen wastes. Various microbial consortia, which have substantially different physiological properties and nutrient requirements, govern the different biological stages of AD process; thus, multi-stage AD systems are more preferable than one-stage systems. However, due to economical reasons one-stage systems are absolutely predominant in industrial scale. Based on the reasons mentioned above, this study aims to investigate the most sustainable alternative to treat kitchen wastes with AD. To achieve the aim several objectives are pointed out:

→ To conduct batch experiment on mesophilic AD of kitchen waste.

→ To study the effect of thermal and chemical pre-treatment methods, through batch experiments.

→ To estimate the most economical method through cost benefit analysis.

→ To conduct one-stage and multi-stage semi-continuous experiment using the batch experiment results.

→ To investigate the environmental impacts of the semicontinuous systems through Life cycle assessment (LCA).

Thermal and chemical (ozonation) pre-treatment methods are selected to be studied for this work. The reasons for selecting these pre-treatment methods or the advantages include the following:

→ Previous studies have shown that both thermal and chemical pre-treatment methods enhance the AD process performance.

→ Both pre-treatment methods can reduce the amount of pathogen micro-organisms.

→ No additional chemicals needed to neutralize the substrate after pre-treatment and prior to AD.

→ Extra-cost can be recovered by the increased biogas production due to pretreatments.

Different concentration of ozone and different temperatures with various contact times will also be investigated. The net profit of each pre-treatment method will be calculated based on the extra biogas production due to pre-treatment method, and the total extra cost.

Semi-continuous experiments will be conducted with both one-stage and multi-stage reactors at mesophilic conditions. Moreover, temperature phased anaerobic digestion (TPAD) will also be conducted as another type of the multi-stage system. TPAD will consist of two stages, namely:

1) The fermentation stage at thermophilic temperature.
2) Methanation stage at mesophilic temperature.

When treating wastes, AD can be used to process specific source separated waste streams such as separately collected kitchen waste. The digestate will be uncontaminated so can be used as a soil improver. To minimize the impact our waste has on

the climate, Friends of the Earth believes that compostable and recyclable material should be separated at source for treatment or reprocessing, using AD where suitable.

5.1- Trace Element Supplementation.

A further part of the study is to establish whether 'kitchen waste only' digestion could be stably operated through the addition of trace elements to the feedstock. A range of different trace element dosing mixes is applied and successful and stable digestion at a particular loading rate per day, generating high biogas yields.

Selenium and cobalt are the key trace elements needed for the long term stability of kitchen waste digesters, and these are likely to be lacking in kitchen waste. Their absence causes problems during digestion at ammonia levels. The research (Project WR1208) has shown that the minimum concentrations recommended in kitchen waste digesters for selenium and cobalt is around 0.16 & 0.22 mg / l respectively, when using a moderate organic loading rate. However, it should be noted that adding too much selenium (greater than 1.5 mg / l) is likely to be toxic to the microbes in the digester Molybdenum, tungsten, nickel and other trace elements also appear to contribute in some regard towards providing sustained stability of kitchen waste digestion at high loading rates (e.g. 5 kg VS/m3/day). The addition of trace elements to a long term severely VFA laden digester only has a relatively slow and slight effect. Feeding at very low loading rates is required in addition to trace element supplementation for the digester to recover.

5.2- Pre-processing of kitchen waste.

Shredded kitchen waste is added to the feed tank, diluted with recycled feedstock and macerated. The aim of pre-shredding is to produce a consistent feed and reduced plant "down-time" due to pipe blockages by large organic objects. The maceration of the shredded kitchen waste improved mechanical action and digestibility. Although kitchen waste is a pliable material, it needs to be transformed into a more liquid form to allow the waste to be pumped. This is done by recirculation and maceration with liquid digestate or water added to reduce the solids content of the waste.The shredding procedure enables easy removal of any cling-film from waste and produces a consistent feed within hours of adding the waste to the reception tanks. Shredding of the kitchen waste reduces its particle size and increases its surface area.

Reduction in particle size provides a greater surface area for the attachment of bacteria which promotes the hydrolysis step within the reception tank. Hydrolysis is performed by the excretion of extracellular enzymes (e.g. cellulase, protease, amylase, etc.) or other metabolic catalysts by the hydrolytic bacteria. The hydrolysis products (amino acids, sugars) are utilised by the microbes for the production of cell mass, intermediate products such as proprionic and butyric acids, other long chain fatty acids, and alcohols. These compounds are substrates for methanogenic bacteria which produce methane. The recycled digestate also acts as an inoculum. It introduces fermentative bacteria accelerating the breakdown of the kitchen waste during the hydrolysis stage as described above. It is noted that the temperature in the reception tank increased (compared to ambient temperature), and the solubility of the feedstock increased because of microbial activity. However, the practice of recycling digestate eventually leads to an accumulation of inhibitory substrates, such as volatile fatty acids or ammonia, within the digester medium, and then water must be added to reduce the concentration of these chemicals.

5.3- Mechanical biological treatment.

AD can also be combined with mechanical sorting systems to process residual mixed wastes (mechanical biological treatment or MBT). After recyclable and compostable materials have been separated from the waste stream, MBT is the best way to treat the remaining waste in terms of the environment, and in particular climate change. MBT should occur in small, localized treatment plants to minimize waste transport.

In an MBT facility, the waste goes through two processes, though the order can vary:

1. Machinery is used to mechanically remove any remaining recyclable waste still left in the waste stream (e.g. metals, plastics, glass)

2. The waste is composted or anaerobically digested. This reduces the volume of waste and makes it biologically inactive so it can be landfilled without releasing methane.

Semi-continuous experiments will be conducted with both one-stage and multi-stage reactors at mesophilic conditions. Moreover, temperature phased anaerobic digestion (TPAD) will also be conducted as another type of the multi-stage system. TPAD will consist of two stages, namely:

1) The fermentation stage at thermophilic temperature.

2) Methanation stage at mesophilic temperature.

Mechanical biological treatment (MBT) of waste is now being widely implemented. Mixed waste is subjected to a series of mechanical and biological operations to reduce volume and achieve partial stabilization of the organic carbon. Typically, mechanical operations (sorting, shredding, and crushing) first produce a series of waste fractions for recycling or for subsequent treatment (including combustion or secondary biological processes). The biological steps consist of either aerobic composting or anaerobic digestion. Composting can occur either in open windows or in closed buildings with gas collection and treatment. Compost products and digestion residuals can have potential horticultural or agricultural applications; some MBT residualsare landfilled, or soil-like residuals can be used as landfill cover. Under landfill conditions, residual materials retain some potential for CH_4 generation (Bockreis and Steinberg, 2005). Reductions of as much as 40–60% of the original organic carbon are possible with MBT (Kaartinen, 2004). Compared with landfilling, MBT can theoretically reduce CH_4 generation by as much as 90% (Kuehle-Weidemeier and Doedens, 2003).

VI. CONCLUSION

Anaerobic digestion is a proven technology for processing source-separated organic wastes and has experienced significant growth. This technology is superior to the land filing and also the aerobic composting. The most successful AD processes at this time are thermophilic processes.

Even though AD is effective, there are problems associated with the application of this technology in diverting organics from the landfills and composting facilities. Additional difficulties in the operation of AD plants are due to the problem of getting fairly clean feedstock what on the other side is crucial factor for the compost quality and the overall efficiency of the AD process. It is therefore, very important to exercise the discipline required to minimize contamination of source-separated organic wastes and for the AD process to include extensive pre-treatment for contaminant separation.

The study carried out in this review has shown that the anaerobic digestion of kitchen waste is a feasible alternative to biogas generation. This finding is of special importance because this lowers the operating costs, decreases the capital and operating costs of the anaerobic digestion of source-separated kitchen waste, and reduces the greenhouse gas emissions of both processes.

Further research is necessary to collect additional data on the use of the Anaerobic Digester using kitchen wastes. Also, further experiments should be performed for identifying the optimum operating parameters for producing higher concentrations of VFAs in the liquid product of an acetogenesis reactor. In addition, technical and economic feasibility studies of the environmental and economic aspects of the industrial application of this process alternative should be carried out.

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AUTHORS

First Author – Mr.N.H.S.Ray, M.Tech., H.O.D.Mech.Engg. Gandhi Engineering College, Bhubaneswar.Odisha, India., E.mail- nayak.ray@gandhi.ac.in

Second Author – Dr. M.K.Mohanty. M.Tech. Ph.D, Associate Professor, Dept.of FMP, College of Agri.Engg. & Technology, Odisha University of Agri. & Technology, Bhubaneswar, Odisha,India., E.mail- mohanty65m@gmail.com

Third Author – Dr. R.C.Mohanty. M.Tech. Ph.D, Associate Professor, Dept.of Mech.Engg. Centurion University of Technology & Mgmt. Bhubaneswar, Odisha, India., E.mail-rcmohanty@cutm.ac.in

Correspondence Author – Mr.N.H.S.Ray, H.O.D.Mech.Engg. Gandhi Engineering College, Bhubaneswar.Odisha, India., E.mail- nayak.ray@gandhi.ac.in, raynhs_driems@yahoo.co.in, Contact number- 919437172490

Risk management of cadmium (Cd) due to *Leiognathus sp, Portunus Pelagicus, Anadara sp* and *Penaeus sp* consumption among community in Tallo Subdistric, Makassar, Indonesia

Anwar Daud[1], Arif Atul Mahmudah Dullah[2], Anwar Malongi[3]

***Author to whom correspondence should be addressed; E-Mail: daudanwar50@yahoo.com
*Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia.

Abstract- This study aimed to investigate the risk management of Cadmium (Cd) for people who consumed *Leiognathus sp., Portunus pelagicus, Anadara sp.* and *Penaeus sp.,* from Tallo River in Tallo Village of Makassar City, Indonesia. Observational study was used by appliying environmental health risk assessment approach. The Cadmium levels in *Leiognathus sp., Portunus pelagicus, Anadara sp.* and *Penaeus sp,* were measured with the Atomic Absorption Spectrometry "Perkin type 210 Germany". Ninety six (96) respondent's body weight, consumption rate and exposure time duration were analyzed quantitatively to calculate the risk quotient (RQ). Result implied that the risk quotient value due to *Leiognathus sp.* consumption was 0.1655 (for a level of 0.00048 mg/gram). The risk quotient value for consuming *Portunus pelagicus was* 0.126 (for a level of 0.00021 mg/gram), while the risk quotient value for consuming *Anadara sp.* was 0.036 (for a level of 0.00106 mg/gram). Furthermore, the risk quotient value for consuming *Penaeus sp.* was 0.0055 (for a level of 0.00021 mg/gram), respectively. Risk management done by reducing the levels of cadmium, controlling the consumption rate and decreasing the exposure time. This study suggested that the most effective risk management is to control the consumption rate for *Leiognathus sp., Portunus pelagicus, Anadara sp.* and *Penaeus sp. from Tallo River.*

Index Terms- *risk management, cadmium (Cd), Leiognathus sp., Portunus pelagicus, Anadara sp., Penaeus sp., Tallo River.*

I. INTRODUCTION

Industrial growth in Makassar considerable potential lead to pollutions in the environment. The number of industries operating in the city of Makassar area are about 4,288 units comprising of 4,099 small industrial units and 199 large industrial units (Environmental Impact Department of South Sulawesi, Indonesia, 2004). A total of 21 industries are the sources of pollutants into Tallo River as water bodies which receiving industrial wastewater disposal (Department of Environmental Management and the cleanliness of Makassar, 2008). Tallo River crosses the 10 districts in the city of Makassar such as the Panaikang Distric, Lakkang Distric, Tallo Distric, Rappokalling Distric, Daya Distric, Bira Distric, Tamalanrea

Distric, Tallo Baru Distric, Antang Distric and Rappojawan Distric and long the river there are also industrial activity, namely Makassar Industrial Estate (KIMA).

Aziz (2004) in his study found that levels of heavy metals (Cd) in sediment of Tallo River by an average of 8.92 mg/kg. Likewise, study by Ibrahim (2009) found the average of Cd in water column in Tallo River was 0.0578 mg/l. Akili (2010) found Cd levels in shellfish *Anadara granosa* exceeds the standards set by the WHO range between 0.085 mg/kg to 0.774 mg/kg.

The results of the studies above show that Tallo River has been polluted by chemicals such as Cadmium (Cd) for the water, sediment and biota. This situation will certainly endanger the health and lives of inhabitants in the area and vicinity region, especially when people consume biota come from this river. Residents who live around Tallo River are currently at risk of health problems due to consumption *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* from Tallo River. Then the control efforts of the factors that could potentially be a threat to the health of the population is necessary and should be done immediately.

2. MATERIALS AND METODHS

This observational study commenced by using an approach of environmental health risk analysis where risk factors were measured at the same time to predict health risk due to the amount of cadmium metal in *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* The research was conducted in two phases; analysis of risk assessment to identify the risk quotient (RQ) and risk management to prevent health risks.

Analysis level of risk carried out by counting the number of cadmium intake (I) through *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp* consumption. Data and information that are required to calculate the rate of intake, R (mg /day), the concentration of risk agent, C (mg/kg), exposure time (tE) (hours/day), frequency of exposure, f_E (days /year) and duration of exposure, Dt (year). The formulations from (EPA

2006) below were used to calculate the intake rate and the risks quotient.

$$I = \frac{C \times R \times f_E \times D_t}{W_b \times t_{avg}} \tag{1}$$

$$RQ = \frac{I}{RfD} \tag{2}$$

Level of risk (Risk Quotient) is the quotient of the intake (I) and Reference Dose (RfD). According to U.S. EPA *RfD* for Cadmium is equal to 0.001 mg/kg/day. It means that intake of cadmium in excess of 0.001 mg/kg/day has exceeded the safety standard for cadmium intake and risk for the occurrence of impaired renal disfungis (proteinuria). Risk exists and needs to be controlled if RQ > 1. However, if RQ ≤ 1, the risk does not need to be controlled, but all existing conditions at the time of this research should be maintained. Risk management can be done with the three approaches using the following formulas:

$$C = \frac{RfD \times W_B \times t_{avg}}{R \times f_E \times D_t} \tag{3}$$

$$R = \frac{RfD \times W_B \times t_{avg}}{C \times f_E \times D_t} \tag{4}$$

$$D_t = \frac{RfD \times W_B \times t_{avg}}{C \times R \times f_E} \tag{5}$$

3. RESULTS

The magnitude concentrations of Cd in *Leiognathus sp.* were ranged from 0.021 to 0.048 mg/kg. The content of cadmium in *Portunus pelagicus* was equal to 0.021 mg/kg. Then, the level content of Cd in *Anadara sp* were ranged from 0.077 mg/kg to 0.106 mg/kg. The concentration of Cd in *Penaeus sp.* is equal to 0.021 mg/kg. Based on SNI standards (2009) levels of Cd in biota is still meet the standard because they ≤ 0.1 mg/kg, except on shellfish samples, one that did not meet the standards set by SNI.

The average exposure frequency of respondents who consumed *Leiognathus sp* was 110.08 days/year, with the highest exposure frequency of 365 days/year whereas the lowest was 12 days/year. The average exposure frequency of respondents who consumed *Portunus pelagicus* was 24 days/year. The highest exposure frequency of 365 days / year and the lowest was 12 days/year. In addition, the average exposure frequency of respondents who consume *Anadara sp.* was 12 days/year, where

the highest exposure frequency of 162 days/year and the lowest one of 12 days/year. Lastly, the average exposure frequency of respondents who consume *Penaeus sp. was* 12 days/year, with the highest exposure frequency of 365 days / year and the lowest one was 12 days / year.

Intake rate or the amount (grams) of *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* that were consumed by a person each day. Tallo urban population had an average rate of *Leiognathus sp* intake by 80 grams/day. The highest intake rate of 450 grams / day and the lowest of 20 grams / day. The average rate intake of *Portunus pelagicus* was 426.4 grams/day, where the highest intake of daily consumption of 1918.8 grams/day and the lowest of 213.20 grams/day. in addition, the average rate of *Anadara sp.* intake is 45 grams / day. *Penaeus sp.* was 30 grams / day, respectively.

The average body weight of the population consumed *Leiognathus sp* was 60 kg, the lowest weight of 35.5 kg and the highest was 103 kg. The average body weight of the population consuming *Portunus pelagicus* was 58 kg, with the lowest weight of 35.5 kg and the highest was 103 kg. The average weight of the population consumed *Anadara sp.* Was at 59.5 kg, with the lowest body weight of 39 kg and the highest of 94 kg. The average weight of the population consumed *Penaeus sp.* Was at 61 067 kg, the lowest weight was 58 kg and the highest was 103 kg. Population who consumed *Leiognathus sp.* with cadmium levels of 0.00021 mg/gram (the lowest levels) are at risk quotient (RQ) by an average of 0.0725 while for consumption *Leiognathus sp.* with cadmium levels 0.00048 mg/g (the highest levels) are at risk quotient (RQ) by an average of 0.1655. People who consume *Portunus pelagicus* with cadmium levels 0.00021 mg/g obtained the risk quotient (RQ) by an average of 0.126.

Respondents who consumed *Anadara sp.* with cadmium levels of 0.00077 mg/gram (the lowest levels) are at risk quotient (RQ) by an average of 0.026. Then, consumption of *Anadara sp.* with levels of 0.00106 mg/g (the highest levels) obtained an average risk level of 0.036. Likewise, the consumption of *Penaeus sp.* with levels of cadmium 0.00021 mg/g had RQ by an average of 0.0055. There are three people who have risk population due to consumption *Leiognathus sp.* contained cadmium of 0.00048 mg/g (Figure 1). Level of risk per individual due to consumption of *Portunus pelagicus* with cadmium levels 0.00021 mg/g was found four people at risk (Figure 2). There was no people at risks due to consumption of *Anadara sp.* with cadmium level 0.00106 mg/g and *Penaeus sp.* with cadmium level of 0.00021 mg/gram (Figure 3 and Figure 4).

4. DISCUSSION

4.1 Risk Analysis of Cadmium

Risk analysis could be developed with two approaches, disease oriented approach and agent-oriented. Methods of risk analysis with disease-oriented approach to assess risk based on the effect that has arisen or appears that the environmental health epidemiology studies. While the agent-oriented approach does not take into account the effects that have occurred, but the risk analysis can be done simply by the existence of an agent that exposes humans either through inhalation, oral or dermal to predict the effects that may occur in the future. This research is a

study of risk analysis using agent oriented approach. Agent in question in this research is cadmium which exposes residents of the Tallo Subdistric through consumption *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* from Tallo River.

In an experiment carried out to follow the transfer of cadmium from a terrestrial to a local aquatic ecosystem, it was found that the number (94-96 %) of cadmium in the soil left behind. Cadmium accumulation had a faster process in the sediment than in living organisms. Twenty percent of cadmium in water was found in suspended particles (Anonim, 2009). A study conducted in areas of high runoff indicates the fact that a large amount of cadmium decreases after passing through sedimentation ponds and wane after going through an arrest in wet areas (Irwin, 1997). Some forms of dissolved cadmium in water and Cadmium bound strongly to soil particles. Fish, plants, and animals can be contaminated with cadmium from the environment (ATSDR, 2008a).

Cadmium can undergo a process of accumulation in fish, mussels and algae, especially species living in an area that is very close to the sediment that has been contaminated by cadmium (IPCS, 1972; 2004; 2009; Irwin, 1997). US.EPA. (1985) in Drinking Water Criteria Document on Cadmium mention that the cadmium concentration of 200 μg/gram wet tissue of human kidney is the highest level that does not cause the occurrence of proteinuria. A model toksikokinetik to determine the level of chronic oral exposure in humans (NOAEL) in which the levels of cadmium contained 200 ug/g wet tissue of human kidney, the model assumes that the daily load cadmium 0.01% experienced a reduction in body (US. EPA, 1985).

With this basis forecasts NOAEL (No Observed Adverse Effect Level) of 0.005 mg cadmium/kg/day for source water intake with UF value (Uncertainty Factor) of 10 while through food by 0.001 mg/kg/day (US-EPA, 1985; IRIS, 2007; 2010).

A person's daily intake of cadmium levels exceeding 0.001 mg/kg/ day generated the increase of excretion of cadmium in urine that has a significant relationship with changes in renal function. Then it might be accompanied by a low molecular weight proteins, intracellular tubular enzymes, amino acids, proteins with a molecular weight high, metalotionin and electrolysis. A comprehensive study found a significant relationship between the dose response to cadmium in urine (or cumulative cadmium intake) and the prevalence of abnormal levels of the biomarker of renal dysfunction.

Exposure to cadmium in a long period in humans will lead to the accumulation of chemicals in the human body, in a certain period of time will lead to the emergence of adverse health effects. Chronic Cadmium poisoning caused by toxins carried by the metal cadmium, occurred in long intervals, then at some point the body can no longer tolerate the toxicity brought by Cd (ATSDR, 2008a). Toxic effects of metals are closely linked to

the level and duration of exposure. Generally, the higher levels of the metal and the longer the exposure, the toxic effect of a metal will be greater. For example, cadmium in single dose, large dose can induce gastrointestinal disorders. While the intake of Cd in small amounts but can repeatedly cause malfunctioning of kidney. (Lu, 1995)

The main health effects due to long-term exposure to cadmium were including kidney dysfunction, lung cancer, and prostate cancer. Cd can lead to a local irritation to the skin and eyes, and the effects can occur from inhalation or ingestion. (OSHA, 2004). Weight loss is a simple index of toxic effects but is sensitive to the presence of toxic substances in the body. Gastrointestinal absorption of cadmium is influenced by diet and nutritional status, with iron status has an important position. An average of 5% of the total oral intake of cadmium can absorbed, but individual values ranged from less than 1% to more than 20% (Lu, 1995).

Takenaka et al (1983) on exposure to rodents by inhalation of cadmium in the form of cadmium chloride at concentrations of 12.5, 25 and 50 ug/cu.m for 18 months, with an additional period of observation for 13 months, obtained significant results in increased lung tumors (IRIS, 2010). Cadmium is known to accumulate in the human kidney for a relatively long time, from 20 to 30 years, and, at high doses, is also known to cause health effects on the respiratory system and are associated with bone disease. Epidemiological information related to support this as the worker or the Japanese people living in areas contaminated with high levels of cadmium (US.EPA, 1985).

Dose-response assessment is the process of characterizing the relationship between the dose of an agent that has been recorded or obtained by the case of a health effect in exposed populations and estimating the incidence as a function of human exposure to an agent (NRC, 1983). Toxicant can be eliminated from the body through several routes. Kidney is a vital organ to remove toxins. Some xenobiotics material is first converted into a water-soluble materials before disposal. Kidney is an organ that is very efficient in eliminating toxicant from the body. Toxic compounds excreted in urine by the same mechanism as when the kidneys remove metabolites result from the body (Mukono, 2005; Lu, 1995). This suggests that the continuous intake of cadmium will eventually lead to a reduction in the kidney's ability to make efforts neutralization cadmium, which eventually led to the occurrence of renal dysfunction.

Chemicals that have undergone cycles in the environment will go into the human body through the three channels of exposure is through the digestive tract (ingestion), breathing (inhalation) and skin contact (dermal) (WHO, 2000; Mukono; 2005; Soemirat, 2009). However, specifically with human engineering alone, toxicant can also enter the body by way of intravenous, intraperitoneal, subcutaneous and intramuscular

(Mukono, 2005; 2000). In addition to the entry of toxicant in the body can also be through parental (Soemirat, 2009). Even the entry of chemicals into the human body through three routes of exposure to the same time (WHO, 2000).

4.2 Risk Management

Risk management aims to control the risk factors that may lead to health problems due to consume of *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* containing cadmium. In a study of risk analysis with agent-oriented approach there are some variables that were measured to determine the amount of risk, the level (concentration) of the chemical in the environment, body weight, duration of exposure, the rate of intake, and frequency of exposure. So in some risk management these variables can be controlled to avoid occurrence of risk due to exposure to a disease agent in the environment. Efforts to control risk can be done in several ways: lower levels of cadmium *in Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp*., controlling the rate of intake and reduce the duration of exposure. Control of risk approaches by reducing cadmium levels in *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp*. can be done by calculating safe levels of cadmium in the biota if taken every day for a certain period. Where the determination of safe levels of cadmium can vary among individuals depending on contact time (duration of exposure) and the person's weight.

Table 1. Exposure Duration of Cadmium due to comsumption of *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp*., base on the varied body weight

Body Weight (kg)	Duration of Exposure (year)											
	Leiognathus sp. a)						*Portunus pelagicus* b)					
	5	10	15	20	25	30	5	10	15	20	25	30
35	0.00274	0.00137	0.00091	0.00068	0.00055	0.00046	0.0005	0.00026	0.00017	0.00013	0.0001	0.000085
40	0.00313	0.00156	0.00104	0.00078	0.00063	0.00052	0.0006	0.00029	0.0002	0.00015	0.00012	0.000098
45	0.00352	0.00176	0.00117	0.00088	0.0007	0.00059	0.0007	0.00033	0.00022	0.00017	0.00013	0.00011
50	0.00391	0.00196	0.0013	0.00098	0.00078	0.00065	0.0007	0.00037	0.00024	0.00018	0.00015	0.000122
55	0.0043	0.00215	0.00143	0.00108	0.00086	0.00072	0.0008	0.0004	0.00027	0.0002	0.00016	0.000134
60	0.00469	0.00235	0.00156	0.00117	0.00094	0.00078	0.0009	0.00044	0.00029	0.00022	0.00018	0.000146
65	0.00508	0.00254	0.00169	0.00127	0.00102	0.00085	0.001	0.00048	0.00032	0.00024	0.00019	0.000158

Body Weight (kg)	Duration of Exposure (year)											
	Anadara sp. c)						*Penaeus sp.* d)					
	5	10	15	20	25	30	5	10	15	20	25	30
35	0.0049	0.0024	0.0016	0.0012	0.001	0.0008	0.0073	0.0037	0.0024	0.0018	0.0015	0.0012
40	0.0056	0.0028	0.0019	0.0014	0.0011	0.0009	0.0083	0.0042	0.0028	0.0021	0.0017	0.0014
45	0.0063	0.0031	0.0021	0.0016	0.0013	0.001	0.0094	0.0047	0.0031	0.0023	0.0019	0.0016
50	0.007	0.0035	0.0023	0.0017	0.0014	0.0012	0.0104	0.0052	0.0035	0.0026	0.0021	0.0017
55	0.0076	0.0038	0.0025	0.0019	0.0015	0.0013	0.0115	0.0057	0.0038	0.0029	0.0023	0.0019
60	0.0083	0.0042	0.0028	0.0021	0.0017	0.0014	0.0125	0.0063	0.0042	0.0031	0.0025	0.0021
65	0.009	0.0045	0.003	0.0023	0.0018	0.0015	0.0136	0.0068	0.0045	0.0034	0.0027	0.0023

a) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential / population that consumes Leiognathus sp for 350 days/year with the rate of intake of 80 grams/day for 30 years.*

b) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential / population that consumes Portunus pelagicus for 350 days/year with intake rate of 426.4 g/day for 30 years.*

c) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential / population that consumes Anadara sp. for 350 days/year with the rate of intake of 45 grams/day for 30 years.*

d) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential population that consumes Penaeus sp. for 350 days / year with the rate of intake of 30 grams / day for 30 / years.*

Someone with a less weight would have a greater risk, so, to control the risk of cadmium levels in *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* should be lower than someone with greater weight. Similarly, the contact length (duration of exposure), a person who is exposed to a longer period of time, is safer to consume *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* the cadmium content of less than someone who consumes life with smaller expose duration although the same weight.

Controlling overall levels of cadmium in biota in the river Tallo cannot be done directly through the control of cadmium levels Tallo river waters. Risk management with control intake rate can be developed by reducing the amount of consumption *Leiognathus sp, Anadara sp., Portunus pelagicus* and *Penaeus sp.,* While maintaining other factors such as body weight, levels of cadmium, frequency of exposure as the current state of the research was conducted.

Body Weight (kg)	Duration of Exposure (year)											
	Leiognathus sp. a)						Portunus pelagicus b)					
	5	10	15	20	25	30	5	10	15	20	25	30
35	456.25	228.125	152.083	114.063	91.25	76.042	1042.857	521.429	347.62	260.71	208.57	173.81
40	521.429	260.714	173.81	130.357	104.286	86.905	1191.837	595.918	397.28	297.96	238.37	198.639
45	586.607	293.304	195.536	146.652	117.321	97.768	1340.816	670.408	446.94	335.2	268.16	223.469
50	651.786	325.893	217.262	162.946	130.357	108.631	1489.796	744.898	496.6	372.45	297.96	248.299
55	716.964	358.482	238.988	179.241	143.393	119.494	1638.776	819.388	546.26	409.69	327.76	273.129
60	782.143	391.071	260.714	195.536	156.429	130.357	1787.755	893.878	595.92	446.94	357.55	297.959
65	847.321	423.661	282.44	211.83	169.464	141.22	1936.735	968.367	645.58	484.18	387.35	322.789

Body Weight (kg)	Duration of Exposure (year)											
	Anadara sp. c)						Penaeus sp. d)					
	5	10	15	20	25	30	5	10	15	20	25	30
35	206.604	103.302	68.868	51.651	41.321	34.434	1042.857	521.429	347.619	260.714	208.571	173.81
40	236.119	118.059	78.706	59.03	47.224	39.353	1191.837	595.918	397.2789	297.959	238.367	198.639
45	265.633	132.817	88.544	66.408	53.127	44.272	1340.816	670.408	446.9388	335.204	268.163	223.469
50	295.148	147.574	98.383	73.787	59.03	49.191	1489.796	744.898	496.5986	372.449	297.959	248.299
55	324.663	162.332	108.221	81.166	64.933	54.111	1638.776	819.388	546.2585	409.694	327.755	273.129
60	354.178	177.089	118.059	88.544	70.836	59.03	1787.755	893.878	595.9184	446.939	357.551	297.959
65	383.693	191.846	127.898	95.923	76.739	63.949	1936.735	968.367	645.5782	484.184	387.347	322.789

a) Maximum intake rate (g/day) according to the weight on the residential population consumes Leiognathus sp with cadmium levels 0.00048 mg/g for 350 days / year

b) Maximum intake rate (g/day) according to the weight on the residential population consumes Portunus pelagicus with cadmium levels 0.00021 mg / g for 350 days / year

c) Maximum intake rate (g/day) according to the weight on the residential population consumes Anadara sp. with high levels of cadmium 0.00106 mg / g for 350 days / year

d) Maximum intake rate (g/day) according to the weight on the residential population consumes Penaeus sp. with high levels of cadmium 0.00021 mg / g for 350 days / year.

The rate of intake, frequency of exposure, and weight vary each respondent. This means that safe exposure duration may vary on each respondent. Someone with greater weight, the smaller the rate of intake and frequency of exposure lower daily safe exposure duration has longer than someone who has a smaller weight, greater intake rate and duration of exposure are higher in the same levels of cadmium.

Frequency of exposure and body weight varies each respondent. Someone with greater weight, and frequency of exposure greater daily has safe levels of intake greater rate than someone with a smaller weight, and frequency of exposure which is smaller.

Management of risk with duration of exposure control can be done by reducing the contact time someone with cadmium contained in *Leiognathus sp, Anadara sp., Portunus pelagicus* and *Penaeus sp.* while maintaining factors such as body weight, levels of cadmium, frequency of exposure and intake rate remains at the current state of the research was conducted.

Duration of exposure (year)

(a)

Body weight (kg)

Duration of exposure (year)

(b)

Figure 1. (a) Maximum exposure duration (years) according to the weight on the residential population that consumes *Leiognathus sp* for 350 days/year with the rate of intake of 80 g/day with Cd concentration 0.00048 mg/g. (b) Maximum Exposure Duration (years) according to the weight on the residential population that consumes *Portunus pelagicus* for 350 days/year with intake rate of 426.4 grams/day with a concentration 0.00021 mg/g.

Duration of exposure (year)

(a)

Duration of exposure (year)

(b)

Figure 2. (a) Maximum Exposure Duration (years) according to the weight on the residential population that consumes *Anadara sp* for 350 days/year with the rate of intake of 45 grams/day. With Cd concentration 0.00106 mg/g. (b) Maximum exposure duration (days/year) according to the weight of residential population that consumes *Penaeus sp.* for 350 days/year with the rate of intake of 30 grams/day with cadmium levels 0.00021 mg/g.

The rate of intake, frequency of exposure, and weight vary each respondent. This means that safe exposure duration may vary on each respondent. Someone with greater weight, the smaller the rate of intake and frequency of exposure lower daily safe exposure duration has longer than someone who has a smaller weight, greater intake rate and duration of exposure are higher in the same levels of cadmium. In it`s application, a risk management decision-making process for controlling which will involve and consider many factors such as social, economic, and relevant techniques. So that risk management is achieved by eating better risk management options should be communicated to the parties concerned.

5. CONCLUSION

Leiognathus sp, Portunus pelagicus, Anadara sp. and *Penaeus sp*. from Tallo River are safe to eat. while maintaining levels of cadmium, weight and frequency of exposure such as when the research was conducted. The most effective risk management in controlling risks due to consumption *Leiognathus sp, Portunus pelagicus, Anadara sp*. and *Penaeus sp*. is to control the rate of intake.

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AUTHORS

First Author –Anwar Daud, PhD of Public Health, Faculty of Public Health, Hasanuddin University, Makassar , Indonesia; email address. daudanwar50@yahoo.com

Second Author – Arif Atul Mahmudah Dullah, MPH of Public Health, Faculty of Public Health, Hasanuddin University, Makassar , Indonesia; email address. @yahoo.com

Third Author – Anwar Mallongi, PhD Program of Environmental Health, Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Indonesia. email address. anwar_envi@yahoo.com

Correspondence Author – Anwar Daud, PhD
Email address. daudanwar50@yahoo.com

Risk management of cadmium (Cd) due to *Leiognathus sp, Portunus Pelagicus, Anadara sp* and *Penaeus sp* consumption among community in Tallo Subdistric, Makassar, Indonesia

Anwar Daud[1], Arif Atul Mahmudah Dullah[2], Anwar Malongi[3]

*Author to whom correspondence should be addressed; E-Mail: daudanwar50@yahoo.com
*Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia.

Abstract- This study aimed to investigate the risk management of Cadmium (Cd) for people who consumed *Leiognathus sp., Portunus pelagicus, Anadara sp.* and *Penaeus sp.,* from Tallo River in Tallo Village of Makassar City, Indonesia. Observational study was used by appliying environmental health risk assessment approach. The Cadmium levels in *Leiognathus sp., Portunus pelagicus, Anadara sp.* and *Penaeus sp,* were measured with the Atomic Absorption Spectrometry "Perkin type 210 Germany". Ninety six (96) respondent's body weight, consumption rate and exposure time duration were analyzed quantitatively to calculate the risk quotient (RQ). Result implied that the risk quotient value due to *Leiognathus sp.* consumption was 0.1655 (for a level of 0.00048 mg/gram). The risk quotient value for consuming *Portunus pelagicus was* 0.126 (for a level of 0.00021 mg/gram), while the risk quotient value for consuming *Anadara sp.* was 0.036 (for a level of 0.00106 mg/gram). Furthermore, the risk quotient value for consuming *Penaeus sp.* was 0.0055 (for a level of 0.00021 mg/gram), respectively. Risk management done by reducing the levels of cadmium, controlling the consumption rate and decreasing the exposure time. This study suggested that the most effective risk management is to control the consumption rate for *Leiognathus sp., Portunus pelagicus, Anadara sp.* and *Penaeus sp. from Tallo River.*

Index Terms- risk management, cadmium (Cd), *Leiognathus sp.*, *Portunus pelagicus*, *Anadara sp., Penaeus sp., Tallo River.*

I. INTRODUCTION

Industrial growth in Makassar considerable potential lead to pollutions in the environment. The number of industries operating in the city of Makassar area are about 4,288 units comprising of 4,099 small industrial units and 199 large industrial units (Environmental Impact Department of South Sulawesi, Indonesia, 2004). A total of 21 industries are the sources of pollutants into Tallo River as water bodies which receiving industrial wastewater disposal (Department of Environmental Management and the cleanliness of Makassar, 2008). Tallo River crosses the 10 districts in the city of Makassar such as the Panaikang Distric, Lakkang Distric, Tallo Distric,

Rappokalling Distric, Daya Distric, Bira Distric, Tamalanrea Distric, Tallo Baru Distric, Antang Distric and Rappojawan Distric and long the river there are also industrial activity, namely Makassar Industrial Estate (KIMA).

Aziz (2004) in his study found that levels of heavy metals (Cd) in sediment of Tallo River by an average of 8.92 mg/kg. Likewise, study by Ibrahim (2009) found the average of Cd in water column in Tallo River was 0.0578 mg/l. Akili (2010) found Cd levels in shellfish *Anadara granosa* exceeds the standards set by the WHO range between 0.085 mg/kg to 0.774 mg/kg.

The results of the studies above show that Tallo River has been polluted by chemicals such as Cadmium (Cd) for the water, sediment and biota. This situation will certainly endanger the health and lives of inhabitants in the area and vicinity region, especially when people consume biota come from this river. Residents who live around Tallo River are currently at risk of health problems due to consumption *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* from Tallo River. Then the control efforts of the factors that could potentially be a threat to the health of the population is necessary and should be done immediately.

2. MATERIALS AND METODHS

This observational study commenced by using an approach of environmental health risk analysis where risk factors were measured at the same time to predict health risk due to the amount of cadmium metal in *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* The research was conducted in two phases; analysis of risk assessment to identify the risk quotient (RQ) and risk management to prevent health risks.

Analysis level of risk carried out by counting the number of cadmium intake (I) through *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp* consumption. Data and information that are required to calculate the rate of intake, R (mg /day), the concentration of risk agent, C (mg/kg), exposure time (tE) (hours/day), frequency of exposure, f_E (days /year) and

duration of exposure, Dt (year). The formulations from (EPA 2006) below were used to calculate the intake rate and the risks quotient.

$$I = \frac{C \times R \times f_E \times D_t}{W_b \times t_{avg}} \qquad (1)$$

$$RQ = \frac{I}{RfD} \qquad (2)$$

Level of risk (Risk Quotient) is the quotient of the intake (I) and Reference Dose (RfD). According to U.S. EPA *RfD* for Cadmium is equal to 0.001 mg/kg/day. It means that intake of cadmium in excess of 0.001 mg/kg/day has exceeded the safety standard for cadmium intake and risk for the occurrence of impaired renal disfungis (proteinuria). Risk exists and needs to be controlled if RQ > 1. However, if RQ ≤ 1, the risk does not need to be controlled, but all existing conditions at the time of this research should be maintained. Risk management can be done with the three approaches using the following formulas:

$$C = \frac{RfD \times W_B \times t_{avg}}{R \times f_E \times D_t} \qquad (3)$$

$$R = \frac{RfD \times W_B \times t_{avg}}{C \times f_E \times D_t} \qquad (4)$$

$$D_t = \frac{RfD \times W_B \times t_{avg}}{C \times R \times f_E} \qquad (5)$$

3. RESULTS

The magnitude concentrations of Cd in *Leiognathus sp.* were ranged from 0.021 to 0.048 mg/kg. The content of cadmium in *Portunus pelagicus* was equal to 0.021 mg/kg. Then, the level content of Cd in *Anadara sp* were ranged from 0.077 mg/kg to 0.106 mg/kg. The concentration of Cd in *Penaeus sp.* is equal to 0.021 mg/kg. Based on SNI standards (2009) levels of Cd in biota is still meet the standard because they ≤ 0.1 mg/kg, except on shellfish samples, one that did not meet the standards set by SNI.

The average exposure frequency of respondents who consumed *Leiognathus sp* was 110.08 days/year, with the highest exposure frequency of 365 days/year whereas the lowest was 12 days/year. The average exposure frequency of respondents who consumed *Portunus pelagicus* was 24 days/year. The highest exposure frequency of 365 days / year and the lowest was 12

days/year. In addition, the average exposure frequency of respondents who consume *Anadara sp.* was 12 days/year, where the highest exposure frequency of 162 days/year and the lowest one of 12 days/year. Lastly, the average exposure frequency of respondents who consume *Penaeus sp. was* 12 days/year, with the highest exposure frequency of 365 days / year and the lowest one was 12 days / year.

Intake rate or the amount (grams) of *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* that were consumed by a person each day. Tallo urban population had an average rate of *Leiognathus sp* intake by 80 grams/day. The highest intake rate of 450 grams / day and the lowest of 20 grams / day. The average rate intake of *Portunus pelagicus* was 426.4 grams/day, where the highest intake of daily consumption of 1918.8 grams/day and the lowest of 213.20 grams/day. in addition, the average rate of *Anadara sp.* intake is 45 grams / day. *Penaeus sp.* was 30 grams / day, respectively.

The average body weight of the population consumed *Leiognathus sp* was 60 kg, the lowest weight of 35.5 kg and the highest was 103 kg. The average body weight of the population consuming *Portunus pelagicus* was 58 kg, with the lowest weight of 35.5 kg and the highest was 103 kg. The average weight of the population consumed *Anadara sp.* Was at 59.5 kg, with the lowest body weight of 39 kg and the highest of 94 kg. The average weight of the population consumed *Penaeus sp.* Was at 61 067 kg, the lowest weight was 58 kg and the highest was 103 kg. Population who consumed *Leiognathus sp.* with cadmium levels of 0.00021 mg/gram (the lowest levels) are at risk quotient (RQ) by an average of 0.0725 while for consumption *Leiognathus sp.* with cadmium levels 0.00048 mg/g (the highest levels) are at risk quotient (RQ) by an average of 0.1655. People who consume *Portunus pelagicus* with cadmium levels 0.00021 mg/g obtained the risk quotient (RQ) by an average of 0.126.

Respondents who consumed *Anadara sp.* with cadmium levels of 0.00077 mg/gram (the lowest levels) are at risk quotient (RQ) by an average of 0.026. Then, consumption of *Anadara sp.* with levels of 0.00106 mg/g (the highest levels) obtained an average risk level of 0.036. Likewise, the consumption of *Penaeus sp.* with levels of cadmium 0.00021 mg/g had RQ by an average of 0.0055. There are three people who have risk population due to consumption *Leiognathus sp.* contained cadmium of 0.00048 mg/g (Figure 1). Level of risk per individual due to consumption of *Portunus pelagicus* with cadmium levels 0.00021 mg/g was found four people at risk (Figure 2). There was no people at risks due to consumption of *Anadara sp.* with cadmium level 0.00106 mg/g and *Penaeus sp.* with cadmium level of 0.00021 mg/gram (Figure 3 and Figure 4).

4. DISCUSSION

4.1 Risk Analysis of Cadmium

Risk analysis could be developed with two approaches, disease oriented approach and agent-oriented. Methods of risk analysis with disease-oriented approach to assess risk based on the effect that has arisen or appears that the environmental health epidemiology studies. While the agent-oriented approach does not take into account the effects that have occurred, but the risk analysis can be done simply by the existence of an agent that

exposes humans either through inhalation, oral or dermal to predict the effects that may occur in the future. This research is a study of risk analysis using agent oriented approach. Agent in question in this research is cadmium which exposes residents of the Tallo Subdistric through consumption *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* from Tallo River.

In an experiment carried out to follow the transfer of cadmium from a terrestrial to a local aquatic ecosystem, it was found that the number (94-96 %) of cadmium in the soil left behind. Cadmium accumulation had a faster process in the sediment than in living organisms. Twenty percent of cadmium in water was found in suspended particles (Anonim, 2009). A study conducted in areas of high runoff indicates the fact that a large amount of cadmium decreases after passing through sedimentation ponds and wane after going through an arrest in wet areas (Irwin, 1997). Some forms of dissolved cadmium in water and Cadmium bound strongly to soil particles. Fish, plants, and animals can be contaminated with cadmium from the environment (ATSDR, 2008a).

Cadmium can undergo a process of accumulation in fish, mussels and algae, especially species living in an area that is very close to the sediment that has been contaminated by cadmium (IPCS, 1972; 2004; 2009; Irwin, 1997). US.EPA. (1985) in Drinking Water Criteria Document on Cadmium mention that the cadmium concentration of 200 µg/gram wet tissue of human kidney is the highest level that does not cause the occurrence of proteinuria. A model toksikokinetik to determine the level of chronic oral exposure in humans (NOAEL) in which the levels of cadmium contained 200 ug/g wet tissue of human kidney, the model assumes that the daily load cadmium 0.01% experienced a reduction in body (US. EPA, 1985).

With this basis forecasts NOAEL (No Observed Adverse Effect Level) of 0.005 mg cadmium/kg/day for source water intake with UF value (Uncertainty Factor) of 10 while through food by 0.001 mg/kg/day (US-EPA, 1985; IRIS, 2007; 2010).

A person's daily intake of cadmium levels exceeding 0.001 mg/kg/ day generated the increase of excretion of cadmium in urine that has a significant relationship with changes in renal function. Then it might be accompanied by a low molecular weight proteins, intracellular tubular enzymes, amino acids, proteins with a molecular weight high, metalotionin and electrolysis. A comprehensive study found a significant relationship between the dose response to cadmium in urine (or cumulative cadmium intake) and the prevalence of abnormal levels of the biomarker of renal dysfunction.

Exposure to cadmium in a long period in humans will lead to the accumulation of chemicals in the human body, in a certain period of time will lead to the emergence of adverse health effects. Chronic Cadmium poisoning caused by toxins carried by the metal cadmium, occurred in long intervals, then at some point

the body can no longer tolerate the toxicity brought by Cd (ATSDR, 2008a). Toxic effects of metals are closely linked to the level and duration of exposure. Generally, the higher levels of the metal and the longer the exposure, the toxic effect of a metal will be greater. For example, cadmium in single dose, large dose can induce gastrointestinal disorders. While the intake of Cd in small amounts but can repeatedly cause malfunctioning of kidney. (Lu, 1995)

The main health effects due to long-term exposure to cadmium were including kidney dysfunction, lung cancer, and prostate cancer. Cd can lead to a local irritation to the skin and eyes, and the effects can occur from inhalation or ingestion. (OSHA, 2004). Weight loss is a simple index of toxic effects but is sensitive to the presence of toxic substances in the body. Gastrointestinal absorption of cadmium is influenced by diet and nutritional status, with iron status has an important position. An average of 5% of the total oral intake of cadmium can absorbed, but individual values ranged from less than 1% to more than 20% (Lu, 1995).

Takenaka et al (1983) on exposure to rodents by inhalation of cadmium in the form of cadmium chloride at concentrations of 12.5, 25 and 50 ug/cu.m for 18 months, with an additional period of observation for 13 months, obtained significant results in increased lung tumors (IRIS, 2010). Cadmium is known to accumulate in the human kidney for a relatively long time, from 20 to 30 years, and, at high doses, is also known to cause health effects on the respiratory system and are associated with bone disease. Epidemiological information related to support this as the worker or the Japanese people living in areas contaminated with high levels of cadmium (US.EPA, 1985).

Dose-response assessment is the process of characterizing the relationship between the dose of an agent that has been recorded or obtained by the case of a health effect in exposed populations and estimating the incidence as a function of human exposure to an agent (NRC, 1983). Toxicant can be eliminated from the body through several routes. Kidney is a vital organ to remove toxins. Some xenobiotics material is first converted into a water-soluble materials before disposal. Kidney is an organ that is very efficient in eliminating toxicant from the body. Toxic compounds excreted in urine by the same mechanism as when the kidneys remove metabolites result from the body (Mukono, 2005; Lu, 1995). This suggests that the continuous intake of cadmium will eventually lead to a reduction in the kidney's ability to make efforts neutralization cadmium, which eventually led to the occurrence of renal dysfunction.

Chemicals that have undergone cycles in the environment will go into the human body through the three channels of exposure is through the digestive tract (ingestion), breathing (inhalation) and skin contact (dermal) (WHO, 2000; Mukono; 2005; Soemirat, 2009). However, specifically with human

engineering alone, toxicant can also enter the body by way of intravenous, intraperitoneal, subcutaneous and intramuscular (Mukono, 2005; 2000). In addition to the entry of toxicant in the body can also be through parental (Soemirat, 2009). Even the entry of chemicals into the human body through three routes of exposure to the same time (WHO, 2000).

4.2 Risk Management

Risk management aims to control the risk factors that may lead to health problems due to consume of *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* containing cadmium. In a study of risk analysis with agent-oriented approach there are some variables that were measured to determine the amount of risk, the level (concentration) of the chemical in the environment, body weight, duration of exposure, the rate of intake, and frequency of exposure. So in some risk management these variables can be controlled to avoid occurrence of risk due to exposure to a disease agent in the environment. Efforts to control risk can be done in several ways: lower levels of cadmium *in Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp*., controlling the rate of intake and reduce the duration of exposure. Control of risk approaches by reducing cadmium levels in *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp*. can be done by calculating safe levels of cadmium in the biota if taken every day for a certain period. Where the determination of safe levels of cadmium can vary among individuals depending on contact time (duration of exposure) and the person's weight.

Table 1. Exposure Duration of Cadmium due to comsumption of *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.*, base on the varied body weight

Body Weight (kg)	Duration of Exposure (year)											
	Leiognathus sp. a)						*Portunus pelagicus* b)					
	5	10	15	20	25	30	5	10	15	20	25	30
35	0.00274	0.00137	0.00091	0.00068	0.00055	0.00046	0.0005	0.00026	0.00017	0.00013	0.0001	0.000085
40	0.00313	0.00156	0.00104	0.00078	0.00063	0.00052	0.0006	0.00029	0.0002	0.00015	0.00012	0.000098
45	0.00352	0.00176	0.00117	0.00088	0.0007	0.00059	0.0007	0.00033	0.00022	0.00017	0.00013	0.00011
50	0.00391	0.00196	0.0013	0.00098	0.00078	0.00065	0.0007	0.00037	0.00024	0.00018	0.00015	0.000122
55	0.0043	0.00215	0.00143	0.00108	0.00086	0.00072	0.0008	0.0004	0.00027	0.0002	0.00016	0.000134
60	0.00469	0.00235	0.00156	0.00117	0.00094	0.00078	0.0009	0.00044	0.00029	0.00022	0.00018	0.000146
65	0.00508	0.00254	0.00169	0.00127	0.00102	0.00085	0.001	0.00048	0.00032	0.00024	0.00019	0.000158

Body Weight (kg)	Duration of Exposure (year)											
	Anadara sp. c)						*Penaeus sp.* d)					
	5	10	15	20	25	30	5	10	15	20	25	30
35	0.0049	0.0024	0.0016	0.0012	0.001	0.0008	0.0073	0.0037	0.0024	0.0018	0.0015	0.0012
40	0.0056	0.0028	0.0019	0.0014	0.0011	0.0009	0.0083	0.0042	0.0028	0.0021	0.0017	0.0014
45	0.0063	0.0031	0.0021	0.0016	0.0013	0.001	0.0094	0.0047	0.0031	0.0023	0.0019	0.0016
50	0.007	0.0035	0.0023	0.0017	0.0014	0.0012	0.0104	0.0052	0.0035	0.0026	0.0021	0.0017
55	0.0076	0.0038	0.0025	0.0019	0.0015	0.0013	0.0115	0.0057	0.0038	0.0029	0.0023	0.0019
60	0.0083	0.0042	0.0028	0.0021	0.0017	0.0014	0.0125	0.0063	0.0042	0.0031	0.0025	0.0021
65	0.009	0.0045	0.003	0.0023	0.0018	0.0015	0.0136	0.0068	0.0045	0.0034	0.0027	0.0023

a) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential / population that consumes Leiognathus sp for 350 days/year with the rate of intake of 80 grams/day for 30 years.*

b) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential / population that consumes Portunus pelagicus for 350 days/year with intake rate of 426.4 g/day for 30 years.*

c) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential / population that consumes Anadara sp. for 350 days/year with the rate of intake of 45 grams/day for 30 years.*

d) *Safe levels of Cd (mg/g) according to the duration of exposure and the weight on the residential population that consumes Penaeus sp. for 350 days / year with the rate of intake of 30 grams / day for 30 / years.*

Someone with a less weight would have a greater risk, so, to control the risk of cadmium levels in *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* should be lower than someone with greater weight. Similarly, the contact length (duration of exposure), a person who is exposed to a longer period of time, is safer to consume *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* the cadmium content of less than someone who consumes life with smaller expose duration although the same weight.

Controlling overall levels of cadmium in biota in the river Tallo cannot be done directly through the control of cadmium levels Tallo river waters. Risk management with control intake rate can be developed by reducing the amount of consumption *Leiognathus sp, Anadara sp., Portunus pelagicus* and *Penaeus sp.,* While maintaining other factors such as body weight, levels of cadmium, frequency of exposure as the current state of the research was conducted.

Body Weight (kg)	Duration of Exposure (year)											
	Leiognathus sp. [a]						Portunus pelagicus [b]					
	5	10	15	20	25	30	5	10	15	20	25	30
35	456.25	228.125	152.083	114.063	91.25	76.042	1042.857	521.429	347.62	260.71	208.57	173.81
40	521.429	260.714	173.81	130.357	104.286	86.905	1191.837	595.918	397.28	297.96	238.37	198.639
45	586.607	293.304	195.536	146.652	117.321	97.768	1340.816	670.408	446.94	335.2	268.16	223.469
50	651.786	325.893	217.262	162.946	130.357	108.631	1489.796	744.898	496.6	372.45	297.96	248.299
55	716.964	358.482	238.988	179.241	143.393	119.494	1638.776	819.388	546.26	409.69	327.76	273.129
60	782.143	391.071	260.714	195.536	156.429	130.357	1787.755	893.878	595.92	446.94	357.55	297.959
65	847.321	423.661	282.44	211.83	169.464	141.22	1936.735	968.367	645.58	484.18	387.35	322.789

Body Weight (kg)	Duration of Exposure (year)											
	Anadara sp. [c]						Penaeus sp. [d]					
	5	10	15	20	25	30	5	10	15	20	25	30
35	206.604	103.302	68.868	51.651	41.321	34.434	1042.857	521.429	347.619	260.714	208.571	173.81
40	236.119	118.059	78.706	59.03	47.224	39.353	1191.837	595.918	397.2789	297.959	238.367	198.639
45	265.633	132.817	88.544	66.408	53.127	44.272	1340.816	670.408	446.9388	335.204	268.163	223.469
50	295.148	147.574	98.383	73.787	59.03	49.191	1489.796	744.898	496.5986	372.449	297.959	248.299
55	324.663	162.332	108.221	81.166	64.933	54.111	1638.776	819.388	546.2585	409.694	327.755	273.129
60	354.178	177.089	118.059	88.544	70.836	59.03	1787.755	893.878	595.9184	446.939	357.551	297.959
65	383.693	191.846	127.898	95.923	76.739	63.949	1936.735	968.367	645.5782	484.184	387.347	322.789

a) Maximum intake rate (g/day) according to the weight on the residential population consumes Leiognathus sp with cadmium levels 0.00048 mg/g for 350 days / year

b) Maximum intake rate (g/day) according to the weight on the residential population consumes Portunus pelagicus with cadmium levels 0.00021 mg / g for 350 days / year

c) Maximum intake rate (g/day) according to the weight on the residential population consumes Anadara sp. with high levels of cadmium 0.00106 mg / g for 350 days / year

d) Maximum intake rate (g/day) according to the weight on the residential population consumes Penaeus sp. with high levels of cadmium 0.00021 mg / g for 350 days / year.

The rate of intake, frequency of exposure, and weight vary each respondent. This means that safe exposure duration may vary on each respondent. Someone with greater weight, the smaller the rate of intake and frequency of exposure lower daily safe exposure duration has longer than someone who has a smaller weight, greater intake rate and duration of exposure are higher in the same levels of cadmium.

Frequency of exposure and body weight varies each respondent. Someone with greater weight, and frequency of exposure greater daily has safe levels of intake greater rate than someone with a smaller weight, and frequency of exposure which is smaller.

Management of risk with duration of exposure control can be done by reducing the contact time someone with cadmium contained in *Leiognathus sp, Anadara sp., Portunus pelagicus* and *Penaeus sp.* while maintaining factors such as body weight, levels of cadmium, frequency of exposure and intake rate remains at the current state of the research was conducted.

Duration of exposure (year)

(a)

Duration of exposure (year)

(b)

Figure 1. (a) Maximum exposure duration (years) according to the weight on the residential population that consumes *Leiognathus sp* for 350 days/year with the rate of intake of 80 g/day with Cd concentration 0.00048 mg/g. (b) Maximum Exposure Duration (years) according to the weight on the residential population that consumes *Portunus pelagicus* for 350 days/year with intake rate of 426.4 grams/day with a concentration 0.00021 mg/g.

Duration of exposure (year)

(a)

Duration of exposure (year)

(b)

Figure 2. (a) Maximum Exposure Duration (years) according to the weight on the residential population that consumes *Anadara sp* for 350 days/year with the rate of intake of 45 grams/day. With Cd concentration 0.00106 mg/g. (b) Maximum exposure duration (days/year) according to the weight of residential population that consumes *Penaeus sp.* for 350 days/year with the rate of intake of 30 grams/day with cadmium levels 0.00021 mg/g.

The rate of intake, frequency of exposure, and weight vary each respondent. This means that safe exposure duration may vary on each respondent. Someone with greater weight, the smaller the rate of intake and frequency of exposure lower daily safe exposure duration has longer than someone who has a smaller weight, greater intake rate and duration of exposure are higher in the same levels of cadmium. In it`s application, a risk management decision-making process for controlling which will involve and consider many factors such as social, economic, and relevant techniques. So that risk management is achieved by eating better risk management options should be communicated to the parties concerned.

5. CONCLUSION

Leiognathus sp, Portunus pelagicus, Anadara sp. and *Penaeus sp.* from Tallo River are safe to eat. while maintaining levels of cadmium, weight and frequency of exposure such as when the research was conducted. The most effective risk management in controlling risks due to consumption *Leiognathus sp, Portunus pelagicus, Anadara sp.* and *Penaeus sp.* is to control the rate of intake.

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AUTHORS

First Author –Anwar Daud, PhD of Public Health, Faculty of Public Health, Hasanuddin University, Makassar , Indonesia; email address. daudanwar50@yahoo.com

Second Author – Arif Atul Mahmudah Dullah, MPH of Public Health, Faculty of Public Health, Hasanuddin University, Makassar , Indonesia; email address. @yahoo.com

Third Author – Anwar Mallongi, PhD Program of Environmental Health, Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Indonesia. email address. anwar_envi@yahoo.com

Correspondence Author – Anwar Daud, PhD
Email address. daudanwar50@yahoo.com

Review of magneto-hydrodynamic flow, heat and mass transfer characteristics in a fluid

Parveen Kumar

Research Scholar, JJT University, Rajasthan

Abstract- In the present article I would like to stress on the potential research agenda for lasting reforms in the area of computational fluid dynamics. On the theoretical frameworks, I have tried to propose that a scope for lots of research is needed in this area of stretching sheet in fluid dynamics. On the basis of varied problem domains carried out in various researches in the past, I have proposed to divide this field into segments namely flow past a stretching sheet, magneto hydrodynamic flow, mixed convection flow and mass transfer flow. These areas have potential applications in industries which have made them important contributor for the progress of the society.

Index Terms- Stretching Sheet, Magneto Hydrodynamic, Mass Transfer, Convection

I. THEORY

The study of laminar flow of a thin liquid film over a stretching sheet is currently attracting the attention of a growing number of researchers because of its immense potential to be used as a technological tool in many engineering applications, with applications in industries such as extrusion, melt-spinning etc. The pioneering works in this area has been done by crane in 1970 where he has explained the exact solution for a viscous and incompressible fluid in two dimensional steady flows in a stretching sheet over the application of uniform stress. Many researchers since then have contributed immensely in this stretching sheet area. Anderson (2002) has obtained the exact analytical solution for the slip-flow of a Newtonian fluid past a linearly stretched sheet. In 2003 Mahapatra and Gupta computed that a boundary layer is formed only when stretching velocity is less than the free stream velocity and an inverted boundary layer is formed when stretching velocity exceeds the free stream velocity. In 2008, Wang further extended stagnation flow to the three-dimensional case from the two-dimensional case. Jat and Chaudhary (2009) have studied the Stretching sheet with the conclusion that the velocity and temperature vary proportionally with the distance from stagnation point. Mehmood and Ali (2010) further investigated the heat transfer analysis in generalized three-dimensional channel flow of a stretching sheet. Y.Khan et.al (2012) used the homotopy analysis method first time for the unsteady linear viscoelastic fluid over a stretching/shrinking sheet with stagnation point flow. Rekha R. Rangi, Naseem Ahmad(2012) studied the boundary layer flow with variable thermal conductivity on a stretching cylinder and employed the Keller-box technique to solve out the non linear equations.

Kumari et al. (1990) investigated the impact of magnetic field on stretching sheet in an electrically conducting ambient fluid and observed various parameters like skin friction, induced magnetic field at the wall and the wall temperature. Andersson (1995) applied uniform magnetic field on stretching sheet and examined the complete similarity solution for the parameters like velocity and pressure in case of two dimensional Navier-Stokes equations. Mahapatra and Gupta (2001) studied the steady stagnation point flow over a flat deformable sheet in an incompressible, viscous, electrically conducting fluid. Ishak et al. (2008) while researching on electrically conducting fluid flow due to moving extensible sheet concluded that the effect of increase in magnetic parameter will reduce the velocity boundary layer thickness and on the other hand thermal boundary layer thickness increases. Ziya et al. (2008) and (2009a) studied inclined porous plate in the presence of high temperature and calculate the magneto-hydrodynamic free convection flow of a viscous fluid. Sharma and Singh (2009) have showed that in the presence of viscous dissipation and Ohmic heating fluid temperature increases while studying the effects of Ohmic heating and viscous dissipation of MHD flow on a stretching sheet. F. Labropulu (2011) examined the effect of transverse magnetic field on an infinite plate and studied the unsteady stagnation point flow of a Newtonian fluid and using finite difference technique, they found small and large frequencies of the oscillations for different values of the Hartmann's number. Stanford Shateyi (2013) studied the effect of MHD flow on a Maxwell fluid crossing the vertical stretching sheet in a Darcian porous medium.

In mixed (combined forced and free) convection the local heat transfer rate and local skin friction are the important parameter and can be modified in comparison to the pure forced convection. Due to the temperature difference, the buoyancy forces arise and they may assist or oppose the forced flow depending on the force flow direction and accordingly modifying the results in either increasing or decreasing the heat transfer rates. Chamkha (1998) has studied that on application of magnetic field on a Newtonian, electrically conducting and heat absorbing fluid at a stagnation point and concluded that local skin friction coefficient and the local Nusselt number vary proportionally in positive manner with increasing buoyancy effects for buoyancy assisting flows. Kumari (2001) has explained while studying the the effect of variable viscosity on free or mixed convection boundary that the constant viscosity has lesser heat transfer as compared to the variable velocity in fluids. Ishak et al. (2006b) while studying the steady mixed convection boundary layer flow in its own plane calculated the relation of variation of parameters like skin friction coefficient, local

Nusselt number, Prandtl number. They observed that skin friction coefficient and local Nusselt number are directly proportional to the buoyancy parameter and on increase in Prandtl number,local Nusselt number increases but skin friction coefficient decreases. Prasad et al (2010) has observed that the momentum boundary layer as well as the thermal boundary layer thickness increases on increasing the variable viscosity parameter and the mixed convection parameter. D. Li et al (2011) investigated steady mixed convection flow of a viscoelastic fluid stagnating orthogonally on a heated or cooled vertical flat plate and found that the skin friction coefficient and the local heat transfer are inversely proportional to the Weissenberg number We in all the flow cases while the skin friction decreases with the Prandtl number Pr and the local heat transfer increases with the Prandtl number Pr .T. Hayat et al (2013) explained the heat transfer effects in magnetohydrodynamic (MHD) axisymmetric flow of third-grade fluid between the stretching sheets.

Takhar et al. (2000) observed the mass transfer characteristic on a viscous electrically conducting fluid and explained that the magnetic field reduces the surface mass transfer marginally but increases the surface skin friction significantly. Ghaly (2002) studied radiation effect on an isothermal sheet and found that velocity and temperature profiles, Nusselt number and local shear stress are markedly influenced by the radiation. Postelnicu (2007) while taking into consideration the diffusion-thermo (Dufour) and thermal-diffusion (Soret) effects explained that the order of chemical reaction and chemical reaction parameter play a vital role in the solution. Partha (2008) examined thermophoresis particle deposition in free convection on a vertical plate in non-Darcy porous medium and found that buoyancies are greatly influenced by the Soret effect. Pal (2009) investigated stretching sheet in the presence of buoyancy force and thermal radiation and found that the local Nusselt number is directly proportional to the Prandtl number. Postelnicu (2010) studied Dufour and Soret effect of stagnation flow in a porous medium and got the asymptotic analytical solution for large suction cases. M. Turkyilmazoglu & I. Pop (2013) has studied the flow and heat transfer of a Jeffrey fluid near the stagnation point on a stretching sheet and found that vaious physical parameters like, stretching/shrinking strength, Deborah number and suction/injection parameters affects the fluid flow while Prandtl number affects the temperature field.

II. CONCLUSION AND FUTURE SCOPE

This computational fluid dynamics area on stretching sheet is flourishing at a fast rate in various types of physical problems. Now a day various researchers are employing nanotechnology in fluids which can be looked upon in the future because nanotechnology enhances the thermal conductivity and various parameters which is of significant use. The scope for the future research could be the application of various soft computing techniques like genetic algorithm, fuzzy and neural network to solve out these physical problems which have enormous applications in the industry. Newer and newer techniques are emerging out to solve out the various stretching sheet problem which will be beneficial for industry and hence in long run to the society.

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AUTHORS

First Author – Parveen Kumar, Research Scholar, JJT University, Rajasthan

Mid-Day Meal Scheme and Primary Education in India: Quality Issues

Uma

Research Scholar, Department of Public Administration, Panjab University, Chandigarh

Abstract- Improving the conditions of the underprivileged and backward has been the major issues while forming the policies of India as a welfare state. The target is children in many policies, acts and also in schemes. The Government of India started Mid-day meal (MDM) scheme in the government primary schools with the objective of improving health of the poor children. In addition, Right to Education implemented in April 2010 to enable these children the education starting from the age of 6 up to the age of 14 years. Though the quality has been gaining importance in all domains, yet, in both the quality factor seems to be missing. The paper will bring out the quality issues related to these two (Mid-day Meal scheme and Right to Education Act, 2010.

Index Terms- MDM scheme, Right to Education, Quality issues.

I. INTRODUCTION

Education plays a vital role in one's life. Though, the education of a child starts with the home itself, yet, the primary school is the first step towards formal schooling in India. India has one of the largest child-population of the world. Half of them are disadvantaged and belong to the families which are economically impoverished. They cannot afford good health care facilities and expensive educational institutes. The Government of India started the Mid Day Meal scheme and implemented Right to Education Act, 2010 to provide nutritional food and free education respectively to these poor children of India. Hence, the government primary schools are the only hope for these children to get free food and education. Though, the Mid day meal scheme has been implemented years back (1966) as compared to Right to Education which has been implemented in the year 2010. Unfortunately, the factor of quality in both is absent. Since in the past few months many incidents were reported in which guidelines to ensure hygiene were kept aside while preparation of the mid day meal scheme. Further, the education in these schools suffers due to MDM scheme. The following paragraphs will bring out the situation of Government Primary School in India with respect to Right to Education Act, 2010 and the MDM scheme.

A number of incidents were highlighted in the media where carelessness was reported while preparing food in the schools. One of the notable incidents of carelessness was reported in the Samran district of Bihar. On July 2013, 23 children died after eating mid day meal in the school. It was reported that instead of putting edible oil the insecticide was used for cooking. The situation in other districts of Bihar was not different where maggot-infested wheat and rice and rotten vegetables were being

used for preparation of food. Further, the usage of toilet water to wash utensils of food in a primary school of Panchkula, A dead lizard was found in the food in a primary school of Haryana and many more. These incidents have become common. Furthermore, the food was being prepared in open in primary schools of Mohali. Hence, non-seriousness in the implementation of the scheme is directly observed in these cases. Moreover, the preparation of the food in the schools directly affects the provision of education in the schools.

II. METHODOLOGY

The methodology included both the secondary data and primary data. For secondary data, recent government and non-government reports on primary education, government websites, newspaper articles and journals were relied upon. For primary data, random sample of teachers were taken from primary schools of mohali, panchkula and Chandigarh. The parents of the children of these primary schools were also interviewed.

III. MAIN PROBLEMS OF THE MID-DAY MEAL SCHEME

MDM scheme is one of the largest centrally funded schemes which provide free one time meal to the students in government primary schools. 11 crore of children are being provided one time meal everyday. The programme is considered of immense benefit since it provides both nutrition and education to the children. However, how far the scheme is really being taken seriously by the government and its officials is the issue. The provision involves the preparation and distribution within the school premises. The main findings during the survey of primary schools of Mohali and Panchkula were as follows:

1. There was no proper kitchen to prepare food in the primary schools.
2. Sitting arrangement for students was either in the classes or open grounds which invited flies and other insects.
3. The cooks in the schools didn't know the guidelines to ensure hygiene.
4. The water used for cooking food was not wholesome.
5. The grievance redressal mechanism for the complaints of MDM scheme was not known to the parents.

The teachers in these schools agreed of lack of infrastructural facilities for these schools. The teachers said that the schools lack the provision of proper kitchen though the scheme of food distribution was there. Further, the teachers told that the cooks hired for cooking, were illiterate or hardly know to

read basic hindi or punjabi. These people didn't know about the guidelines issued by the MHRD to ensure the hygine.

Hence, it was concluded that MDM scheme though has been implemented but is not being monitored properly. The scheme has given one way provision. The feedback from the students and parents should be taken regularly. Further, how MDM scheme is affecting the education in the schools.

IV. QUALITY AND EDUCATION

The Right to Education guarantees free education for the children of age group of 6-14 years. However, the quality through this act is not enabled. According to Annual Status of Education Report (ASER), in 2010, 46.3% children of class V could not read the text of class II. In 2011 and 2012 this percentage increased to 51.8% and 53.2% respectively. This is an alarming situation in terms of quality being offered in these schools.

The interviews with the teachers in Primary Schools brought out the following obstacles to ensure quality in the education. Teacher responsibilities in the Primary schools with special reference to MDM scheme: The foremost duty of the teachers has become the supervision and distribution of food among the students. Though the supervision does not improve the quality of food, yet, teachers get distracted from the main duty of teaching. Further, many teachers added that the students after eating tend to sleep. The higher officials didn't bother about the teaching or learning of the students. According to one of the teachers they clearly say that 'Let the children sleep. They will develop better physically'. Hence, distributing food and guarding these children has become the prime duty of these teachers. This neglects the main duty of teaching in these schools.

To add to the issue of quality education for the students, they have to be given passing grades in these classes. The results must be 100% pass, whether they learn the subject matter or not. The teachers were unable to justify their profession of teaching and evaluating a child in these schools. Further, it was stated by a senior teacher that the 'quality is certainly being compromised in education. The students get pass whether they study or not. This will make them suffer in their life later. When there are competitive exams and entrance tests for medical or engineering. If we promote the students every year then the competitive exams held should also be made cleared by all the candidates appearing. Why don't they pass all the candidates?? It was stated by one of the retired teachers of a reputed primary school in Chandigarh.

Hence, it can be concluded that the teachers in these schools were not doing their primary duty of teaching due to many duties assigned to them by the higher officials. Major one of them was the MDM supervision and distribution. Further, the teachers were passing the children in the exams without making them learn because of the pressure of the policy makers and executers. This hampered their role and brought forward the fact that the quality in education was being compromised in the primary schools in India.

V. CONCLUSION AND SUGGESTIONS

Therefore, from the above discussion it was concluded that the clients of government primary schools were the children who belonged to the poor families. Though, the objectives and potential benefits of the MDM scheme were mainly: increased enrolment, attendance and retention; improved child nutrition; and social equity. Though, the enrolment statistics have improved and the dropouts might have reduced however, quality in education and food has also decreased. Since, proper care is not being taken care while preparing the food and teachers are involved in various other duties. The quality has to be taken care in primary education in terms of class size, child-centered teaching process, and continuous assessment of learning of students and so on.

Further, the meaning of school for these kids and their parents is more of food rather than education. Since the prime duty of teaching was not being done in these schools. The teachers were doing everything except imparting the education. Furthermore, the quality of education was absent as children were being passed to next class every year. The achievements of these programs were being measured quantity wise rather than quality wise.

The recommended solution for these primary schools is to change the role of government sector in these programs. The preparation of food for the students should be contracted out to the non-government organizations. The negligence should result to the cancellation of the contracts. Further, the government's role should be more of monitoring and regulating these organizations. In addition, the contact numbers of redressal mechanism for mid day meal scheme should be made available with the parents representatives and teachers in the schools. This will help the teachers to bring back to their main work of teaching.

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AUTHORS

First Author – Uma (Research Scholar, Department of Public Administration, PU, Chandigarh), Email Id: uma.sharma106@gmail.com

Mid-Day Meal Scheme and Primary Education in India: Quality Issues

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AUTHORS

First Author – Uma (Research Scholar, Department of Public Administration, PU, Chandigarh), Email Id: uma.sharma106@gmail.com

Health Monitoring of Rotating Electrical Machine Using Soft Computing Techniques: A Review

[*]Alka Thakur[**]Dr.Sulochana Wadhwani[***]Vandana Sondhiya

[*]Assistant.professor Bhabha Engg. Research Institute, Bhopal
[**]Associate Professor Madhav Institute of Tech.&Science Gwalior
[***]Assistant.professor Sam college of Sc.& Technology

Abstract- Induction motor is mostly utilized in industrial application due to its favorable, economical and technical reasons. It has been observed that during the operation of drive system, motor faces different types of abnormal condition which in turn create various types of faults and failures in machine thereby affecting the production system. Hence to avoid such faults health monitoring of induction machines have become necessary. Different techniques are used for motor health diagnosis. Basically this techniques are classified into model based technique, signal based technique and soft computing technique. By using these techniques motor can be prevented from various catastrophic failures which in turn increase the efficiency and production. This literature presents a review of various techniques used for fault diagnosis.

Index Terms- Induction motor, health monitoring, fault diagnosis, catastrophic failures, different techniques.

I. INTRODUCTION

In this paper, an overview of fault detection of induction motor has been analyzed. Health monitoring allows us to distinguish the type of fault and its severe effect on the drive system, thereby reducing the catastrophic failure and damage. As in most of the drive system, induction motor is generally used as the basic P.M ,with the help of such analysis and health prediction we can pre justify the sudden failure, and can prevent the large industrial system from heavy losses thereby reducing the cost occurring for machine maintenance and repairment. As a result, one can pre-decide the maintenance schedule to reduce or prevent such failure. However complete prevention of losses cannot be estimated out but one can increase the efficiency and reliability of motor by analyzing the faults. In this literature some on-line diagnostic techniques have been reviewed for the fault diagnostic of electric machine. Various on-line fault detection techniques can be used as a valuable tool for the pre-detection of faults of the prime mover. Some of these technique are fuzzy logic technique (9) , artificial intelligence technique(9) , wavelet transformation technique, artificial neutral network based and mat lab simulation based online computation technique s (17), Negative sequence components of motor terminal quantities ,broken rotor bars(8), stator current spectrum and motor current signature stator winding inter turn short(5).With the help of such technique one can estimate the motor parameter and can prevent the machine or the drive system from severe failure ,because it is useless to perform practical experiment to verify any fault. In the early times motor were supervised by then noise, vibration &

temp, but this method were expensive, consume lot of times & does not   discriminate all types of faults aswell. Hence advance in sensor algorithm and computational and simulation technique may lead to ease and effective fault prediction. The use of advance sensors measure not only stator voltage and currents but also measures the air gap eccentricity, flux, flux densities, rated output torque & various harmonics & vibration of the motor.

Fault: The induction machine faces various types of stresses during the operation. These stresses might lead to the various severe faults that a motor faces. Hence condition monitoring becomes necessary to avoid such catastrophic failures. A brief classification related to stator, rotor, bearing and other system related fault has been introduced in this context along with various online techniques to overcome those faults.

Various types of faults in induction machine:

1 Faults relate to stator: it includes faults related to stator core and stator winding.

2. Faults related to rotor: it includes broken rotor bars, broken rotor end rings and shorted rotor field windings.

3. Gear box abnormalities.

4. Cracked or bent shaft.

5. Bearing faults.

6. Miscellaneous faults: It includes faults in next devices which regroup the accessories of the drive system.

Faults related to stator: From the graph above it constitutes almost 40 % of the overall faults. The stator winding fault occurs when the insulation between the two adjacent turns in a coil fails. This is called shorted or turn to turn fault. The resultant induced current causes heating up of the surroundings and damage to the stator insulation. The heat so produced by the resultant current create imbalance in the magnetic field which produces vibration that severely affects the bearings.

Another type of fault in case of stator is stator inter turn short circuit. Which is also caused due to the voltage transients which occur by the successive reflection resulting from cable connection between motor and ac drives. This drives produce extra voltage stress on stator winding which are produce due to the inherent pulse width modulation of voltage applied to the stator winding.

Faults related to rotor: Rotor faults contribute about 10% of the overall fault. Broken rotor bars can be either partially or fully cracked. This cracking can be due frequency or sudden start at rated voltage or due to high temperature, vibration, mechanical stress caused by bearing faults and sometimes due to

manufacturing defects. This broken rotor affects the motor health very severely.

Bearing faults: A major portion of all the faults is bearing faults. It contributes about 40% of overall faults in the induction machine. The bearing used in the induction machine consists of an inner race and outer race with a set of balls on the rolling elements. Since ball bearing support the rotor, any bearing defect will produce a radial motion between rotor and stator of the motor.

Another problem caused by the bearing fault is the installation problem caused due to the imbalanced or improper alignment of the bearing onto the shaft. This produces false brinelling of the raceways thereby affecting the motor physically.

Gearbox abnormalities: It also covers some percentage of the overall faults in the induction machine. Gearboxes may also give rise to current components of frequencies close to or similar to those of broken bar components. In gearboxes, load fluctuations on the gearbox and gear defects are two major sources of vibration. The main components in gear vibration spectra are the tooth-meshing frequency and its harmonics, together with sideband structures due to modulation effects. Sideband structures can be used as an important diagnostic symptom for gear fault detection. Hence, in order to perform a reliable diagnosis of a rotor winding for motors connected to a gearbox, the influence of gearbox components in the spectrum need be considered and analyzed.

Cracked or Bent shaft: Bent shaft results in a rub between the rotor and stator, causing a serious damage to the stator core and windings.

Various soft computing techniques:-With the help of soft computing technique, the analysis of fault becomes more accurate and easier. It gives an improved performance of the machine.Hence the validity of a simulation based database of the fault can be verified with this technique. Such an analysis can reduce the sudden machine damages .Hence these techniques prove to be a good tool for improved and efficient production system. Some of the techniques are summarized below.

Artificial Neural Network: It is basically an artificial intelligent (AI) technique. ANN is a computational method of brain, which assumes that computation contribute over several sample units called neurons, which are interconnected and operate in parallel known as parallel distributed processing system. By using ANN in induction motor one can identify the particular phase of induction motor where the fault namely interturn short circuit fault occurs. Thus ANN synthesizes the interconnection between different input variables with output variables which indicate fault severity. These variables can be current, voltage or slip.

Fuzzy Logic system: It involves making decision based on classifying signals into a series of fuzzy values rather than healthy or faulty. It is also known as an Artificial Intelligent Technique. Fuzzy logic allows combining fuzzy information from different signals together to make more accurate decision. The fuzzy sets are based on a set of rules whose value lies between 0 to 1. In case of induction motor, the fuzzy sub sets and corresponding membership function describe parameter amplitude. The fuzzy rules and member function are constructed by observing the data set.

Genetic Algorithm(GA): It is also an artificial intelligent technique which is used to elect best set of feature set from the available set of features.GA are based on natural selection an natural genetics. Genetic algorithm use the reproduction, crossover and mutation operators.GA belongs to the optimization methods for solving set of non –linear equations and they do not need an initial guess for the unknowns,ie.. they do not require any problem-specific auxiliary knowledge such as derivative of the function

Wavelet Transform: It is used for transforming analogue sensor signals into frequency spectra. Wavelets can model irregular data patterns such as impulse sound elements better than the Fourier transform. The wavelet transform is a frequency analyzing method which decomposes the signals into a set of non-sinusoidal reference waveforms. It is generally applied to pulse type waveform.

CBR: Another artificial intelligence method is CBR methodology which has the ability to explicitly how example of solutions through past case and its dynamic and reversible storage base enables system performance to continuously be enhanced by adding new, and revising old cases. The CBR then itself naturally to fault diagnosis of machine by representing sensor data as the problem and the repair action as the solution. Once the fault is identified and repaired it is added to the to the case library. Finally the technician can make correct decision based on earlier classification of similar sensor signal.

Expert system:-This artificial intelligence technique is based on knowledge of a human expert by representing a series of rules from which results can be conclude.ES is an important tool which is expressed as any combination of IF-THEN rule. It's an interference mechanism which manipulates the stored knowledge to produce the solution.

II. CONCLUSION

In this literature various technique namely, knowledge based systems, fuzzy logic, artificial neural network and genetic algorithm expert system and some online techniques for fault diagnostics of induction machines has been reviewed.

III. FUTURE ASPECTS

Along with these soft computing techniques remote monitoring and use of multiple sensors can be more reliable and efficient.

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AUTHORS

First Author – Alka Thakur, Assistant.professor Bhabha Engg. Research Institute, Bhopal

Second Author – Dr.Sulochana Wadhwani, Associate Professor Madhav Institute of Tech.&Science Gwalior

Third Author – Vandana Sondhiya, Assistant.professor Sam college of Sc.& Technology

Assessing the quality of pipe borne water using Magnetic Susceptibility Measurements

Bannor K. Antwi-Boasiako, Kwasi Preko and Kenny. M. Graham

Department of Physics, Kwame Nkrumah University of Science and Technology, University Post Office, PMB, Kumasi, Ghana

Abstract- Magnetic susceptibility measurements and chemical analysis were performed on samples of water taken from the academic and residential areas of the Kwame Nkrumah University of Science and Technology (KNUST) campus, Kumasi. The aim of these measurements was to see if water delivered through metallic pipes was clean. Magnetic susceptibility measurements were performed using the Bartington MS2 magnetic susceptibility meter, with MS2G single frequency sensor and the chemical analysis was performed with the Varian SpectrAA 220FS Atomic Absorption Spectrometer. Results of the measurements showed that the water samples had negative magnetic susceptibility (χ) values of the order of 10^{-5} and were thus diamagnetic. The χ values obtained for the samples were between -1.3×10^{-6} SI and -1.23×10^{-5} SI for the Academic Area (sampled colleges) and -3.0×10^{-7} SI and -8.7×10^{-6} SI for the Residential Area (sampled Halls of residence). Chemical analysis of the samples showed variation in the concentrations of iron and zinc. Regression analysis of their concentrations with their χ values revealed zinc to have a strong inverse relationship with a correlation coefficient of 73%. Although the study showed some level of metallic contamination in the water samples of average concentration of 0.03mg/l, these were well below the concentration of 3mg/l which is of detrimental concern as outlined by the World Health Organization (WHO). This makes drinking water from the study area safe for drinking.

Index Terms- Magnetic Susceptibility, Diamagnetic, Water sample, chemical analysis, metal contamination.

I. INTRODUCTION

Water is one of the most essential needs for the continued existence of all living organisms on earth. The day-to-day activities of all living organisms require water in different forms. It is effectively and efficiently put into use by plants, animals, microorganisms and man. In the microbial world, no single microorganism has been discovered to be active at the extreme lack of water and this is the singular reason that man cannot exist without water; it is of paramount importance to monitor domestic water supply (Sofola and Lawal, 1983). Unsafe water is a global public health threat, placing persons at risk for a host of diarrhoea and other diseases as well as chemical intoxication (Hughes and Koplan, 2005). The provision of treated water to the inhabitants of the city is a civic responsibility of the city administration. The presence of good treated water is essential for good health and the elimination of some water borne diseases.

It is known that corrosion of household plumbing systems (made mostly of metallic material) can contaminate the water that passes through them through the release of metallic particles, like Fe, Al, Zn amongst others. Concentrations of iron in drinking-water are normally less than 0.3 mg/litre but may be higher in countries where cast iron, steel, and galvanized iron pipes are used for water distribution (WHO, 2003). High metallic content in water can cause liver or kidney damage or high blood pressure when one is exposed to it for a long time. Moreover, hardness of water is caused largely by calcium and magnesium salts and to a small extent by iron, aluminium, and other metals (Microsoft Encarta 2009). Since water is basically used for everything on the campus of Kwame Nkrumah University of Science and Technology (KNUST), it became imperative to ascertain the metallic content of pipe borne water on KNUST campus using magnetic susceptibility and atomic absorption spectrometry methods.

The determination of magnetic susceptibility is a useful, sensitive and fast method and is used in mineralogy and pollution research. Recently, magnetic susceptibility has been adapted as a tool for the mapping of pollutant distribution (Canbay, 2010, Canbay et al., 2009; Wang and Qin 2005). The magnetic measurement is considered as a rapid and affordable screening tool for the determination of the spatial distribution of contamination level. The use of magnetic susceptibility measurement as a proxy for the chemical method of assessing pollution is possible because pollutants and magnetic minerals are genetically related (Hanesch and Scholger 2002). During the 1970s and 1980s, scientists realised that magnetic properties were useful for describing and classifying all types of environmental materials. Many studies are available in literature where heavy metal contamination and industrial activities causing soil, air or water pollution were investigated (Canbay 2010; Vadiunina et al., 1972; Tite et al., 1975; Mullins et al., 1973, 1977).

In addition, magnetic susceptibility has shown to be a highly useful indicator of industrial pollution, gas emission into air due to traffic and other atmospheric pollutants (Canbay 2010; Thompson et al., 1986; Hay et al., 1997; Strzyszcz and Magiera , 1998; Durza, 1999; Kapicka et al., 1997, 2003; Lecoanet et al., 1999, 2001; Knab et al., 2001; Hanesch et al., 2003, 2005; Lu et al., 2007).

This paper investigates the quality of water delivered through metallic pipes at KNUST campus, Kumasi by using magnetic susceptibility measurements vis-à-vis chemical analyses.

II. MATERIALS AND METHODS

2.1 Project Site Description

The Kwame Nkrumah University of Science and Technology is located in Kumasi, the Ashanti Regional capital, bounded between latitudes 6° 41′ 15″ N and 6° 39′ 39″ and longitude 1° 35′ 11″ W and 1° 32′ 51″ of Ghana. It is about 18 square kilometres in area, and is located about 13 km to the east of Kumasi, with a student population of about 32,198 as at 2012. It is the second public university established in the country. The experiments were carried out in five halls of residence on the campus (namely Africa Hall (established in 1967), Independence Hall (established in 1959), Queen Elizabeth II Hall (established in 1959), Republic Hall (established in 1961), Hall and Hall seven (established in 2011)) and 5 colleges (namely the College of Agriculture and Natural Resources, College of Health Sciences, College of Art and Social Sciences, College of Architecture and Planning, College of Engineering, and College of Science).
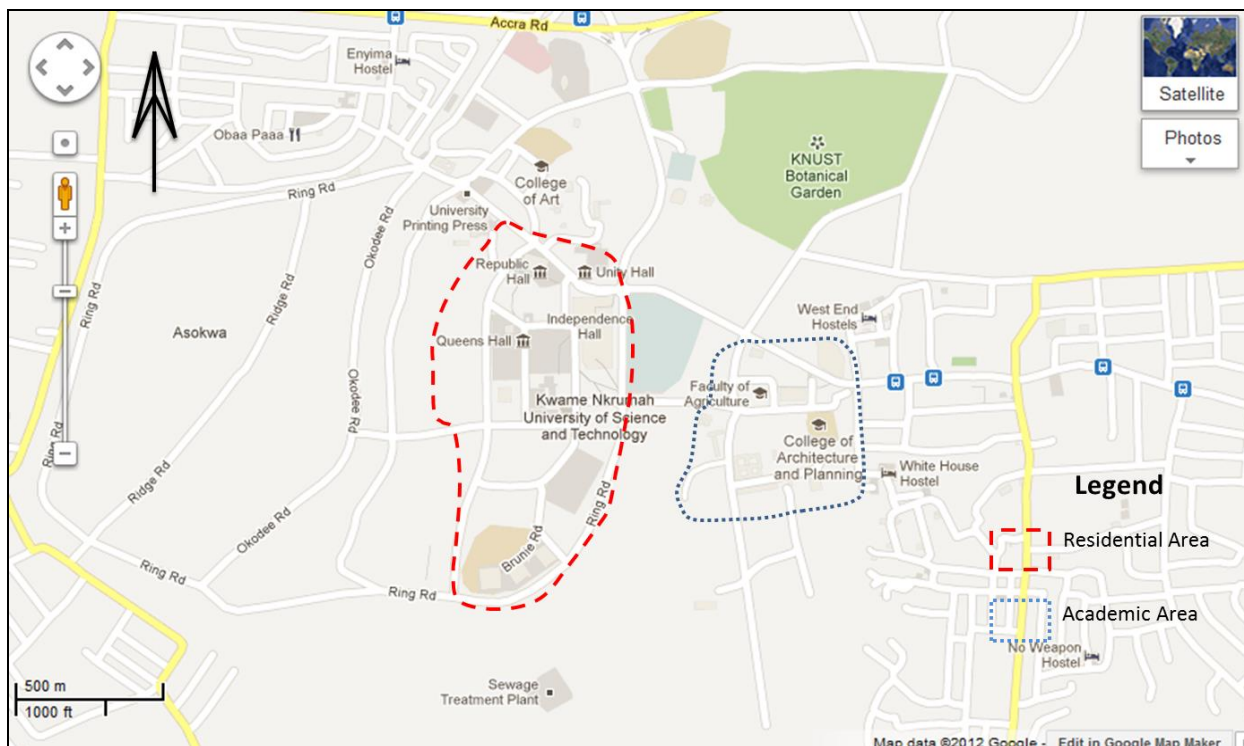
Figure 3: Satellite map of KNUST campus from Google Earth, showing Residential and Academic area

2.2 Water Supply Network at KNUST

The supply of water to the Kumasi Metropolis is from two surface water treatment plants; Owabi and Barekese head works located 10 km and 16 km respectively from Kumasi.
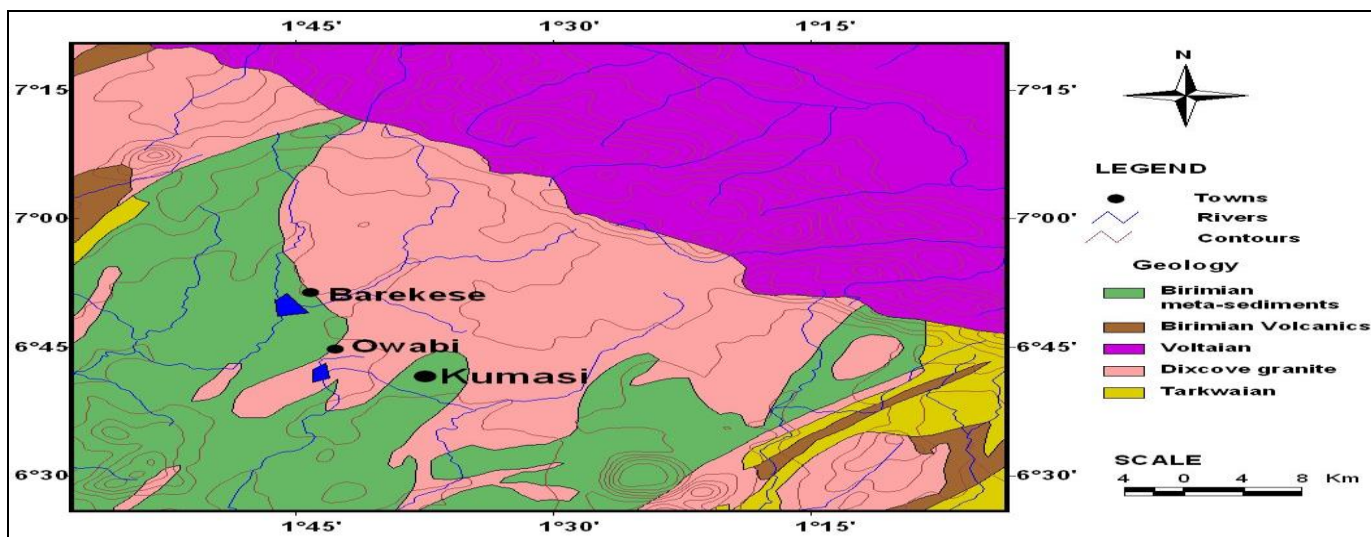
Figure 4: Geological Map of Kumasi Area showing the Catchment of Barekese and Owabi Reservoirs.

The supplies of water from these head works serve Kumasi metropolis as well as surrounding communities outside the metropolis. Treated water is pumped from Barekese and Owabi head works through steel and iron mains for 22 km and 14 km respectively to the Suame town where it is centrally monitored. The quality of water is monitored in a central laboratory at Suame and at 150 other points in the distribution system (Blokhuis et al., 2005). Some treated water is later pumped to the 1,900,000 litres capacity reservoir located at KNUST. This reservoir serves the KNUST campus.

2.3 Magnetic Susceptibility Measurements

The magnetic susceptibility measurements were conducted using the magnetic susceptibility meter (Figure 3 b, MS2, Bartington Instruments Ltd., UK) with MS2G Single Frequency Sensor (Figure 3 a). The set was mounted higher up on a wooden bench to remove, as much as possible, the contaminating influence from metallic substances like buried metallic pipes or cables which might be present in the area.
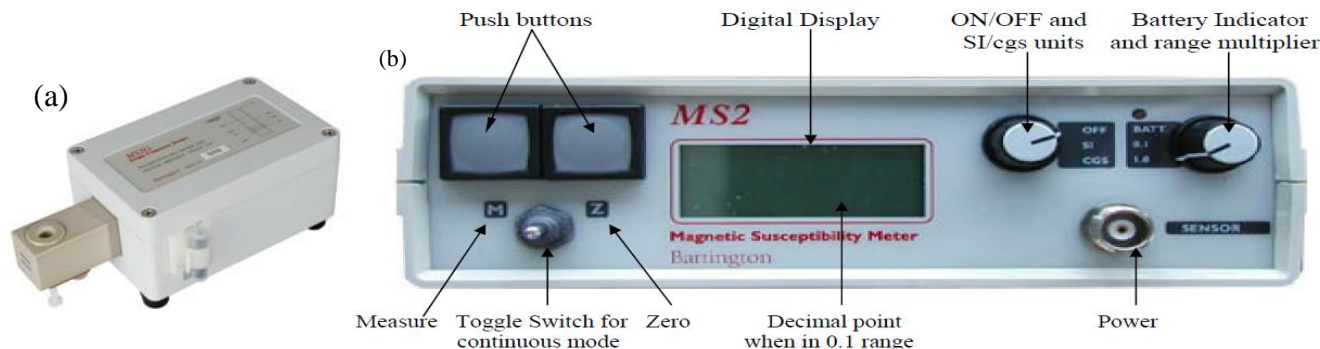
Figure 3: (a) MS2G Single Frequency Sensor (b) Bartington MS2 meter

All sampling experiments were carried out in a way to minimise contamination from ferrous metal, since that metallic contamination can affect the susceptibility readings. Furthermore, in order to minimise error in the susceptibility readings, the 1 ml sample tubes were filled fully and with the same volume of the samples while special care was taken in placing the sample in the MS2G sensor. In all a total of 100 samples of 1 ml tubes were taken from the study area, with 50 samples from the academic area and remaining 50 samples from the residential area. To enhance the quality of the readings, the more sensitive 0.1 range on the meter was used and for each measurement, three readings were taken and the average recorded.

2.4 Chemical Analysis

Metallic concentrations of As, Cu, Pb, Fe, Cd, Ni, Cr and Zn were determined for the samples by atomic absorption spectrometry using the Varian SpectrAA 220FS Atomic Absorption Spectrometer. The results of the chemical analysis are shown in Table 11. It was seen that only Zn and Fe showed variation in concentrations for the various water samples, suggesting that the magnetic susceptibility differences recorded were caused by the presence of these metals. Consequently, graphs of magnetic susceptibility were plotted against metallic concentrations for Fe and Zn with linear regression fits to establish the relationship between the metal concentrations and magnetic parameters of the water samples.

Figure 4: SpectrAA 220, Absorption Spectrometer

III. RESULTS AND DISCUSSION

The results of the experiment showed that samples taken at different locations had different responses when exposed to an externally applied magnetic field and thus had different magnetic susceptibility values. It was observed that the magnetic susceptibility values of the pipe borne water samples were negative and within the range -3.00×10^{-7} SI to -1.23×10^{-5} SI. Water samples from the Academic area were seen to be more diamagnetic than those from the Residential area. The magnetic susceptibility values obtained for the samples were between -1.30×10^{-6} SI and -1.23×10^{-5} SI for the Academic area (i.e. water samples from the colleges) and between -3.00×10^{-7} SI and -8.70×10^{-6} SI for the Residential area ((i.e. water samples from the halls of residence).

The average magnetic susceptibility values for the academic area and the halls of residence were -4.9×10^{-6} SI and -4.8×10^{-6} SI, respectively. The Republic Hall recorded the highest χ value of -3.0×10^{-8} SI while Hall Seven had the least susceptibility value of -8.7×10^{-7} SI. For the academic area, College of Agriculture had the highest susceptibility value of -1.3×10^{-7} SI with the College of Architecture recording the least susceptibility value of -1.23×10^{-6} SI.

It was also observed that the magnetic susceptibility values of the samples were negative indicating that they were diamagnetic. The magnetic susceptibility values for the samples were however, generally, higher than the theoretical magnetic susceptibility value of water, -9.05×10^{-6} SI. This suggests the presence of some metals (like zinc or iron particles) in the water samples. From Table 6, sample S2 from the Republic Hall had the highest susceptibility value of -3.0×10^{-8} SI. This may be attributed to the contamination of the water by magnetic materials like iron (caused by the rusting of the iron pipe-stand).

At the College of Science, samples from the New Complex Building (Table 1) had the least susceptibility values and these were closer to the theoretical value than samples from the Physics Block. The physical observation on the two buildings showed that most of the plumbing systems at the Physics Block looked old and rusty as compared to the New Science Complex which had new plumbing system. Water from the Physics Block may thus be contaminated with some amount of ironic materials. At Hall Seven, Table 9, the measured susceptibility values were closer to that of the theoretical value. This indicates that the metallic content in the samples were very small amount and this is so because Hall Seven is, relatively, a new hall with new and clean plumbing system.

Generally, places with lower magnetic susceptibility values, in terms of magnitude, had their pipe stands being rusty indicating the presence of some metal content like iron or zinc in them. This is so based on the research by Talara et al (2002) which suggests that a high magnetic susceptibility anomaly could be attributed to the presence of metallic components.

Table 4: Magnetic Susceptibility value for samples from College of Science

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Goundfloor Pipe-Stand Near The Auditorium	S1	-1.03
Physics Male Wash Room	S2	-0.60
Physics Stand-Pipe Ground Floor	S3	-0.27
Mathematics Department Male Wash Room	S4	-0.33
Mathematics Department Female Wash Room	S5	-0.43

Table 5: Magnetic Susceptibility value for samples from College of Agriculture

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Standing Pipe	S1	-0.30
Entomology Lab	S2	-0.27
Plant Pathology Lab Ground Floor	S3	-0.17
Natural Resource Lab	S4	-0.13
Natural Resource Wash Room	S5	-0.70

Table 6: Magnetic Susceptibility value for samples from College of Architecture

Sample	Notation	Notation
Ground Floor Male Wash Room I	S1	-0.30
Ground Floor Female Wash Room I	S2	-0.67
Pipe Stand (Water Was Warm)	S3	-1.17
Ground Floor Male Wash Room Ii	S4	-0.13
Ground Floor Female Wash Room Ii	S5	-1.23

Table 7: Magnetic Susceptibility value for samples from College of Engineering

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Second Floor Male Wash Room	S1	-0.57
First Floor Female Wash Room	S2	-0.27
Pipe Stand Adjacent Auditorium	S3	-0.50
Communication Wash Room Second Floor	S4	-0.30
Electrical Laboratory	S5	-0.20

Table 8: Magnetic Susceptibility value for samples from College of Arts

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Painting	S1	-0.57
Wash Room Near Studio	S2	-0.17
Nursery Poly Tank I	S3	-0.60
Nursery Poly Tank II	S4	-0.67
Sculpture Wash Room	S5	-0.70

Table 9: Magnetic Susceptibility value for samples from Republic Hall

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Flat One	S1	-0.17
SRC Ground Floor	S2	-0.03
Block B	S3	-0.07
Zongo Area	S4	-0.70
SRC Second Floor	S5	-0.53

Table 10: Magnetic Susceptibility value for samples from Africa Hall

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Ground Floor Stand-Pipe	S1	-0.27
First Floor Block A	S2	-0.13
Second Floor Block A	S3	-0.10
First Floor Block B	S4	-0.30
Second Floor Block B	S5	-0.43

Table 11: Magnetic Susceptibility value for samples from Independence Hall

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Stand Pipe Near Shops	S1	-0.53
Wash Room, West Of West Wing	S2	-0.13
Wash Room, East Of West Wing	S3	-0.67
Wash Room, West Of East Wing	S4	-0.83
Wash Room, East Of East Wing	S5	-0.60

Table 12: Magnetic Susceptibility value for samples from Hall Seven

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
Ground Floor Left-End Of M Block	S1	-0.77
Ground Floor Left-End Of O Block	S2	-0.63
Ground Floor Right-End Of O Block	S3	-0.87
Central Pipe-Stand	S4	-0.73
Ground Floor Right-End Of M Block	S5	-0.80

Table 13: Magnetic Susceptibility value for samples from Queen Elizabeth II Hall

Sample	Notation	Susceptibility, $\chi \times 10^{-5}$ SI
West Wing, First Floor	S1	-0.13
Polytank Right-End, Zongo Area	S2	-0.54
East Wing, Third Poly Tank	S3	-0.43
Polytank Left-End, Zongo Area	S4	-0.83
Polytank Nearest Potters' Lodge	S5	-0.77
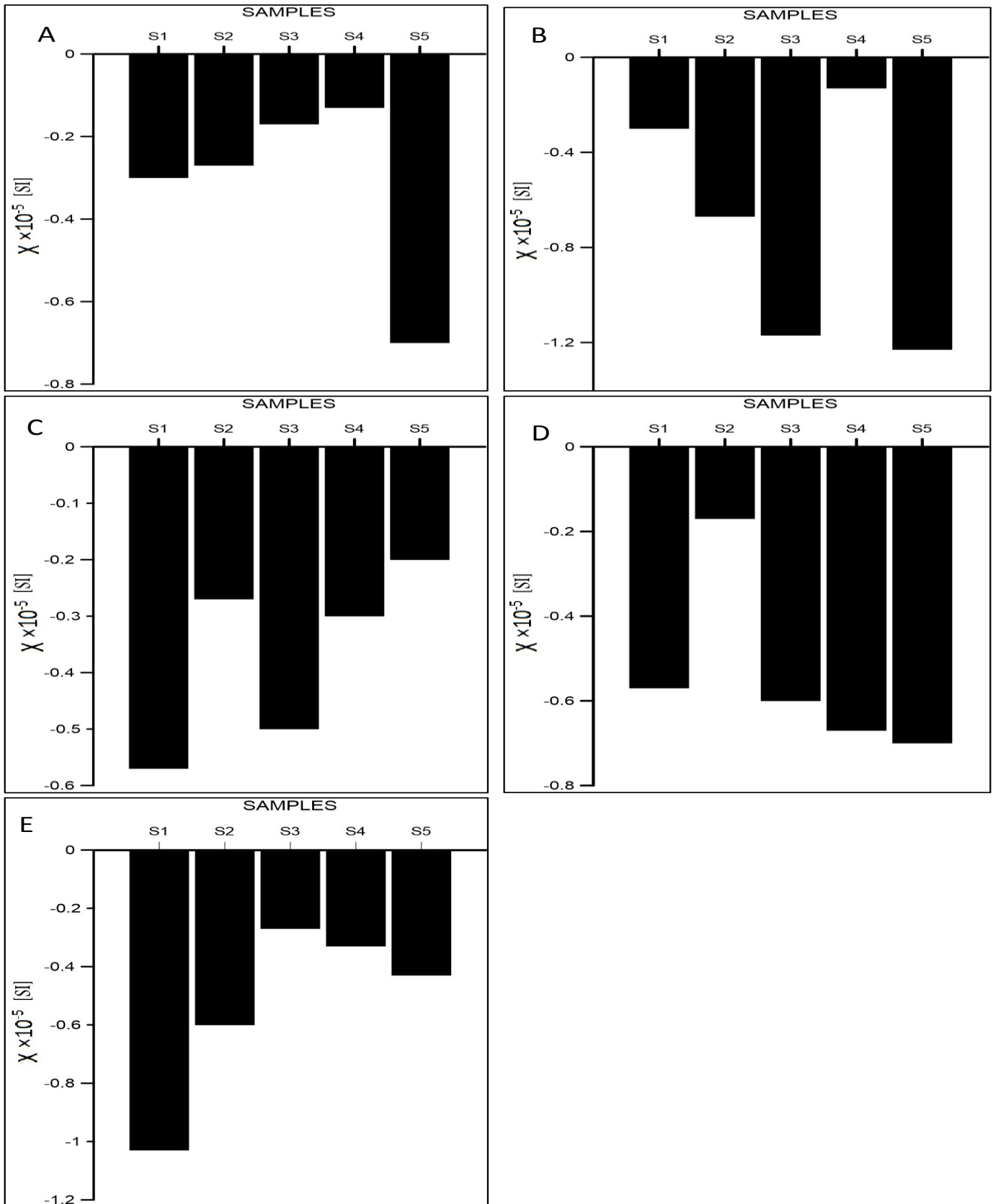
Figure 5: Bar chart of Magnetic Susceptibility value for the samples from the various colleges; A-College of Agriculture, B-College of Architecture, C – College of Engineering, D-College of Art, and E- College of Science
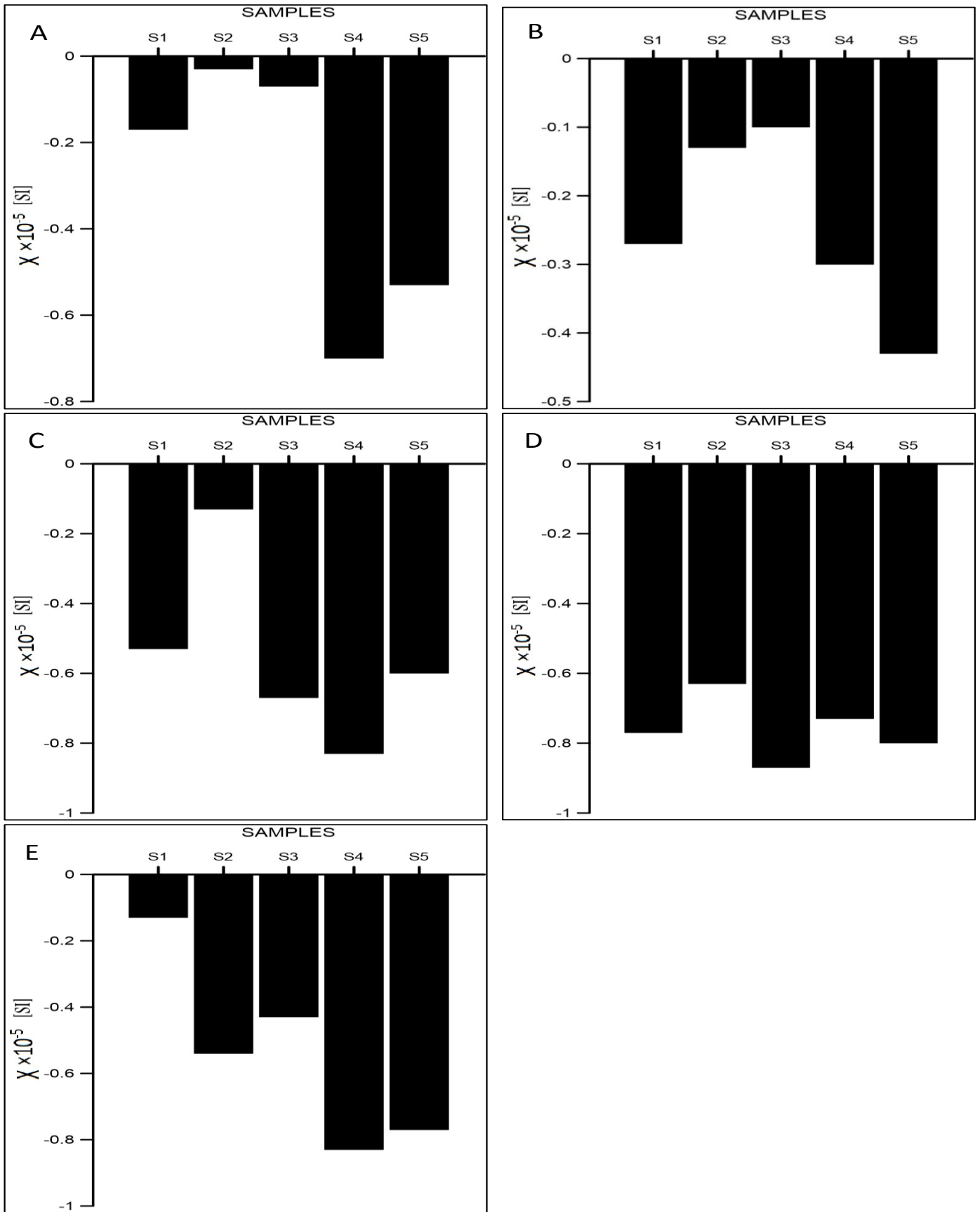
Figure 6: Bar chart of Magnetic Susceptibility value for the samples from the various Halls of Residence; A- Republic Hall, B-Africa Hall, C- Independence Hall, D- Hall seven, and E- Queen Elizabeth II Hall

3.1 Water Chemical Analysis

Chemical analysis was carried out to determine the metallic concentrations of As, Cu, Pb, Fe, Cd, Ni, Cr and Zn using the Varian SpectrAA 220FS Atomic Absorption Spectrometer. Table 11 displays the concentrations of the various heavy metals analysed.

Table 11: Concentrations of some heavy-metal from chemical analysis

	As(ppm)	Cu(ppm)	Pb(ppm)	Fe(ppm)	Cd(ppm)	Ni(ppm)	Cr(ppm)	Zn(ppm)
Agriculture	0.003	0.006	0.003	0.026	0.003	0.003	0.003	0.023
Art	0.003	0.006	0.003	0.045	0.003	0.003	0.003	0.021
Architecture	0.003	0.006	0.003	0.012	0.003	0.003	0.003	0.035
Engineering	0.003	0.006	0.003	0.011	0.003	0.003	0.003	0.035
Science	0.003	0.006	0.003	0.021	0.003	0.003	0.003	0.035
Africa Hall	0.003	0.006	0.003	0.014	0.003	0.003	0.003	0.006
Republic Hall	0.003	0.006	0.003	0.022	0.003	0.003	0.003	0.033
Queens	0.003	0.006	0.003	0.032	0.003	0.003	0.003	0.028
Independent Hall	0.003	0.006	0.003	0.026	0.003	0.003	0.003	0.007
Hall 7	0.003	0.006	0.003	0.024	0.003	0.003	0.003	0.077

Table 12: Concentrations of Fe and Zn and the magnetic susceptibility values of water samples

	Fe(ppm)	Zn(ppm)	Fe [mg/l]	Zn [mg/l]	Magnetic Susceptible Values		
					Average	High	Low
Africa	0.014	0.006	0.0140	0.0060	-0.27	-0.13	-0.43
Republic	0.022	0.033	0.0220	0.0330	-0.17	-0.03	-0.70
Hall 7	0.024	0.077	0.0240	0.0769	-0.63	-0.73	-0.87
Independent	0.026	0.007	0.0260	0.0070	0.53	-0.13	-0.83
Queens	0.032	0.028	0.0320	0.0280	-0.77	-0.13	-0.83
Agriculture	0.026	0.023	0.0260	0.0230	-0.30	-0.13	-0.70
Art	0.045	0.021	0.0449	0.0210	-0.57	-0.17	-0.70
Architecture	0.012	0.035	0.0120	0.0350	-1.17	-0.13	-1.23
Engineering	0.011	0.035	0.0110	0.0350	-0.50	-0.20	-0.57
Science	0.021	0.035	0.0210	0.0350	-0.43	-0.27	-1.03
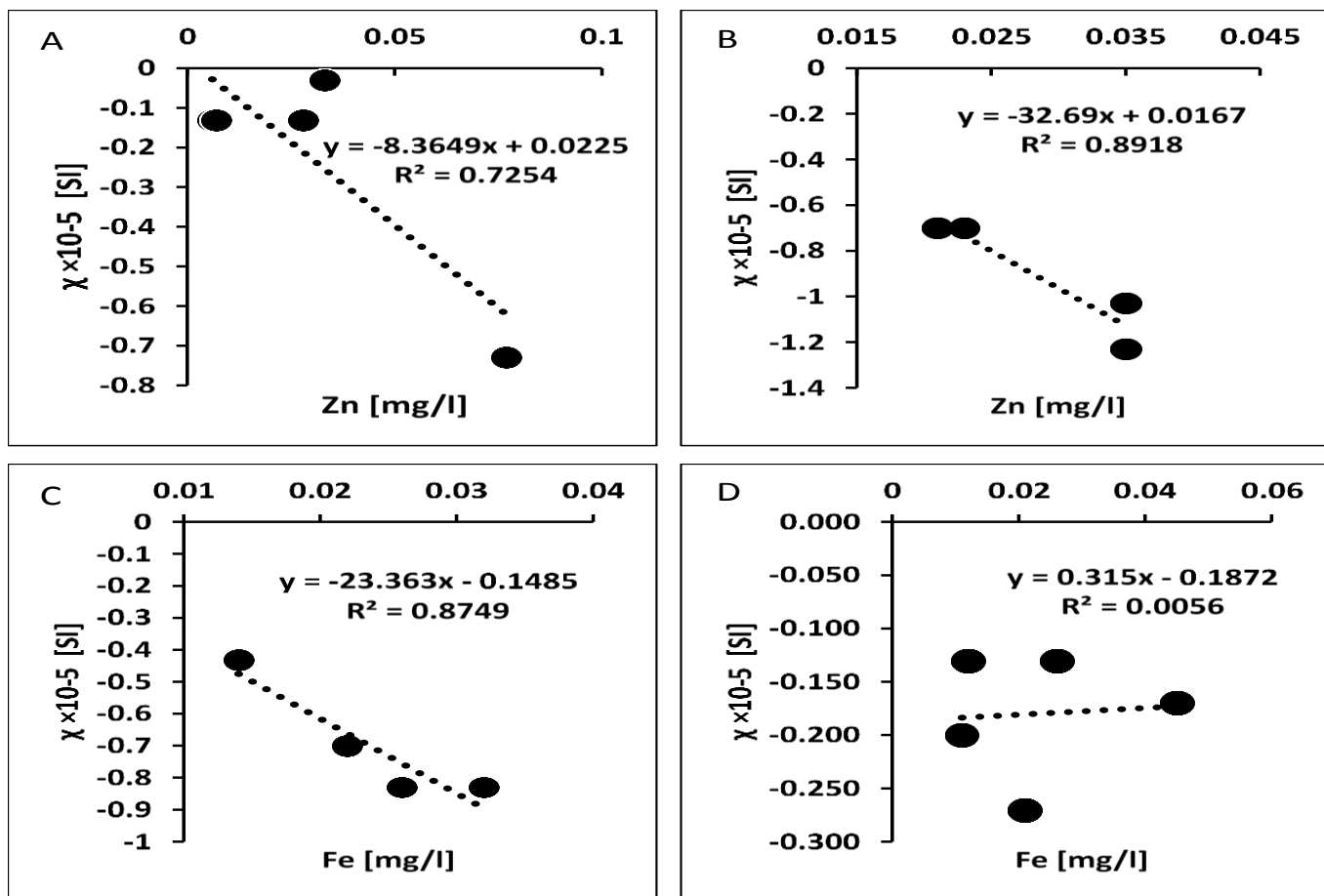
Figure 7: Graphs showing the magnetic susceptibility values against concentration of Zn at the Halls, A) and at the Academic Area, B), and those of Fe, C) and D), respectively.
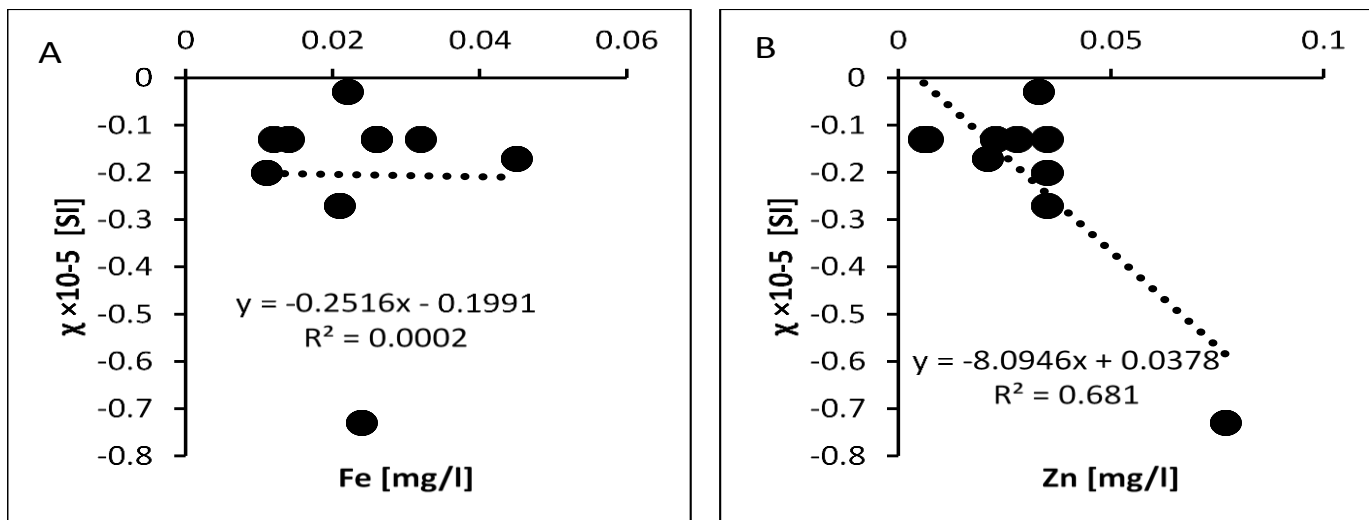
Figure 8: Graphs showing the magnetic susceptibility values against the concentrations of Fe, A), and that of Zn, B), for both Residential and Academic areas.

Magnetic susceptibility values, χ, correlated well with the concentration of Zn with a correlation coefficient of 0.725 at the residential area, figure 7A, with χ values decreasing with increasing Zn concentration. A good correlation coefficient of 0.892 was also attained at the academic area as shown in Figure

7B. As expected, the graph showed an inverse relationship with increasing concentration of Zn resulting in decrease in χ values as was evident at the residential area. Magnetic susceptibility showed a correlation coefficient of 0.875 with Fe concentration Figure 7C. Again, the parameters depicted an inverse

relationship. The χ values increased with increasing concentration of Fe at the Academic area with a weak correlation coefficient of 0.006, Figure 7D.

Averagely for both academic and residential areas, Fe concentration did not have a good correlation with χ values as seen in Figure 8A, which reveals a correlation coefficient of 0.0002. This suggests that Fe may not be the main cause of the variation in χ values of the water samples. In Figure 8B, the concentration of Zn shows good correlation coefficient of 0.681 with χ values. The negative slope suggests an inverse relationship. Thus, increasing concentration of the Zn results in a decrease in the χ values. Zn concentration in drinking water is higher as a result of the leaching of zinc from piping and fittings in tap water (WHO, 2003).

Zinc has the potential of imparting an undesirable astringent taste to water. According to WHO (2003), drinking water usually makes a negligible contribution to zinc intake (Table 12) by humans unless high concentrations of zinc occur as a result of corrosion of piping and fittings. Given certain situations, tap water can provide up to 10% of the daily intake. Acute toxicity arises from the taking in of excessive amounts of zinc salts, either accidentally or deliberately as an emetic or dietary supplement. Consuming more than 500 mg of zinc sulphate may cause vomiting. Drinking water containing zinc at levels above 3 mg/l tends to be opalescent, develops a greasy film when boiled, and has an undesirable astringent taste. The concentrations of zinc in the pipe-borne water for both the residential and academic areas of KNUST were well below harmful levels, thus, proving good potable water for all kinds of use.

IV. CONCLUSIONS AND RECOMMENDATIONS

Results of the measurements showed that the water samples had negative values of magnetic susceptibility of the order of 10^{-5} and were thus diamagnetic. The magnetic susceptibility values obtained for the samples were between -1.3×10^{-6} SI and -1.23×10^{-5} SI for the Academic Area (sampled colleges) and between -3.0×10^{-7} SI and -8.7×10^{-6} SI for the Residential Area (sampled Halls of residence). These point to the fact that the samples from the study area may contain some amount of metallic content. The mean magnetic susceptibility values of the samples significantly deviated from the EPA or WHO value for water (-9.05×10^{-6} SI).

Chemical analysis of the samples, by absorption spectrometry, showed varying concentrations of iron and zinc in the water samples. Statistical analysis proved zinc concentration to have an inverse relationship with magnetic susceptibility and a good correlation coefficient of 0.726. Whereas, iron proved not to be the main cause of the variation of the magnetic susceptibility values having a poor correlation coefficient of 0.0002. The average concentration of zinc, 0.030mg/l, is well below the amount of detrimental concern, 3mg/l (WHO, 2003), in the pipe-borne water for both the residential and academic areas of KNUST. Thus, making the water here potable for all purposes and usage.

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AUTHORS

First Author – Bannor K. Antwi-Boasiako, MSc, Department of Physics, Kwame Nkrumah University of Science and Technology (KNUST) babkayjr@yahoo.com
Second Author – Kwasi Preko, Senior Lecturer, KNUST, kwasipreko.sci@knust.edu.gh
Third Author – Kenny. M. Graham, MSc KNUST, fiikennyg@yahoo.com

Correspondence Author – Bannor K. Antwi-Boasiako, babkayjr@yahoo.com, babkayjr@gmail.com , +233 207032616

Best Principal Management of School Mission and Instructional Programs of Secondary Schools in Banda Aceh, Indonesia

Mohamad Johdi Salleh [*], **Muhammad Hatta**[**]

[*] Institute of Education, International Islamic University Malaysia
[**] Faculty of Education, University Negeri of Acheh Indonesia

Abstract- The main focus of the study is to analyze the principals' management of school mission and instructional programs of secondary schools in Banda Aceh, Indonesia. The framework of the study is based on the models by Dwyer (1984), Hallinger and Murphy (1985), and, Latip (2006). Data was collected using survey methods and the questionnaires are the main tool of the study. Questionnaires used were the Principal Instructional Management Rating Scale (PIMRS) that had been adopted from Hallinger and Murphy (1985). One hundred and sixty three teachers and twelve principals of twelve public secondary schools in Banda Aceh were chosen as the respondents of the study. The data gathered from the survey was analyzed using descriptive and inference statistics of the SPSS-Versions 16.0 programme. The findings show that the principals of secondary schools in Banda Acheh had practiced the highest on 'Monitoring Student Progress' as perceived both by teachers and the principals themselves. It is hoped that this research will provide useful findings which will effectively assist the innovation of instructional leadership quality among principals and teachers of secondary schools in Banda Aceh in order to enhance students' academic performance.

Index Terms- Best Principal Management - School Mission and Instructional Programs

I. INTRODUCTION

Nanggroe Aceh Darussalam, with its three special privileges in terms of religion, culture, and education, is facing the low quality of education as well as low students' academic achievement especially in the national examination grades. According to data provided by the Department of National Education of Nanggroe Aceh Darussalam, Nanggroe Aceh Darussalam ranks 22nd out of the 33 provinces of Indonesia in term of the quality of education. Even though there are various factors contributing to the low quality of education in Nanggroe Aceh Darussalam, principals as instructional leaders play a vital role in determining the success of the education in their schools (Firman & Tola 2008).

II. LITERATURE REVIEW: DIMENSIONS OF SCHOOL MISSION AND INSTRUCTIONAL MANAGEMENT

Dwyer (1984), Hallinger and Murphy (1985), Doyke & Rice (2002). and, Latip (2006) suggest that the basic instructional management role of the principals can be subdivided into two general dimensions comprises of 'defining the school mission', and, 'managing the instructional programme'.

III. DIMENSION OF THE SCHOOL MISSION

Hoy & Hoy (2006) state that one of the important dimensions of the principal's role as instructional leader is to define and communicate a mission or purpose for the school. Instructional leaders are often said to have a "vision" of what the school should be trying to accomplish. Defining a school mission involves communicating this vision to the staff and students in such a way that a sense of shared purpose exists, linking the various activities that take place in classrooms throughout the school (Southworth 2002; McMillan, 2004). The principal's role in defining the mission involves framing schoolwide goals and communicating these goals in a persistent fashion to the entire school community (Hallinger & Murphy, 1985). In fact, operating without a clear mission is like beginning a journey without having a destination in mind. Chances are you will not know when you get there (King, 2002).

Leithwood et al. (1999) and McEwan (2003) noted that effective leaders will involve staff in determining and defining school mission to be implemented and evaluated at the end of the year. This condition will increase their commitment to cooperate in achieving the school's goals and objectives. Therefore, each school will be confident of being a success if it has a clear vision and mission as well as teacher commitment towards high students academic achievements.

IV. MANAGING THE INSTRUCTIONAL PROGRAMME

This dimension of instructional leadership involves working with teachers in areas specifically related to curriculum and instruction. Krug (1992, as cited in Terry, 1996) emphasized that instruction is the primary service that schools offer. Therefore, it is imperative that principals have at least an awareness of all subject areas and the special needs of each. They should be able to provide information and direction to teachers regarding instructional methods, and they should be actively involved in and supportive of curriculum development (Lashway, 2002; Green, 2005; Glikman, Gordon & Ross-Gordon 2007). This dimension consists of several related job functions. These are supervising and evaluating instruction, coordinating the curriculum, and monitoring student progress (Andrews & Soder 1987).

Major findings on the subject indicate that principals who are strong in these areas make a considerable impact on the function of the school (Hallinger & Murphy, 1987; Lashway, 1999;. Quinn, 2002; Fullan, 2002; Firman & Tola 2008).

Based on that reason, it is appropriate to conduct this study because there are no studies on the practice of instructional leadership among secondary school principals in Banda Aceh. More specifically, the main focus of the study is to analyze the principals' management of school mission and instructional programs of secondary schools in Banda Aceh, Indonesia.

V. OBJECTIVE OF THE STUDY

The objective of this study is to identify best principal management of school mission and instructional programs of secondary schools in Banda Aceh, Indonesia and to analyze the relationship with students' academic achievement.

VI. RESEARCH METHODOLOGY

The questionnaires used were the Principal Instructional Management Rating Scale (PIMRS) that had been adopted from Hallinger and Murphy (1985). One hundred and sixty three teachers and twelve principals of twelve high achievements public secondary schools in Banda Aceh were chosen as the respondents of the study. The data gathered from the survey was analyzed using descriptive and inference statistics of the SPSS-Versions 16.0 programme.

The respondents, the principals' demographic background contains the five variables of gender, age, academic qualifications, teaching experience and years of experience as principal. The teachers' demographic background contains the four variables of gender, age, academic qualifications, and teaching experience (Best & Kahn 2003; Creswell 2005).

VII. DATA ANALYSIS AND RESULT OF THE STUDY

The practice of five job functions can be measured based on the interpretation of mean score classified into 4 levels (Latip, 2006). Those 4 levels are low level or not implemented (x = 1.000 – 2.000), simple low level (x = 2.001 – 3.000), simple high level (x = 4.001 – 4.000), and high level (x = 4.001 – 5.000).

The data analysis and result of the study are presented in the following sections.

Research Question:
What is the best practice of Management of School Mission and Instructional Program among the principals of secondary schools in Banda Aceh?

The detailed distribution of each function of Management of School Mission and Instructional Programme among the principals of secondary schools in Banda Aceh is shown in Table 1.

Table 1: The best practice of Management of School Mission and Instructional Program among the principals of secondary schools in Banda Aceh according to Principals' and Teachers' Perceptions (n = 175)

The Functions of Instructional Leadership	Mean (1.000-2.000) L	Mean (2.001-3.000) SL	Mean (3.001-4.000) SH	Mean (4.001-5.000) H	Mean	Level of Implementation	Superiority Ranking
Framing School Goals	2 1.1%	16 9.1%	72 41.2%	85 48.6%	3.957	Simple High	2
Communicating School Goals	2 1.1%	16 9.1%	94 53.8%	63 36%	3.872	Simple High	4
Supervising and Evaluating Instruction	3 1.7%	23 13.1%	98 56%	51 29.2%	3.750	Simple High	5
Coordinating Curriculum	2 1.1%	17 9.7%	83 47.5%	73 41.7%	3.913	Simple High	3
Monitoring Student Progress	1 0.6%	18 10.3%	59 33.7%	97 55.4%	4.072	High	1
Total Mean (X)					3.836	**Simple High**	

* L = Low; SL = Simple Low; SH = Simple High; H = High

The table exhibits that the best practice of Management of School Mission and Instructional Program among the principals of secondary schools in Banda Aceh according to Principals' and Teachers' Perceptions was 'Monitoring Student Progress' mean 4.072 implemented at 'high' level. It was followed by 'Framing School Goals' mean 3.957, 'Coordinating Curriculum' mean 3.913, 'Communicating School Goals' mean 3.872, and, 'Supervising and Evaluating Instruction' mean 3.750.

Discussion on the best practice of Monitoring Student Progress among the principals of secondary schools in Banda Aceh

Table 2 shows in detail the mean score, standard deviation and the level of implementation of each task related to this function.

Table 2: The Practice of Monitoring Student Progress as perceived by Principals and Teachers (n = 175)

	The Tasks of Monitoring Student Progress	Mean	Std. Deviation	Level of Implementation
1.	Meet individually with teachers to discuss student academic progress	3.966	0.830	Simple High
2.	Discuss the item analysis of tests with the faculty to identify strengths and weaknesses in the instructional programme	4.080	0.812	High
3.	Use test results to assess progress towards school goals	4.234	0.908	High
4.	Distribute test results in a timely fashion	4.023	0.953	High
5.	Inform teachers of the school's performance results in written form (e.g. in a memo or newsletter)	4.086	0.801	High
6.	Inform students of the school's performance results	4.143	0.889	High
7.	Identify students whose test results indicate a need for special instruction such as remediation or enrichment	3.949	0.886	Simple High
8.	Develop or find the appropriate instructional programme(s) for students whose test results indicate a need	4.097	0.895	High
	Total Mean (X)	**4.072**	**0.670**	**High**

The findings of the study show that two tasks involved in monitoring student progress were implemented at the simple high level, i.e. first, meet individually with teachers to discuss student academic progress, with a mean score of 3.966 and standard deviation of 0.830. Secondly, identify students whose test results indicate a need for special instruction, with a mean score is 3.949 and standard deviation of 0.886. Meanwhile, other tasks related to this function were implemented by principals at a high level with mean scores ranging from 4.023 to 4.234.

Moreover, the result of the data analysis as shown in Table 3 indicates that there was a significant relationship between monitoring student progress and students' academic achievement. This is clear when the Pearson Correlation shows $r = 0.207$, $p<0.05$.

Table 3: Relationship between Instructional Leadership and Its   Eleven Job Functions with Students' Academic Achievement

H1	Instructional Leadership & Its Eleven Job Functions	N	Pearson Correlation	Sig. p	Level of Significant	Hypothesis
H1	Monitoring Student Progress	175	0.207	0.006	P<0.05	Accepted

_____

Meanwhile, there was a positive correlation between monitoring student progress and students' academic achievement. It could be interpreted that the higher the monitoring of student progress, the higher students' academic achievement.

Hence, the study indicates that the principals of public secondary schools in Banda Aceh were more concerned with 'monitoring student progress' in order to improve their academic achievement, especially in terms of the grades achieved in national examinations.

VIII. CONCLUSION

The findings show that the principals of secondary schools in Banda Acheh had practiced the highest on 'Monitoring Student Progress' function. As a school leader the principal has to monitor student progress in order to improve their academic achievement. It is hoped that this research will provide useful findings which will effectively assist the innovation of instructional leadership quality among principals and teachers of secondary schools in Banda Aceh in order to enhance students' academic performance.

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AUTHORS

First Author – Mohamad Johdi Salleh, johdisalleh@gmail.com Institute of Education, International Islamic University Malaysia Mohamad Johdi Salleh: The Presenter/Researcher is an Assistant Professor at the Institute of Education, International Islamic University Malaysia, Kuala Lumpur. He possessed BA Hons. (Malaya), MA Education (London), and, PhD Education (Birmingham). His area of specialization and interest are Educational Leadership & Administration, Teacher Professionalism, and, History Education.

Second Author – Muhammad Hatta, Faculty of Education University Negeri of Acheh Indonesia

Sulfur Dioxide (SO2) and Nitrogen Dioxide (NO2) Indoor Honai Pollution in Wamena, Papua Province, Indonesia

A.L. Rantetampang[1*], Alimin Maidin[2], Muhammad Furqaan Naiem[3] and Anwar Daud[4]

[1]Postgraduate Program, Medical Faculty, Public Health Study Program, Hasanuddin University, Makassar, South Sulawesi, Indonesia, 90245
[2]Faculty of Public Health, Hasanuddin University, Makassar Indonesia
[3]Occupational Health Department, Faculty of Public Health, Hasanuddin University, Makassar, Indonesia
[4]Environmental Health Department, Faculty of Public Health Hasanuddin University, Indonesia

*Author to whom the correspondence should be addressed: alrant17@yahoo.co.id

Abstract- *The use of biomass indoor Honai (traditional house) in Wamena have been conducted for several decades and become a traditional habit of Honai occupants. Since air temperature at night in Wamena Regency is cold the inhabitans burn the Kasuari woods to warm their body. As a result, they continuously inhale the Sulfur Dioxide (SO_2) and Nitrogen Dioxide (NO_2) and some contaminated air in Honai room daily which may lead to varies illnesses. This study aimed to investigate the SO_2 and NO_2 contaminated Honai indoor air, record the air contaminated inhalation rate and lung vital capacity among the honai occupants at five villages in Wamena regency. Samples were collected from 15 Honai before and after the honai modification by recording the SO_2 and NO_2 levels. Likewise, 30 inhabitants of Honai occupants were measured for their lung vital capacity as well as the personal SO_2 and NO_2 inhalation rate. Sample of SO_2 and NO_2 were collected used midget impinger technique and concentration measured by using the pararosaniline-spectrofotometri. In addition, lung vital capacity was measured use a spirometric whereas personal inhalation was measured by personal inhalation tool. Results implied that, of those five villages showed the mean of NO_2 values before honai modification were 4.011 ± 1.138 µg/Nm^3 and after the modification were 0.350 ± 0.201 µg/Nm^3, respectively. Based on the statistical t -test showed that the decrease in NO_2 concentrations was shown with p values of 0.000, or in other words no influence homes honai modification to the decrease of NO_2 concentration. Likewise, SO_2 concentrations were between 0.650 ± 0.454 before modification and 0.057 ± 0.048 after modification indicated over the standard. The statistical t - test showed that a decrease in the concentration of SO_2 is shown with p values of 0.000, or no influence honai modification to decrease the SO_2 concentration.*

Index Terms - *Sulfur Dioxide, Nitrogen Dioxide, Honai modification, Indoor Air Pollution, Inhalation Rate and Lung Capacity.*

I. INTRODUCTION

Indoor air pollution in developing counties is a major contributor to the global burden of illness and is becoming the second biggest environmental pollutant contributor to ill health in the world [1]. The sources of air pollution mostly generated by the industry, forest fire, vehicles and the burning of biomass that are currently threatening the inhaled air quality in the entire world [2]. At this era, most of people spent their time more in the indoor; the kind and varied range of indoor sources of emission and the increased magnitude of concentration of some pollutants indoors compared with the outdoors pollution [3]. In the last three decades, some evidence have been accumulating about the effect of health impacts of exposure to air chemical substances pollutants in childhood and of adult. Research from the United States, Poland, and Austria recorded significant relationships between decrements in lung function growth and chronic exposures to total suspended particulates (TSP), ozone, and nitrogen dioxide (NO_2) [4-6].

Some other examples were, the indoor air quality close to the industrial area is tightly associated to pollutant substances concentration rate, because the pollution from outdoor heavily influences air quality and, as the consequent of the inhabitants indoor health. Here, a pollution management system is necessary for human health protection especially from indoor pollution. Both manual or automatic air quality management systems have became a imperative research issue with strong implications for community's health. In this study we develop a chimney and modify the honai ventilation based on neural networks for SO2 and NO_2 concentration control Idoor of Honai traditional houses [7]. In addition, Air pollution from fossil fuel from vehicles combustion has been known to affect human health for region. More detailed insights developed in the 20th century, as a result of studies prompted by severe air pollution episodes such as those in the Meuse Valley, Belgium in 1930, and

London, UK in 1952. The focus in the early studies was on local pollution produced by industry, power generation and home heating sources. [8].

Some researches relate to the indoor air pollution have been done, although most of these studies were snapshots of a small number of locations, but Biersteker et al [9] reported a larger study that measured indoor and outdoor chemical concentrations in 60 homes in Rotterdam, Netherlands. The study revealed that the mean concentrations of indoor smoke were about 80% of those outdoors, mean concentrations of indoor SO2 were about 20% of those outdoors. However, it was also found that a small number of homes had indoor concentrations much higher than those in outdoors, and the authors speculated on their contribution to elevated mortality during smog episodes. It is likely that higher concentrations would have been found in homes with open coal fires, as was common in the UK during the 1950s, than in this Dutch sample of homes primarily using gas for heating. The reasons for the much lower indoor concentrations of SO2 were considered by Spedding [10], who summarized studies showing a large variation in the capacity of indoor materials to absorb SO2. He used measured deposition velocities and surface areas in a typical UK house to identify emulsion paint as the most important sink for SO2.

In this study area, the common forms of cooking energy in use in Wamena are fuel wood, kerosene, limited liquefied petroleum gas (LPG) and very limited electricity. Here in this study site of Wamena District, water boiling and cooking experiments using the common household energy sources from biomass where Casuari wood that available in the area and surround are available in large quantity. The experimental data obtained, the energy price data, cooking energy intensity and the frequency biomass were used for cooking as well as the major diseases suffered by community who occupy *Honai* the traditional house. The effect on air quality arising from consumption of these biomass energy types was computed using emission factors [11, 12]. No initial data relate use of biomass, the frequency of the cooking and the duration of wood burning during the cold in the evening. This study cover of five village in Kurulu District and similar studies have not been reported elsewhere, however, relate to the current trends regarding the penetration of air conditioners in homes, this suggests that domestic air pollution may be an issue of concern for the foreseeable future.

II. MATERIAL AND METHODS

2.1 Study Area

This study was commenced in five villages, namely; Punakul Village, Wenabubaga Village, Musalfak Village,

Kilugaba Villages and Mulimah Village in Kurulu District, Wamena Province, Papua-Indonesia. District Kurulu was selected to be sampling areas on the basis that this region is a zone has many traditional housing (honai) and they use wood for cooking and for warming the indoor air temperature daily. In addition the majority of illnesses suffered by residents of this area were found of *asthma, pneumonia* and *tuberculosis*.

2.2 Sample Design

Data were collected both for subject and objects samples of population, then we measure lung vital capacity for those *Honai* occupants by using a *spirometer* and proceeds with inhalation rate measurements for SO_2 and NO_2 by using a personal sampler inhalation. The ambient indoor *Honai* air samples were taken for SO2 and NO2 as the object samples for the *honai* house communities. All sample were recorded at 16:00 to 17:00, 17:00 to 18:00 or 18:00 to 19:00 in the evening. Each sample was collected for 60 minutes at every house. Numbers of sampling points were 15 *Honai* houses done before and after the chimney installation. We do the installation of chimney (close technology) with a diameter of 30 cm that is placed along the 2.5 m above the furnace roof and wall edges out of Honai. The aim of this chimney installation was to flow out the smoke in *Honai*. Ina ddition, these object sampling sites were divided into 5 regions based on availability of *Honai* or *Honai* density at those five selected villages. We also taking into account the willingness of residents to involve during this research as the explained in the ethical consideration. Likewise, we took into account the distance between *Honai* sample points where about 300 to 500 m each *Honai* were selected that subsequently obtained through a Global Positioning System coordinates [13]. Moreover, the number of respondents or subject samples in this study was 30 respondents. They were split evenly by the large number of traditional houses Honai in each village, in this study we got 6 respondents every village who voluntarily wanted to involve during this study.

2.3 Consideration of Ethical Clearance

All respondent living in the five villages area who were requested as the respondent signed an informed consent letter prior to inclusion in the study commencement. The collection of samples of Inhalation rate and lung vital capacity were done base on the ethical clearance consideration issued by Medical Faculty of Hasanuddin University number UH13070282. The measurement of

those sample were base on the voluntary case of people. Confidentiality of initial information and freedom to withdraw from the study anytime was stipulated and without any force from the third parties. Those found to have health concerns such as disease symptoms or any illness will be informed individually or provided with the appropriate management and informed secretly, as necessary. All questions and complaints were also adopted and answered directly by authors if required.

2.4 Samples Analysis

The collection of SO_2 and NO_2 samples were done by using impinger method and measurement techniques using pararosaniline-spectrofotometri accordance with the Indonesian National Standard (SNI 19-7119.7-2005) [14]. Principle of this method is based on the absorption of SO_2 and NO_2 gas from the air on absorbent solution of potassium tetra kloromerkurat (TCM). In this case the complex formed diklorosulfito merkurat air oxidation resistant. Furthermore the complex is then reacted with formaldehyde to form pararosanilin and sulfonic acid methyl pararosanilin colored. The color intensity is measured with a spectrophotometer that occurs directly associated with the amount of SO_2 and NO_2 in the air sample has been taken. The measurement method is based on Schiff reaction that can measure the concentration of SO_2 and NO_2 in the range of 25-1000 µg/m3 in the air sample flow rate, while for the smaller than 25 µg/m3 could be measured by the volume of air that a larger sample. All the sequences were done in accordance by laboratory staffs in Accredited Chemical Laboratory of Makassar Indonesia

III. RESULTS AND DISCUSSION

3.1. Lung capacity base on NO_2 parameter

Lung capacity measurement was conducted both for NO_2 and SO_2 parameters. All data recorded at the same time. 30 respondent were participated in this study, the results are shown on **Table 1** and **Table 2** as follow:

Table 1. Distribution of respondent lung capacity by category of Inhalation Rate for NO_2 in Five Villages, Kurulu District, Wamena 2013

NO2	Decrease of function		Normal		Total		Statistical value
	n	%	n	%	n	%	
> standard	0	0	0	0	0	0	
< standard	12	40	18	60	30	100	P =0,000
Total	12	40	18	60	30	100	

Table 1 described that the rate of 30 respondents with inhalation under the allowed standard, there were 40% of respondent have decreased lung vital capacity. Based on the table also shows that all respondents have inhalation rate for NO_2 in the category parameters under the allowed standard, so it does not qualify for the test conducted chi-square statistic. Although some stations were still under the set regulation of pollutant, the continual inhalation of contaminated indoor air will lead to varied illness that might be suffered by the Honai occupants. Relevant study results by Haddad [15] showed that residents who exposed with indoor air pollutant for more than 5 years will be potentially suffering from varies diseases. The study showed that 29 % respondents had been diagnosed with at least one type of respiratory disorders and 24% for adult acute [15].

3.2 Lung capacity base on SO_2 parameter

Table 2. Distribution of lung vital capacity of respondents by category inhalation rate of SO_2 in Five Villages Kurulu District, Wamena 2013

SO2	Lung Vital Capacity				Total		Statistical value
	Decrease of function		Decrease of function				
	n	%	N	%	n	%	
> standard	12	92.3	1	7.7	13	100	
< standard	0	0	17	100	17	100	P =0,000
Total	12	40	18	60	30	100	

Table 2 implied showed that of the 13 respondents with inhalation rate above allowed standard, there were 92.3% who had a reduction in lung vital capacity. Of those 17 respondents the rate inhalation category under allowed standard, all of them have normal lung capacity function. Results of statistical tests using yate's correction showed that the value of p = 0.000, which means that there is a

relationship between inhalation rate with decreased lung function capacity.

In line with study conducted by Fernandez [16] who compared the use of biomass in home for cooking and those homes cook without biomass. The results indicated that the concentration levels of SO_2 and NO_2 were much higher at home with biomass in cooking or 9.8 times compared with that home that cook without biomass.

Likewise, the potential diseases associated with respiratory disturbance among patients illustrated that residents with biomass will be faster and more likely to suffer higher than those without biomass.

3.3 NO_2 and SO_2, air temperature, and humidity, before and after the installation of closed model chimney

Table 3. Distribution concentrations NO_2 and SO_2, air temperature, and humidity, before and after the installation of closed model chimney, in Five Villages, Kurulu District, Wamena 2013.

Variable		Mean ± SD	Minimum	Maximum	Statistical test	
					t-test	P
NO_2 concentrations ($\mu g/Nm^3$)	Before modification	4.011 ± 1.138	2.481	6.557	13.400	0.000
	After modification	0.350 ± 0.201	0.118	0.728		
SO_2 concentrations ($\mu g/Nm^3$)	Before modification	0.650 ± 0.454	0.086	1.247	5.249	0.000
	After modification	0.057 ± 0.048	0.007	0.150		
Temperature Udara (^{o}C)	Before modification	26.487 ± 2.606	21.700	29.200	2.182	0.047
	After modification	25.813 ± 2.515	21.700	29.700		
Humidity (%)	Before modification	70.827 ± 2.377	67.900	74.800	-2.378	0.032
	After modification	71.420 ± 2.462	67.900	74.800		

Table 3 revealed the average concentration of NO_2 prior to the modification of home *honai* was 4.011 $\mu g/Nm^3$ with a standard deviation of ± 1,138 $\mu g/Nm^3$. The concentration was higher when compared to the average concentration of NO_2 after the home modification 0.350 $\mu g/Nm^3$ with standard deviation 0.201 $\mu g/Nm^3$. Based on the statistical t -test showed that the decrease in NO_2 concentrations was shown with p values of 0.000, or in other words no influence homes *honai* modification to the decrease of NO_2 concentration. Relevant study revealed that the mean indoor concentrations of NO_2 in the expolis study ranged from 13 mg m^{-3} to 43 mg m^{-3} in different cities [17]. Typical daily mean indoor air concentrations in homes with gas cooking vary between 25 and 200 mg m^{-3} [18, 19].

For SO_2 concentration, the average concentration of SO_2 prior to any modification of home *honai* 0.650 $\mu g/Nm^3$ with a standard deviation of ± 0.454 $\mu g/Nm^3$. The concentration was higher when compared to the

average concentration of SO_2 after the home / honai modification 0.057 $\mu g/Nm^3$ with a standard deviation of 0.048 $\mu g/Nm^3$. Based on the statistical t -test showed that a decrease in the concentration of SO_2 is shown with p values of 0.000, or no influence honai modification to decrease the SO_2 concentration.

The wide range of building design leads to large variations in infiltration rate and hence indoor and personal exposure. Compare to *Honai* building that has a closed model design it may lead to a hazard of indoor air pollutant. Concentration of SO_2 indoor of *Honai* might be reduced by the proper installation of chimney that may flow out the contaminated air. Although new houses do not necessarily mean air tight houses, but it need the installation of chimney to flow out the pollutant. Study relate the indoor pollution relate to the house design conducted by Sherman and Matson [20] implied that the main reasons for tighter construction are to reduce energy costs and maintain thermal comfort which is more efficient.

For the air temperature, the average temperature before the honai modification was from 26.487 ^{o}C with ± 2,606 ^{o}C for its standard deviation. This concentration was lower when compared to the average air temperature after a honai modification which leveled to 25.813 °C with a standard deviation of 2,515 ^{o}C. Based on the test statistic t -test showed that an increase in air temperature indicated by a p value of 0.047, or in other words no influence honai modifications to the increase of air temperature. This increase is relatively small at an average of only 0.674 °C. Likewise, the average humidity of the air before the honai modification was 70.827 % with a standard deviation of ± 2.377 %. This concentration was lower when compared to the average air humidity after the honai modification which amounted to 71.420 % with a standard deviation of ± 2,462 %. Based on the statistical t -test showed that there was an increase in air humidity indicated by the p value of 0.032, or we can say that no influence of honai modifications to the increase of air humidity. This increase is relatively small at an average of only 0.593.

2. CONCLUSION

Based on the results of the study, it can be concluded that the indoor air concentration of SO_2, and NO_2 in the *Honai* house mostly exceeded the standard. Measurement of lung capacity in 30 respondents who stayed in *Honai* for more than 10 years as well as inhalation rate measurements were found that all concentrations of SO_2 in the honai has exceeded the threshold value both set by Nasional and International standards. NO_2 concentrations at several homes Honai still under NAB, but the majority have been exceeded. Furthermore, the value of lung capacity and inhalation rate for both SO_2 and NO_2 parameters showed decreased lung capacity and some of respondents have experienced pneumonia and lung vital capacity were not normal.

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Authors

First Author – A.L. Rantetampang, PhD Program of Public Health, Faculty of Public Health, Cenderawasih University, Papua, Indonesia; email address. Alrant17@yahoo.co.id

Second Author – Alimin Maidin. Professor of Public Health, Faculty of Public Health Hasanuddin University, Makassar Indonesia

Third Author – *Muhammad Furqaan Naiem*, PhD of Occupational Health , Occupational Health Department, Faculty of Public Health, Hasanuddin University, Makassar Indonesia

Fourth Author – Anwar Daud, PhD of Environmental Health, Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Indonesia. email address. Daudanwar50 @yahoo.com

Correspondence Author ; A.L. Rantetampang
Email Address: *alrant17@yahoo.co.id*

Rainfall Variability in the Sahel: A study from Sudan (1970-2010)

Ahmed H.I. Elfaig[1], Ibrahim M. Eltom[1] and Abdelrahim Salih[2]

[*] Department of Environment and Ecology, Faculty of Geographical and Environmental Sciences, University of Khartoum
[**] National Center for Research, Remote sensing Authority, Natural Resource Mapping & monitoring Department.

Abstract- This article focuses on studying and analyzing rainfall variability in the Sahel area with a case study from Sudan. The main objective of the article is to analysis the rainfall variation over both space and time during the last four decades. The data for rainfall variability was collected from five meteorological stations namely, Elobied, EnNuhud, Elfashir, Nyala, and Elginaina for the period 1970-2010 including four strong Elnino events. The descriptive and statistical analytical methods, the mean, standard deviation, coefficient of variation and Geographical Information System (GIS) have been used for data analysis. The results show that rainfall is highly fluctuated and varied over both space and time indicating a real variation in annual average rainfall values. the coefficient of variation ranges between 0.22 to 0.37 and the standard deviation ranges between 76 to 127.6 which are presented in GIS formats. Results also show a successive decade of small rainfall variatbility followed by a decade of high rainfall variability. Two positive and four negative anomalies have been found during the period 1970-2010.

Index Terms- Sahel, Anomalies, Elobied, Elfashir, EnNuhud, Elginaina, rainfall, fluctuation, Variability, GIS

I.   INTRODUCTION

Rainfall is one of the major climatic elements that affect the traditional producers, especially traditional farmers livelihood. It plays a major role in the environment and socioeconomic conditions of the Sudan. Rainfall aspect is vital for both present and future rational utilization of the economic and human resources (Abdalla 1992). Many studies for example (Bewket, 2009) focused on the relation between inter-annual and seasonal variability of rainfall with the fluctuation in production of cereals. Rainfall variation, fluctuation and condition have a crucial role in determining the success of rainfed production specially in the study area which is a part of the Sahelian zone. Rainfall variability is also one of the climate indications denoting the trends of changes within the earth's environment that can affect the natural set up. Cimate records suggest that preceipitation patterns have already shifted in the 20th century (christophre *et al.*, 2005). Climate variability and change profoundly influence social and natural events throughtout the world. Seasonal to inter-annual rainfall fluctuations strongly affect the success of agriculture and the abandonce of water resources (Adnan, 2009). The internal variability in the rainfall system can be recognized as a form of schock, meaning that the current state of rainfall reflects consequences upon the human life. The variability involves changes in the average state of rains over durations ranging from decades to millions of years. Rainfall variability means the degree to which rainfall amounts vary across an area or through time. There are two types of rainfall variability (spatial and temporal). The temporal variability means the variation of rainfall amounts at a given location across a time interval, which is important in understanding climate change.

Contradictory reports were found about the nature of rainfalls in the Sahel zone for example, le Compte *et a*l., 1994 reported that the year 1994 was the wettest year during the last twenty five years. Simulatenously, Tucker (1995) suggested that the year 1994 was a relatively dry year) in the Sahel . These contradictions statements were also confirmed by the study conducted by (Nicholson *et al*., 1996) who reported that the year 1994 barely exceeded the long term rainfall mean in the Sahel zone. This contradiction can be attributed to the operational definitions of the Sahel concept and its geographical domain and, therefore, greatly affect the analysis. The interannual variability of rainfall over Africa, specially in the Sahel has been tackled by many authors for example Nicholson, 1994, and Nicholson *et. el.,* 1996. In west Africa there has been a pattern of continued aridity since the late 1960s (Nicholson *et. al.,* 1999). However, some recovery occurred in most eastern sector during the 1990s with rainfall in some years being near or just above the long-term mean (Nicholson *et. al.,* 1999). As such, this article aims at analyzing temporal and spatial rainfall variability in centeral and western Sudan as a part of the Sahelian zone using quantivie methods along with Geographical Information System (GIS) analysis techniques and presentation formats.

1.2   Materials and Methods

This section provides a short description of the geographical and environmental characteristics of the study area while focusing on the nature of the material and information used in the analysis and the tools and methods utilized for the collection of such information.

1.2.1   Geographical and Environmental Charactaristics of the Study Area

The study area is a part of the Sahelian zone lies between longitude $(32^0 - 22^{0/}$ E) and latitude $(10^0 - 20^0$ N) as presented in Map 1. This area charactarised by vulnerable environment, high rainfall variability, high water deficiency, frequent rainfall failure,prolonged drought, as in 1984 and 1991 and rainfall varies over both space and time (Dano, 1980, El-Jaili 1995, Egemi 1995, Elfaig 1996, Elfaig 2002). The rainy months in this area extended from July to October (the month when it has at least 10% of the annual rainfall (Eltom, 1975, Musa 1986, Abdalla 1992).
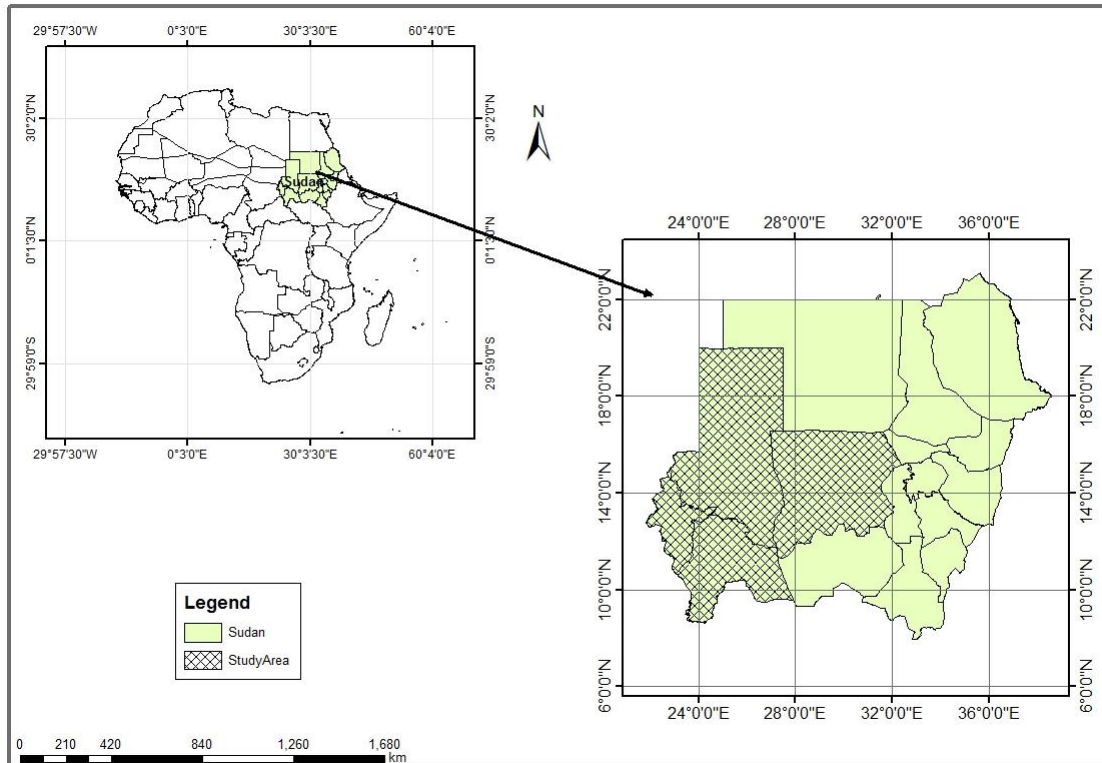
Map 1: Location of the Study Area

1.2.2 Rainfall Variability Data

The data related to rainfall variability has been collected from Elobied, EnNuhud, Nyala, Elfashir and Elgenaina meteorological stations for the last four decades 1970-2010 (Table 1).

Table 1: Rainfall data of the study area (1970-2010)

| year | Meteorolgical Stations | | | | |
	Elobeid	EnNahud	Nyala	Elfashir	Elgenaina
1970	343.1	254.3	509	306.3	459.3
1971	245.7	334.8	386.4	255.9	514.3
1972	423.8	327.7	347.5	119.4	342.5
1973	256.9	299.1	362.4	199.5	213.8
1974	387	343.4	405.5	329	404.3
1975	377.2	274.6	412.9	190.5	349.9
1976	286.4	334.3	310.7	176.7	416.5
1977	317.6	186.9	333.3	183.4	533.4
1978	391.7	359.8	469.6	208.9	383.6
1979	423.8	219.8	318.3	169.9	471.2
1980	681	327	533.4	219	527.6
1981	494.4	296.3	339	197.2	348.1
1982	363.1	346	272.4	110.4	310.4
1983	321.2	339	325.2	72.1	241.3
1984	138.9	127	196.3	101.5	124.4

1985	320.9	219.2	347.4	171.6	419.7
1986	274.7	364.8	294.1	20.1	329.4
1987	318	271.8	248.5	214	238.1
1988	382.9	283.1	493.4	250.3	510.4
1989	350.9	277.5	422.7	151.7	334.4
1990	164.6	199.5	289	125	424.2
1991	322.2	258.2	413.5	112.6	420.4
1992	411.3	442.6	325.9	202.8	335.9
1993	281.9	378.7	319.7	150.2	408.2
1994	425.7	344.7	416.9	304.8	597
1995	517.2	337.7	293.7	221.1	661.5
1996	372	359.2	360.6	149.9	274.5
1997	474.7	329.4	396.3	159.1	472.6
1998	430.9	370.6	379.6	369.6	444.5
1999	347.8	581	430.7	269.5	559.2
2000	276.3	314.5	552.4	263.1	320.1
2001	351.6	292.5	324.9	165.2	492.2
2002	363.2	116.9	299.2	166.7	456.1
2003	335.8	355	626.1	143.3	652.8
2004	198.4	318	432.3	116.5	441.7
2005	403.3	237.5	487.3	317.2	635.1
2006	391.7	379	445.2	242.2	422.2
2007	777.7	557.7	459.3	281.7	527.4
2008	238.4	411.2	498	132	393.4
2009	306.6	321.2	302	130.1	475.1
2010	315.3	414.1	380.3	250	595.6

Source: Khartoum Meteorolgical Authority (2012)

1.2.3 Method of Data Analysis

In order to analyze the data related to the rainfall variability several methods were adopted and applied. These Include: Quantitative methods which imply the mean, standard deviation (SD) and coefficient of variation (CV). The coefficient of variation (CV), also known as "relative variability", equals the standard deviation divided by the mean. It can be expressed either as a fraction or a percent. These equations are used to calculate the long term rainfall variability as shown hereafter. These equations showed the variability factor in terms of percentage, specially the coefficient of variation.

$$\bar{X} = \frac{\sum X}{N} \quad \text{i.e} \quad \bar{X} = \frac{\sum_{i=1}^{n} Xi}{n}$$

Equation (1)

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(xi - \bar{X})^2}{n-1}}$$

Equation (2)

σ = population standard deviation
X_i = value of sample (i)
$\bar{X}$ = mean of sample values
n = number of samples

$$Cv = \frac{\sqrt{\frac{\sum_{i=1}^{n}(xi - \frac{\sum_{i=1}^{n} Xi}{n})^2}{n-1}}}{\frac{\sum_{i=1}^{n} Xi}{n}}$$

Equation (3)

Cv = is the Coefficient of variation in percent
X_i = is the value of sample (i)
n = is the number of samples
$\sum$ is ' the sum of'

1.2.4 GIS analytical methods (Inverse distance weighted interpolation)

The Inverse Distance Weighted (IDW) interpolation is a Geostatistical method that determines cell values using a linearly weighted combination of a sample points. In this method we assume that the rainfall variability being mapped increases with distance from the measured meteorological site. This method is used because of the lack of the sufficient rainguages to cover the whole area. The method greatly depends on the coefficient of variation which was used by Chacón and Fernandez (2006) to study temporal variability of rainfall in the mountainous region of the Reventazón River basin, Costa Rica.

II. RESULTS AND DISCUSSION

2.1 General Rainfall Variabilty: Spatial and temporal Variation

Data on rainfall for the period 1970-2010 shows that rainfall was highly fluctuated and varied over both space and time. It shows that Elgenaina received high amount of rainfall with an average of 476.6 mm followed by Nyala (401.6mm) and EnNuhud (367mm) as shown in Figure 1.

Figure 1: Rainfall Variation in the study area
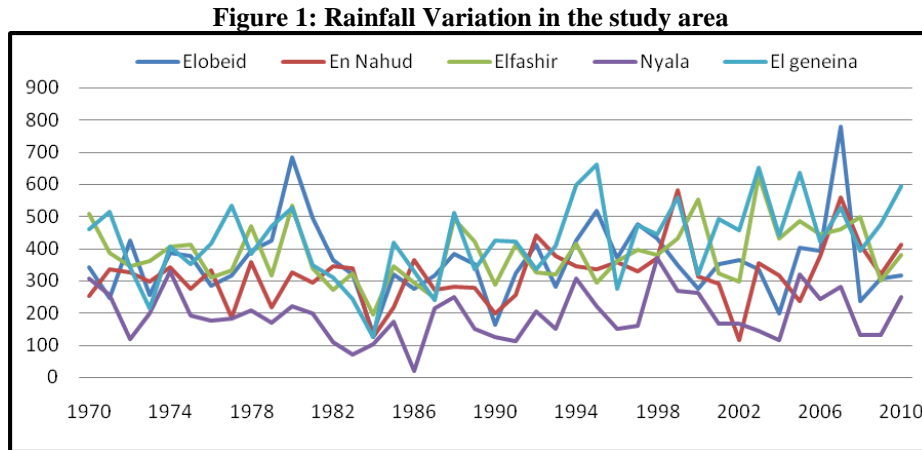
The data also shows high rainfall variability at Elfasir (CV = 0.37). High rainfall spatial variation on the study area clearly observed as shown in Table 2, Maps 2 and 3 and Figures 2:1-2:5. The differences in the maps can be explained by the fact that the standard deviation is largely affected by the extreme values where four strong Elnino events as well as frequent occurance of drought happened during this period .

Table 2: Rainfall Indicators and Dispersion in the Study Area

Period	Meteorological stations	Maximum amount	Minimum amount	Mean	STD	CV
1970-2010	Eobied	777.7	138.9	348.5	104.9	.30
	En Nuhud	581	127	367	127.6	.35
	Elfashir	369.6	20.1	203.5	76	.37
	Nyala	626.1	196.3	401.6	90.2	.23
	Elgenaina	661.5	124.4	476.6	108.9	.22
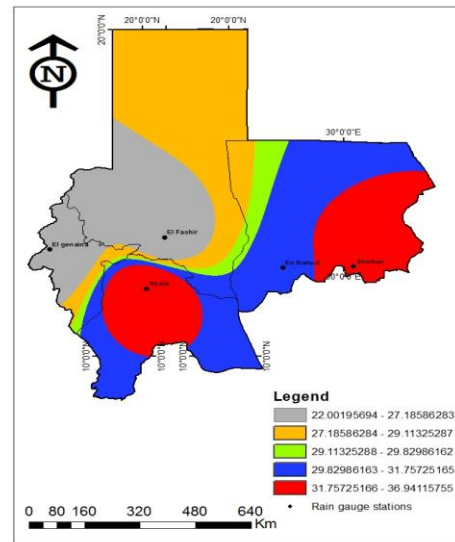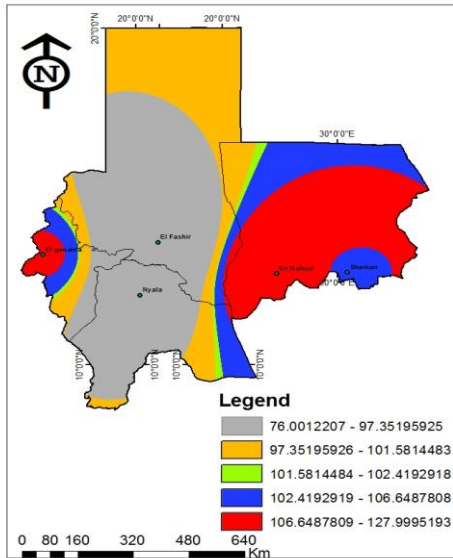
Map2: Rainfall Variablity shown by deviation (1970-2010)

Map2: Rainfall Variablity shown by Coefficient of variation (1970-2010)
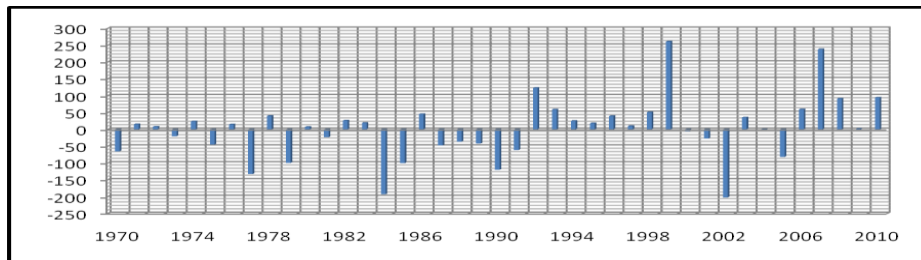
Figure 2.1: Rainfall Anomalies and Deviation in Elobied
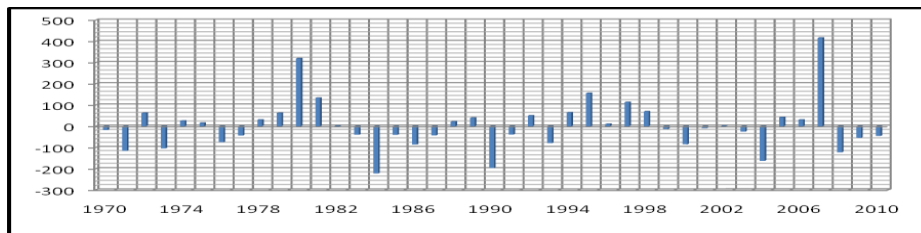
Figure 2.2: Rainfall Anomalies and Deviation in EnNuhud
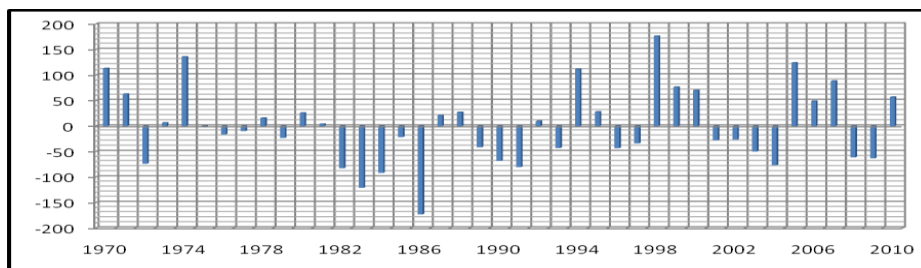
Figure 2.3: Rainfall Anomalies and Deviation in Elfashir
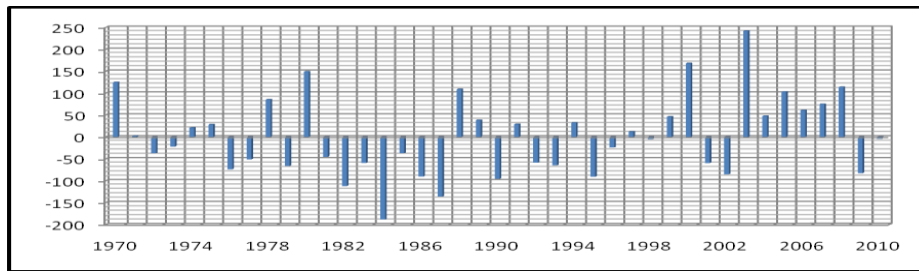
Figure 2.4: Rainfall Anomalies and Deviation in Elgenaina
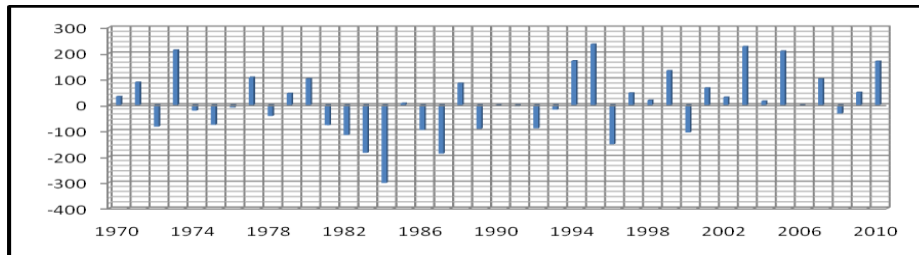
Figure 2.5: Rainfall Anomalies and Deviation in Nyala

2.2 Spatial and Temporal Rainfall Variability: Decades Intervals

The data for temporal and spatial rainfall variability for every decade shows enormous variation and fluctuation in rainfall over both space and time as shown in Table 3 and Figures 3.1-3.4. For example in Nyala area (South Darfur). The study shows that a decade of of small rainfall variability (CV = 0.15) followed by a decade of high rainfall variability (CV = 0.34) during the last four decades.

Table 3: Rainfall variability idicators in the Study Area: Decades Intervals

Period	Meteorological stations	Minimum amount	Maximum amount	Mean	STD	CV
1970-1979	Eobied	245.2	423.8	345.3	68.9	.20
	En Nuhud	186.9	359.8	293.7	66	.22
	Elfashir	119.4	306.3	214	64.6	.30
	Nyala	310.7	509	385.6	65.2	.17
	Elgenaina	213.8	533.4	408.9	94.1	.23
1980-1989	Eobied	138.9	681	364.6	142.4	.39
	En Nuhud	127	364.8	324.9	116.6	.36
	Elfashir	20.1	250.3	287	130.2	.45
	Nyala	196.3	533.4	332.3	112.2	.34
	Elgenaina	124.4	527.6	299	129.5	.43
1990-1999	Eobied	164.6	517.2	374.8	102	.27
	En Nuhud	199.5	581	360.2	102.2	.28
	Elfashir	112.6	369.6	206.5	105.5	.51
	Nyala	289	430.7	362.6	52.7	.15
	Elgenaina	274.5	661.5	459.8	119.2	.26
2000-2010	Eobied	198.4	777.7	291.5	159.4	.55
	En Nuhud	116.9	557.7	297.5	136.1	.46
	Elfashir	130.1	317.2	315	144.8	.46
	Nyala	302	626.1	401.2	133.6	.33
	Elgenaina	320.1	652.8	364.4	149	.41

In Elginana (West Darfur) similar situation was also found where small rainfall variation was reported. The CV ranges between 0.23-0.26 for the periods 1970-1979 and 1990-1999, respectively. Meanwhile great variation and fluctuation in rainfall was found for the period 1980-1989 and 2000-2010 where the CV range between 0.41-0.43. In Elfashir (north Darfur) a tendency of increasing in rainfall variability is a general feature of rainfall charactaristics in that area. High rainfall variability was reported during the period 1970-1979

and 1990-1999 for both Elobied (CV ranged between 0.39-0.55) and EnNuhud (CV ranged between 0.36-0.46).
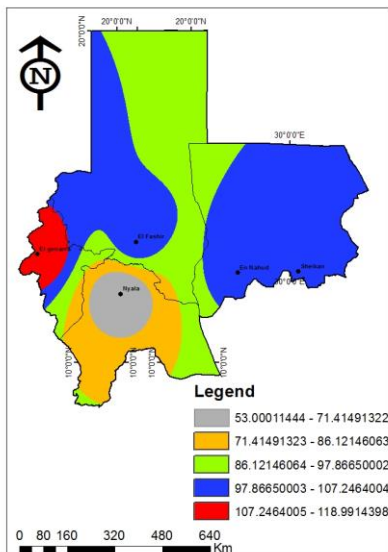
Fig.3.1: Rainfall Variability1970-197
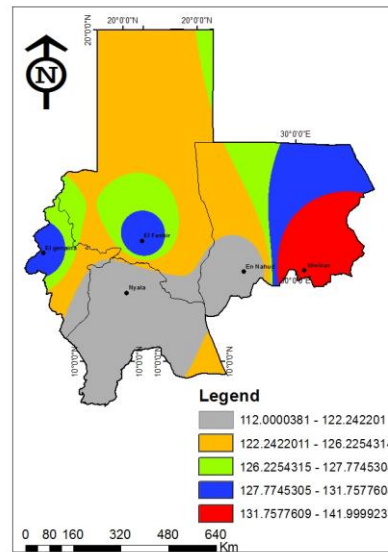
Fig. 3.2: Rainfall Variability 1980-1989
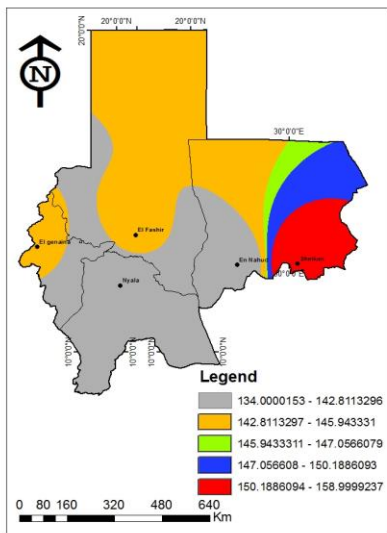
Fig.3.3:Rainfall Variability 1990-1999
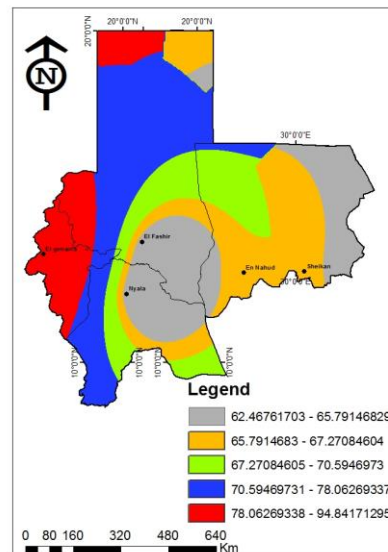
Fig.3.4:Rainfall Variability 2000-2010

III. CONCLUSIONS

Rainfall conditions during the period 1970-2010 were highly fluctuating in most of the years (45%) of the study period below the   long-term rainfall average. Four extreme negative anomalies were found as in the years 1977, 1979, 1984 and 1990 which represent prolonged drought prevailed during that period. This means that rainfall amounts vary across the study area through time which is an important feature of the climate of the study area. Results also show that since 1988, the study area has recorded a series of good years, however, rainfall continues fluctuating and rainfall variability persists i.e inter-annual and intra-seasonal rainfall. A tendency of good and bad year occurs randomly. A successive decade of small rainfall variability followed by a decade of high rainfall variability was concluded in most parts of the study area. This characteristic of rainfall can't be explained neither by the presence of the two positive anomalies as in 1994 and 2007 nor by the presence of

four negative anomalies as in 1977, 1984,1990 and 2002. Such a phenomena can be explained in the context that there is a general trend of rainfall variation over both space and time that may indicate climatic change in this semi-arid area of the Sahelian zone which affect agricultural as well as pastoral sectors . These results are compatable with the theory of climatic school thought as mentioned by Dando (1980), Cox (1981) and Lamp (1982) that provides centurial long-term or short-term rainfall data to document a climatic transformation that considered climatic change and climatic elements, specially rainfall variability is e one of the major factor contributing to environmental degradation and famine in the Sahel zone.

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AUTHORS

First Author – Ahmed H.I. Elfaig, Department of Environment and Ecology, Faculty of Geographical and Environmental Sciences, University of Khartoum:elfaig@hotmail.com

Second Author – Ibrahim M. Eltom, Department of Environment and Ecology, Faculty of Geographical and Environmental Sciences, University of Khartoum

Third Author – Abdelrahim Salih, National Center for Research, Remote sensing Authority, Natural Resource Mapping & monitoring Department.

Optimal Strategy Analysis of an N-policy M/E$_k$/1 Queueing System with Server Breakdowns and Multiple Vacations

P.Jayachitra*, Dr.A.James Albert**

*P.hD Research Scholar ,Mathematics, Karpagam University
**Dean, Mathematics, Karpagam University

Abstract- This paper studies the optimal control of an N-policy M/E$_k$/1 queueing system with server breakdowns and multiple vacations. The server is turned on when N units are accumulated in the system. The server is turned off and takes a vacation with exponential random length whenever the system is empty. If the number of units waiting in the system at any vacation completion is less than N, the server will take another vacation. If the server returns from a vacation and find atleast N units in the system, it immediately starts to serve the waiting units. It is assumed that the server breakdown according to poisson process and the repair time has an exponential distribution. We derive the distribution of the system size and employ the probability generating function to obtain the mean queue length. It is proved that the service station is busy in the steady state is equal to the traffic intensity. The total expected cost function per unit time is developed to determine the optimal operating policy at minimum cost. This paper provides the minimum expected cost and the optimal operating policy based on numerical values of the system parameters. Sensitivity analysis is also provided.

Index Terms- : M/E$_k$/1 queueing system, multiple vacations, N-policy, probability generating function, Server breakdowns.

I. INTRODUCTION

This paper considers the modeling of a production system at which arrivals of production order follow a poisson process at a rate λ. The production times of the orders are made up of k independent and identically distributed exponential random variables with mean 1/kμ which yields an Erlang type k distribution. The system operation starts (turned on) only when N orders have accumulated and is shut down (turned off) when no orders are present. When the server is working he may meet unpredictable breakdown but it is immediately repaired. When the system is turned off, the server leaves the system for a random period of time called vacation. On returning to the system if the server finds less than N units in the system immediately he takes another vacation. This production system can be modeled by an M/E$_k$/1 queueing system with server breakdowns and multiple vacations under N-policy. The concept of the *N* policy, was first introduced by Yadin and Naor [6]. Past work regarding queueing systems under the *N* policy may be divided into two categories: (i) cases with server's vacations and (ii) cases with server's breakdowns. For cases with server breakdowns, Wang [2] first proposed a management policy for Markovian queueing systems under the *N* policy with server breakdowns. Wang [4] and Wang *et al*. [5] extended the model proposed by Wang [2] to M/Ek/1 and M/H2/1 queueing systems respectively. Vasantha Kumar and Chandan [7] presented the optimal strategy analysis of two phase M/Ek/1 queueing system with server breakdowns and gating. Also they obtained the total expected cost function for the system and determine the optimal value of the control parameter N.

Existing research works, including those mentioned above, have never covered cases involving both server breakdowns and vacations. Queueing models with server breakdowns and vacations accommodate the real-world situations more closely. The purpose of this paper is threefold.

1.   The steady state equations are established to get the steady state probability distribution and to show that it generalizes the previous results.
2.   We formulate the system total expected cost in order to determine the optimal operating N-policy numerically at the minimum cost for various values of system parameters while maintaining the minimal service quantity.
3.   We perform a sensitivity analysis

II. MODEL DESCRIPTION

For the purpose of analytical investigation, we consider the model with the following assumptions:
1.   The arrival is poisson process with parameter λ and with service times according to an Erlang distribution with mean 1/μ and stage parameter k. The Erlang type k distribution is made up of k independent and identical exponential stages, each with mean 1/kμ. A customer goes into the first stage of the service (say stage k) then progresses through the remaining stages and must

complete the last stage (say stage 1) before the next customer enter the last stage. We assume that customers arriving at the service station form a single waiting line and are served in the order of their arrivals.

2. When the system is turned off, the server leaves the system for a random period of time called vacation which is exponentially distributed with parameter θ.
3. When the server is working, the server may breakdown at any time with a Poisson breakdown rate α.
4. When the server fails, it is immediately repaired at a repair rate β, where the repair times are exponentially distributed.

III. STEADY STATE RESULTS

In steady state the following notations are used.

$P_{0,0,0}$ = Probability that there are no customers in the system when the server is on vacation

$P_{n,i,0}$ = Probability that there are n customers in the system and the customers in service is in stage i while the server is on vacation.

$P_{n,i,1}$ = Probability that there are n customers in the system and the customers is in the stage i while the server is busy.

$P_{n,i,2}$ = Probability that there are n customers in the system and the customer inservice is in stage i when the server is in operation but found to be brokendown.

The steady state equations are given as follows

$$\lambda P_{1,k,0} = \lambda P_{0,0,0} \tag{1}$$

$$\lambda P_{n,k,0} = \lambda P_{n-1,k,0} \qquad (2 \le n \le N-1) \tag{2}$$

$$\lambda P_{0,0,0} = k\mu P_{1,1,1} \tag{3}$$

$$(\lambda + \theta)P_{n,k,o} = \lambda P_{n-1,k,0} \qquad (n \ge N) \tag{4}$$

$$(\lambda + k\mu + \alpha)P_{1,i,1} = k\mu P_{1,i+1,1} + \beta P_{1,i,2} \qquad (1 \le i \le k-1) \tag{5}$$

$$(\lambda + k\mu + \alpha)P_{1,k,1} = k\mu P_{2,1,1} + \beta P_{1,k,2} \tag{6}$$

$$(\lambda + k\mu + \alpha)P_{n,i,1} = \lambda P_{n-1,i,1} + k\mu P_{n,i+1,1} + \beta P_{n,i,2} \qquad (2 \le n \le N-1 \ 1 \le i \le k-1) \tag{7}$$

$$(\lambda + k\mu + \alpha)P_{n,k,1} = \lambda P_{n-1,k,1} + k\mu P_{n+1,1,1} + \beta P_{n,k,2} \qquad (2 \le n \le N-1) \tag{8}$$

$$(\lambda + k\mu + \alpha)P_{n,k,1} = \lambda P_{n-1,k,1} + k\mu P_{n+1,1,1} + \theta P_{n,k,0} + \beta P_{n,k,2} \qquad (n \ge N) \tag{9}$$

$$(\lambda + k\mu + \alpha)P_{n,i,1} = \lambda P_{n-1,i,1} + k\mu P_{n,i+1,1} + \beta P_{n,i,2} \quad (n \ge N, 1 \le i \le k-1) \tag{10}$$

$$(\lambda + \beta)P_{1,k,2} = \alpha P_{1,k,1} \tag{11}$$

$$(\lambda + \beta)P_{n,i,2} = \alpha P_{n,i,1} + \lambda P_{n-1,i,2} \qquad (1 \le i \le k-1) \qquad (n \ge 2) \tag{12}$$

$$(\lambda + \beta)P_{1,i,2} = \alpha P_{1,i,1} \quad (1 \le i \le k-1) \tag{13}$$

$$(\lambda + \beta)P_{n,k,2} = \lambda P_{n-1,k,2} + \alpha P_{n,k,1} \qquad (n \ge 2) \tag{14}$$

Solving equations (1),(2) and (4) recursively, we finally get

$$P_{n,k,0} = \begin{cases} P_{0,0,0}, & 1 \le n \le N-1 \\ R^{n-(N-1)}P_{0,0,0}, & n \ge N \end{cases} \tag{15}$$

where $R = \dfrac{\lambda}{\lambda + \theta}$

IV. PROBABILITY GENERATING FUNCTION

The technique of using the probability generating function may be applied in a recursive manner from equations (1) to (14) to obtain the analytic solution of $P_{0,0,0}$ in neat closed form expression. Define the probability generating function of $G_0(z)$, $G_1(z)$ and $G_2(z)$ respectively as follows:

$$G_0(z) = P_{0,0,0} + \sum_{n=1}^{\infty} z^n P_{n,k,0} \tag{16}$$

$$H_i(z) = \sum_{n=1}^{\infty} z^n P_{n,i,1} \quad 1 \le i \le k-1 \tag{17}$$

$$G_1(z) = \sum_{i=1}^{K} H_i(z) \tag{18}$$

$$G_i(z) = \sum_{n=1}^{\infty} z^n P_{n,i,2} \qquad 1 \le i \le k-1 \tag{19}$$

$$G_2(z) = \sum_{i=1}^{K} G_i(z) \tag{20}$$

where $|z| \le 1$

Applying algebraic manipulation technique to equations (2) and (3), we get the following

$$G_0(z) = \left[\frac{1-z^N}{1-z} + \frac{Rz^N}{1-Rz} \right] P_{0,0,0} \tag{21}$$

Multiplying equation (5) by z and (7) and (10) by z^n and summary over n we get

$$H_{i+1}(z) = (r + 1 - rz + s) H_i(z) - t G_i(z) \tag{22}$$

Where $r = \dfrac{\lambda}{k\mu}$ $s = \dfrac{\alpha}{k\mu}$ $t = \dfrac{\beta}{k\mu}$

Multiplying equation (6) by z (8) and (9) by z^n and summing over n we get

$$(r + 1 + s) H_K(z) = rz H_K(z) + \frac{1}{z} H_1(z) + \lambda \left[\frac{\theta R z^N}{1 - Rz} - 1 \right] P_{0,0,0} + t G_K(z) \tag{23}$$

Again multiplying (11) and (13),(12) and (14) respectively by appropriate powers of z and summary over n we find

$$G_i(z) = \frac{\alpha}{\lambda + \beta - \lambda z} H_i(z) \tag{24}$$

$$G_K(z) = \frac{\alpha}{\lambda + \beta - \lambda z} H_K(z) \tag{25}$$

Substituting $G_i(z)$ in equation (23) we get

$$H_{i+1}(z) = \left[(r+1-rz+s) - t\frac{\alpha}{\lambda+\beta-\lambda z} \right] H_i(z)$$

Therefore $H_i(z) = \left[(r+1-rz+s) - t\left(\frac{\alpha}{\lambda+\beta-\lambda z}\right) \right]^{i-1} H_1(z)$ \hfill (26)

Solving (21) and (22) in equation (19) we obtain

$$H_1(z) = \frac{rz\left[1 - \dfrac{\theta R z^N}{\lambda(1-Rz)} \right]}{1 - z\left[(r+1-rz+s) - t\left(\dfrac{\alpha}{\lambda+\beta-\lambda z}\right) \right]^K} P_{0,0,0} \hfill (27)$$

We solve equations (26) and (27) for $G_1(z)$ and $G_2(z)$ to obtain the following

$$G_1(z) = \frac{z\left[\dfrac{\theta R z^N}{\lambda(1-Rz)} - 1 \right]}{1 - z + s - t\left(\dfrac{\alpha}{\lambda+\beta-\lambda z}\right)} \; \frac{1 - \left[(r+1-rz+s) - t\left(\dfrac{\alpha}{\lambda+\beta-\lambda z}\right) \right]^k}{1 - z\left[(r+1-rz+s) - t\left(\dfrac{\alpha}{\lambda+\beta-\lambda z}\right) \right]^K} P_{0,0,0} \hfill (28)$$

$$G_2(z) = \frac{\alpha}{\lambda+\beta-\lambda z} G_1(z) \hfill (29)$$

We evaluate the probability $P_{0,0,0}$ using normalizing condition. For this purpose
we evaluate $G_0(1), G_1(1)$ and $G_2(1)$ from equations (21),(28) and (29) respectively as

$$G_0(1) = \left(N + \frac{\lambda}{\theta} \right) P_{0,0,0} \hfill (30)$$

$$G_1(1) = \left(N + \frac{\lambda}{\theta} \right)\left[\frac{\rho}{1 - \rho\left[1 + \dfrac{\alpha}{\beta} \right]} \right] P_{0,0,0} \hfill (31)$$

$$G_2(1) = \frac{\alpha}{\beta} G_1(1) \hfill (32)$$

Now using the normalizing condition given by

$G_1(1) = G_0(1) + G_1(1) + G_2(1) = 1$, we obtain the value of probability that the system empty is

$$P_{0,0,0} = \frac{1 - \rho\left(1 + \dfrac{\alpha}{\beta} \right)}{N + \dfrac{\lambda}{\theta}} \hfill (33)$$

V. SOME OF THE PERFORMANCE MEASURE

Denote the long run fraction time for which the server is on vacation, busy and broken down by P_0, P_1 and P_2 respectively. Thus

$$P_0 = G_0(1) = 1 - \rho\left(1 + \frac{\alpha}{\beta}\right) \tag{34}$$

$$P_1 = G_1(1) = \rho \tag{35}$$

$$P_2 = G_2(1) = \frac{\alpha}{\beta}\rho \tag{36}$$

We define the expected number of customers in the system as follows.

L_v = the expected number of units in the system when the server is on vacation.

L_b = the expected number of units in the system when the server is working.

L_d = the expected number of units in the system when the server is broken down.

L_s = Expected number of customer in the system.

To find L_v, we compute $G_0^{'}(1)$ in equation (21) by applying L'Hospital rule twice to obtain.

$$L_v = \left\{ \frac{N(N-1)}{2\left[N+\frac{\lambda}{\theta}\right]} + \frac{\lambda}{\theta} \right\}\left[1 - \rho\left(1+\frac{\alpha}{\beta}\right)\right] \tag{37}$$

Similarly, we compute $G_1^{'}(1)$ and $G_2^{'}(1)$ in equations (28) and (29) respectively, by applying L'hospital rule twice to obtain

$$L_b = G_1^{'}(1)$$

$$L_b = -\frac{1}{2\left(1+\frac{\alpha}{\beta}\right)}\left\{ \left[\frac{2sk\frac{\lambda^2}{\beta^2} + \left(1+\frac{\alpha}{\beta}\right)^2(\rho^2 + \rho r)}{\left[\rho\left(1+\frac{\alpha}{\beta}\right)-1\right]} \right] + \rho\left\{ \left[\frac{N(N-1)}{\left(N+\frac{\lambda}{\theta}\right)} + 2\left(\frac{\lambda}{\theta}+1\right) \right]\left[-\left(1+\frac{\alpha}{\beta}\right) \right] + 2\alpha\frac{\lambda}{\beta^2} \right\} \right\} \tag{38}$$

$$L_d = G_2^{'}(1)$$

$$L_d = \frac{\alpha}{\beta}G_1^{'}(1) + G_1(1)\left[-\frac{\alpha\lambda}{\beta^2} \right] \tag{39}$$

$$L_s = G_0^{'}(1) + G_1^{'}(1) + G_2^{'}(1)$$

$$L_s = \left[\frac{N(N-1)}{2\left(N+\frac{\lambda}{\theta}\right)} + \frac{\lambda}{\theta} \right]\left[1-\rho\left(1+\frac{\alpha}{\beta}\right) \right] - \frac{1}{2}\left\{ \frac{2sk\frac{\lambda^2}{\beta^2} + \left(1+\frac{\alpha}{\beta}\right)^2(\rho^2+\rho r)}{\rho\left(1+\frac{\alpha}{\beta}\right)-1} + \rho\left[\frac{N(N-1)}{N+\frac{\lambda}{\theta}} + 2\left(\frac{\lambda}{\theta}+1\right) \right]\left[-\left(1+\frac{\alpha}{\beta}\right) \right] \right\} - 2\rho\frac{\alpha\lambda}{\beta^2} \tag{40}$$

VI. SPECIAL CASES

In this section we present some existing results in the literature which are special cases of our model.
Case (i):
If $\Theta=\infty, \alpha=0$ and $\beta=\infty$, expressions (37),(38) and (40) reduces to a special cases of L_{off}, L_{on} and L_N respectively of Wang and Huang[3](p.1019)

Case (ii):
If N=1, $\Theta=\infty, \alpha=0$ and $\beta=\infty$, the expression (33) reduces to a special case of expression (2.8) of Gross and Harris[1]

VII. OTHER SYSTEM CHARACTERISTIC

A grand vacation and the grand vacation process are defined to investigate the operating characteristics of our model. The first grand vacation (G_1) starts from the point the system becomes empty and the server leaves for the first vacation (V_1) and lasts until the server finds one (or) more customers after returning from a vacation. At the end of the first grand vacation, if the number of customers in the queue is less than N, the server leaves for another vacation and it becomes the new starting pint of the second grand vacation (G_2). This second grand vacation continues until a different system state is observed after a vacation. Grand vacations $(G_1,G_2….)$ continues in this manner until the number of units observed after a grand vacation is found to be greater than or equal to N.

The grandvacation process is a process imbedded in the idle period in which the imbedded states are the number of units in the queue just after the server leaving for grand vacations. One cycle begins when the system is empty and the server takes a vacation. The server remains on vacation until there are at least N units in the system when it returns from a vacation. We call this the idle period. The busy period is initiated when the server starts serving the waiting units and terminates when there are no units in the system. While providing service the server may breakdown and sent for repair immediately. This is called breakdown period.

The idle period I is developed by means of the grand vacation process. It is defined that

ϕ_k = the probability that the grand vacation process passes through state k.

π_k = the probability that k customers arrive during a vacations

Then using the concept of grand vacation process it is determined

$$\phi_n = \sum_{k=1}^{n} \frac{\pi_k}{1-\pi_0}\phi_{n-k} \qquad k = 1,2………..$$

$$\phi_0 = 1$$

Calculating ϕ_n recursively it is determined

$$\phi_n = \frac{\theta}{\lambda+\theta}$$

Since the expected length of a grand vacation is $\dfrac{E(V)}{1-\pi_0} = \dfrac{1}{\theta(1-\pi_0)}$ then $\dfrac{\phi_k}{\theta(1-\pi_0)}$ is the expected length of the grand vacation which starts with k customers. Hence we have the expected length of the idle period is given by

$$E(I) = \frac{1}{\theta(1-\pi_0)}\sum_{k=0}^{N-1}\phi_k \tag{41}$$

Substituting for π_0 and ϕ_k we have

$$E(I) = \frac{N}{\lambda} \tag{42}$$

If E(B),E(D) and E(C) denote the expected busy period, brokendown period and busy cycle respectively, we have

$$E(C) = E(I) + E(B)+E(D)$$

From equations (34) to (36) we obtain the long run fraction of time for the server is idle, busy and brokendown respectively:

$$\frac{E(I)}{E(C)} = P_0 = 1-\rho\left(1+\frac{\alpha}{\beta}\right) \tag{43}$$

$$\frac{E(B)}{E(C)} = P_1 = \rho \tag{44}$$

$$\frac{E(D)}{E(C)} = P_2 = \frac{\alpha}{\beta}\rho \qquad (45)$$

Thus we have the number of cycles per unit time

$$E(C) = \frac{N}{\lambda\left[1-\rho\left(1+\frac{\alpha}{\beta}\right)\right]} \qquad (46)$$

VIII.   OPTIMAL N-POLICY

We develop a steady state total expected cost function per unit time for the N-policy $M/E_K/1$ Queueing system with server vacations and breakdowns in which N is a decision variable. Following the cost structure is constructed, our objective is to determine the optimal operating N policy so as to minimize this cost function. Let

C_h = holding cost per unit time for each customer present in the system.

C_o = Cost per unit time for the operating service station.

C_s =Set up cost per cycle.

C_d =breakdown cost per unit time

C_r =removable cost per unit time for removing the service station.

C_γ =removable per unit time for the server being on vacation.

Using the definition of each cost elements and its corresponding characteristics, the total expected cost function per unit time is given by

$$T(N) = C_h L_s + C_o \frac{E(B)}{E(C)} + (C_s + C_r)\frac{1}{E(C)} - C_d \frac{E(D)}{E(C)} + C_\gamma \frac{E(I)}{E(C)} \qquad (47)$$

We obtain the optimal value N*,which minimizes cost function by differentiating it with respect to N and setting the result to be zero. i.e., $\frac{\partial}{\partial N}(T(N)) = 0$.The solution N to (47) may not be an integer and the optimal positive integer value of N is one of the integers surrounding N* which gives a smaller cost T. Here we should be pointed out explicitly that the solution really gives the minimum value and $\frac{\partial^2}{\partial N^2}(T(N)) = 0$ at N=N* is greater than zero when the values of system parameters satisfy suitable conditions.

However, it is quite tedious to present the explicit expression. Therefore we will perform the numerical experiments to demonstrate that the function is really convex and the solution gives a minimum.

IX. SENSITIVITY ANALYSIS

In the course of analysis, sensitivity analysis has been carried out to find the optimum value of N (ie.,N*), expected system length and minimum cost based on changes in the system parameters by using MATLAB.

In order to arrive at the conclusions, the following arbitrary values of the system parameters are considered.
λ= 2, α = 3, μ = 5, β = 5, C_h=5, C_0=200, C_s=500, C_d=100, C_v=25, C_μ=25, Θ=3, k=2

It is noticed from the results in table 1 that as λ increases, the value of N*,L(N*) and expected cost T(N*) increases.

Table 1:

λ	0.5	0.75	1	1.25	1.5
N*	9	10	11	12	13
L(N*)	17.43688	26.5325	43.4053	80.8181	191.9188
T(N*)	179.3854	218.50	295.5919	474.3281	1020.81

Computed values in table 2 show that N* increases for smaller values of μ and does not change for larger values μ, the expected cost increases and queue length also increases.

Table 2:

μ	4	6	8	10	12
N*	9	14	16	17	17
L(N*)	2.9796	14.0804	28.6198	46.9767	69.3989
T(N*)	120.6893	169.5034	237.4133	326.0808	436.0279

It can be observed from table3 that N* increases for smaller values of β and does not change for larger values β , the expected cost and queue length increases with increase in β.

Table 3:

β	4	6	8	10	12
N*	10	12	13	14	14
L(N*)	5.14644	11.11154	17.91131	26.11784	35.87028
T(N*)	119.3701	163.658	204.6549	249.8467	301.3808

From table 4 , it is observed that N* remain unchanged when α increases from 1.1 to 1.9. Thus N* is insensitive to the changes in α. L(N*) and T(N*) decreases as α increases.

Table 4:

α	1.1	1.3	1.5	1.7	1.9
N*	14	14	14	14	14
L(N*)	46.7689	34.7618	27.0737	21.8137	18.0288
T(N*)	357.4992	295.6264	254.6264	226.1125	204.9639

Computed values in table 5 show that N* is insensitive to the changes in Ө. L(N*) and T(N*) decreases as Ө increases.

Table 5:

Ө	1	3	5	7	9
N*	12	12	12	12	12
L(N*)	10.5117	8.1157	7.6515	7.4540	7.3451
T(N*)	154.5856	142.9433	140.6922	139.7319	139.1949

X. CONCLUSION

Optimal strategy analysis of N-policy $M/E_k/1$ queueing system with server breakdowns and vacations has been studied. Some of the system performance measures have been derived. A cost function is formulated to determine the optimal value of N. Sensitivity analysis is carried out through numerical illustrations. These numerical values will be useful in analyzing practical queueing system and make decision to improve the grade of service by selecting appropriate system descriptors. The present study can be extended by working vacation. The future scope of the study is the cost and profit analysis of this model.

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AUTHORS

First Author – P.Jayachitra, Ph.D. Research Scholar, Karpagam University, Coimbatore.E.mail: jayaasasi_akshu@rediffmail.com
Second Author – Dr.A.James Albert, Dean, Arts, Science and Humanities,Karpagam University, Coimbatore, Tamil Nadu
        E.mail:asiralbert@gmail.com.

Correspondence Author – P.Jayachitra, Ph.D. Research Scholar, Karpagam University, E.mail: jayaasasi_akshu@rediffmail.com

Particular and Unique solutions of DGLAP evolution equations in Next- to-Next-to-Leading Order and Structure Functions at low-x

Rasna Rajkhowa

Physics Department, T.H.B. College, Jamugurihat, Sonitpur, Assam, India

Abstract- We present particular and unique solutions of singlet and non-singlet Dokshitzer-Gribov-Lipatov- Altarelli-Parisi (DGLAP) evolution equations in next-to-next-to-leading order (NNLO) at low-x. We obtain *t*-evolutions of deuteron, proton, neutron and difference and ratio of proton and neutron structure functions at low-*x* from DGLAP evolution equations. The results of *t*-evolutions are compared with HERA and NMC lox-*x* and low-Q^2 data. We also compare our result of *t*-evolution of proton structure function with a recent global parameterization.
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Index Terms- Particular solution, Complete solution, Unique solution, Altarelli-Parisi equation, Structure function, Low-*x* physics.

I. INTRODUCTION

In our earlier works [1-4], we obtain particular solution of the Dokshitzer-Gribov-Lipatov- Altarelli-Parisi (DGLAP) evolution equations [5-8] for *t* and *x*-evolutions of singlet and non-singlet structure functions in leading order (LO) and next-to-leading order (NLO) and hence *t*-evolution of deuteron, proton, neutron, difference and ratio of proton and neutron and *x*-evolution of deuteron in LO and NLO at low-*x* have been reported. The same technique can be applied to the DGLAP evolution equations in next-to-next-to-leading order (NNLO) for singlet and non-singlet structure functions to obtain *t*-evolutions of deuteron, proton, neutron, difference and ratio of proton and neutron structure functions. These NNLO results are compared with the HERA H1 [9] and NMC [10] low-*x*, low-Q^2 data and we also compare our results of t-evolution of proton structure functions with recent global parameterization [11].

II. THEORY

The DGLAP evolution equations with splitting functions for singlet and non-singlet structure functions in NNLO are in the standard forms [12-14]

$$\frac{\partial F_2^S(x,t)}{\partial t} - \frac{\alpha_S(t)}{2\pi}\left[\frac{2}{3}\{3+4\ln(1-x)\}F_2^S(x,t)+I_1^S(x,t)\right] - \left(\frac{\alpha_S(t)}{2\pi}\right)^2 I_2^S(x,t) - \left(\frac{\alpha_S(t)}{2\pi}\right)^3 I_3^S(x,t) = 0 \tag{1}$$

and

$$\frac{\partial F_2^{NS}(x,t)}{\partial t} - \frac{\alpha_S(t)}{2\pi}\left[\frac{2}{3}\{3+4\ln(1-x)\}F_2^{NS}(x,t)+I_1^{NS}(x,t)\right] - \left(\frac{\alpha_S(t)}{2\pi}\right)^2 I_2^{NS}(x,t) - \left(\frac{\alpha_S(t)}{2\pi}\right)^3 I_3^{NS}(x,t) = 0 \tag{2}$$

where,

$$I_1^S(x,t) = \frac{4}{3}\int_x^1 \frac{d\omega}{1-\omega}\left[(1+\omega^2)F_2^S\left(\frac{x}{\omega},t\right) - 2F_2^S(x,t)\right] + N_f\int_x^1 \{\omega^2 + (1-\omega)^2\}G\left(\frac{x}{\omega},t\right)d\omega, \tag{3}$$

$$I_2^S = \left[(x-1)F_2^S(x,t)\int_0^1 f(\omega)d\omega + \int_x^1 f(\omega)F_2^S\left(\frac{x}{\omega},t\right)d\omega + \int_x^1 F_{qq}^S(\omega)F_2^S\left(\frac{x}{\omega},t\right)d\omega + \int_x^1 F_{qg}^S(\omega)G\left(\frac{x}{\omega},t\right)d\omega\right] \tag{4}$$

$$I_3^S(x,t) = \int_x^1 \frac{d\omega}{\omega}\left[P_{qq}(x)F_2^{NS}\left(\frac{x}{\omega},t\right) + P_{qg}(x)G\left(\frac{x}{\omega},t\right)\right]. \tag{5}$$

$$I_1^{NS}(x,t) = \frac{4}{3}\int_x^1 \frac{d\omega}{1-\omega}\left[(1+\omega^2)F_2^{NS}\left(\frac{x}{\omega},t\right) - 2F_2^{NS}(x,t)\right], \tag{6}$$

$$I_2^{NS}(x,t) = (x-1)F_2^{NS}(x,t)\int_0^1 f(\omega)d\omega + \int_x^1 f(\omega)F_2^{NS}\left(\frac{x}{\omega},t\right)d\omega \tag{7}$$

$$I_3^{NS}(x,t) = \int_x^1 \frac{d\omega}{\omega}\left[P_{NS}^{(2)}(x) F_2^{NS}\left(\frac{x}{\omega}, t\right)\right].$$

(8)

Here $t = \ln\dfrac{Q^2}{\Lambda^2}$, Λ is the QCD cut off parameter. Also

$$f(\omega) = C_F^2[P_F(\omega) - P_A(\omega)] + \frac{1}{2}C_F C_A[P_G(\omega) + P_A(\omega)] + C_F T_R N_f P_{N_f}(\omega),\quad F_{qq}^S(\omega) = 2C_F T_T N_f F_{qq}(\omega),$$

$$F_{qg}^S(\omega) = C_F T_T N_f F_{qg}^1(\omega) + C_G T_T N_f F_{qg}^2(\omega)$$

$$P_F(\omega) = -\frac{2(1+\omega^2)}{(1-\omega)}\ln(\omega)\ln(1-\omega) - \left(\frac{3}{1-\omega} + 2\omega\right)\ln\omega - \frac{1}{2}(1+\omega)\ln\omega + \frac{40}{3}(1-\omega),$$

$$P_G(\omega) = \frac{(1+\omega^2)}{(1-\omega)}\left(\ln^2\omega + \frac{11}{3}\ln\omega + \frac{67}{9} - \frac{\pi^2}{3}\right) + 2(1+\omega)\ln\omega + \frac{40}{3}(1-\omega),$$

$$P_{N_f}(\omega) = \frac{2}{3}\left[\frac{1+\omega^2}{1-\omega}\left(-\ln\omega - \frac{5}{3}\right) - 2(1-\omega)\right]\quad P_A(\omega) = \frac{2 1+\omega^2}{(1+\omega)}\int_{\left(\frac{\omega}{1+\omega}\right)}^{\left(\frac{1}{1+\omega}\right)} \frac{dk}{k}\ln\left(\frac{1-k}{k}\right) + 2(1+\omega)\ln\omega + 4(1-\omega)$$

$$F_{qq}(\omega) = \frac{20}{9\omega} - 2 + 6\omega - \frac{56}{9}\omega^2 + \left(1 + 5\omega + \frac{8}{3}\omega^2\right)\ln\omega - (1+\omega)\ln^2\omega$$

$$F_{qg}^1(\omega) = 4 - 9\omega - (1-4\omega)\ln\omega - (1-2\omega)\ln^2\omega + 4\ln(1-\omega) + \left[2\ln^2\left(\frac{1-\omega}{\omega}\right) - 4\ln\left(\frac{1-\omega}{\omega}\right) - \frac{2}{3}\pi^2 + 10\right]P_{qg}^1(\omega)$$

$$F_{qg}^2(\omega) = \frac{182}{9} + \frac{14}{9}\omega + \frac{40}{9\omega} + \left(\frac{136}{3}\omega - \frac{38}{3}\right)\ln\omega - 4\ln(1-\omega) - (2+8\omega)\ln^2\omega$$

$$+ \left[-\ln^2\omega + \frac{44}{3}\ln\omega - 2\ln^2(1-\omega) + 4\ln(1-\omega) + \frac{\pi^2}{3} - \frac{218}{3}\right]P_{qg}^1(\omega) + 2P_{qg}^1(-\omega)\int_{\left(\frac{\omega}{1+\omega}\right)}^{\left(\frac{1}{1+\omega}\right)} \frac{dz}{z}\ln\frac{1-z}{z}$$

$$P_{qg}^1(\omega) = \omega^2 + (1-\omega)^2,\quad N_c = C_A = C_G = 3,\ T_R = \text{½},\quad C_F(\omega) = \frac{(N_c^2 - 1)}{2N_c},\quad P_{qq} = P_{NS}^{(2)} + P_{PS}^{(2)}$$

$$P_{NS}^{(2)}(x,t) = N_f\left\{\begin{array}{l}\{L_1(-163.9x^{-1} - 7.208x) + 151.49 + 44.51x - 43.12x^2 + 4.82x^3\}(1-x) \\ + L_0 L_1(-173.1 + 46.18L_0) + 178.04L_0 + 6.892L_0^2 + \frac{40}{27}(L_0^4 - 2L_0^3)\end{array}\right\}$$

$$P_{PS}^{(2)}(x) \cong \left\{ N_f \begin{pmatrix} -5.926L_1^3 - 9.751L_1^2 - 72.11L_1 + 177.4 + 392.9x - 101.4x^2 \\ -57.04L_0L_1 - 661.6L_0 + 131.4L_0^2 - \frac{400}{9}L_0^3 + \frac{160}{27}L_0^4 \\ -506.0x^{-1} - \frac{3584}{27}x^{-1}L_0 \end{pmatrix} (1-x) \right. $$
$$\left. + N_f^2 \begin{pmatrix} 1.778L_1^2 + 5.944L_1 + 100.1 - 125.2x + 49.26x^2 - 12.59x^3 \\ -1.889L_0L_1 + 61.75L_0 + 17.89L_0^2 + \frac{32}{27}L_0^3 + \frac{256}{81}x^{-1} \end{pmatrix} \right\}$$

$$P_{qg}(x) \cong N_f \begin{pmatrix} \frac{100}{27}L_1^4 - \frac{70}{9}L_1^3 - 120.5L_1^2 + 104.42L_1 + 2522 - 3316x + 2126x^2 \\ + L_0L_1(1823 - 25.22L_0) - 252.5xL_0^3 + 424.9L_0 + 881.5L_0^2 \\ -\frac{44}{3}L_0^3 + \frac{536}{27}L_0^4 - 1268.3x^{-1} - \frac{896}{3}x^{-1}L_0 \end{pmatrix}$$
$$+ N_f^2 \begin{pmatrix} \frac{20}{27}L_1^3 + \frac{200}{27}L_1^2 - 5.496L_1 - 252.0 + 158.0x + 145.4x^2 - 139.28x^3 \\ -98.07xL_0^2 + 11.70xL_0^3 - L_0L_1(53.09 + 80.616L_0) \\ -254.0L_0 - 90.80L_0^2 - \frac{376}{27}L_0^3 - \frac{16}{9}L_0^4 + \frac{1112}{243}x^{-1} \end{pmatrix}$$

with $L_0 = \ln(x)$, $L_1 = \ln(1-x)$.

Here results are from direct x-space evolution and $P_{NS}^{(2)}(x)$ is calculated using Fortran package [15]. Except for x values very close to zero of $P_{NS}^{(2)}(x)$, this parameterizations deviate from the exact expressions by less than one part in thousand, which can be consider as sufficiently accurate. For a maximal accuracy for the convolutions with quark densities, slight adjustment should done using low integer moments [16].

The strong coupling constant, $\alpha_S(Q^2)$ is related with the β-function as [17]

$$\beta(\alpha_S) = \frac{\partial \alpha_S(Q^2)}{\partial \log Q^2} = -\frac{\beta_0}{4\pi}\alpha_s^2 - \frac{\beta_1}{16\pi^2}\alpha_s^3 - \frac{\beta_2}{64\pi^3}\alpha_S^4 + \Lambda$$
.

where

$$\beta_0 = \frac{11}{3}N_C - \frac{4}{3}T_f = \frac{33 - 2N_f}{3},$$

$$\beta_1 = \frac{34}{3}N_C^2 - \frac{10}{3}N_CN_f - 2C_FN_f = \frac{306 - 38N_f}{3}$$

$$\beta_2 = \frac{2857}{54}N_C^3 + 2C_F^2T_f - \frac{205}{9}C_FN_CT_f + \frac{44}{9}C_FT_f^2 + \frac{158}{27}N_CT_f^2 = \frac{2857}{2} - \frac{6673}{18}N_f + \frac{325}{54}N_f^2$$

Let us now introduce the variable $u = 1-w$ and note that [18]

$$\frac{x}{w} = \frac{x}{1-u} = x \sum_{k=0}^{\infty} u^k.$$

The above series is convergent for $|u| < 1$. Since $x<w<1$, so $0<u<1-x$ and hence the convergence criterion is satisfied. Now, using Taylor expansion method we can rewrite $F_2^S(x/w, t)$ as

$$F_2^S(x/w,t) = F_2^S(x + x\sum_{k=1}^{\infty}u^k, t) = F_2^S(x,t) + x\sum_{k=1}^{\infty}u^k\frac{\partial F_2^S(x,t)}{\partial x} + \frac{1}{2}x^2(\sum_{k=1}^{\infty}u^k)^2\frac{\partial^2 F_2^S(x,t)}{\partial x^2} + ...$$

which covers the whole range of u, $0<u<1-x$. Since x is small in our region of discussion, the terms containing x^2 and higher powers of x can be neglected as our first approximation as discussed in our earlier works [1-4], $F_2^S(x/w, t)$ can be approximated for small-x as

$$F_2^S(x/w,t) \cong F_2^S(x,t) + x\sum_{k=1}^{\infty}u^k\frac{\partial F_2^S(x,t)}{\partial x}.$$
(9)

Similarly, $G(x/w, t)$ and $F_2^{NS}(x/w, t)$ can be approximated for small-x as

$$G(x/w,t) \cong G(x,t) + x\sum_{k=1}^{\infty}u^k\frac{\partial G(x,t)}{\partial x}$$
(10)

and

$$F2^{NS}(x/w,t) \cong F2^{NS}(x,t) + x\sum_{k=1}^{\infty}u^k\frac{\partial F2^{NS}(x,t)}{\partial x}.$$
(11)

Using equations (9) and (10) in equations (3), (4) and (5) and performing u-integrations we get,

$$\frac{\partial F_2^S(x,t)}{\partial t} - \frac{\alpha_s(t)}{2\pi}\left[A_1(x)F_2^S(x,t) + A_2(x)\frac{\partial F_2^S(x,t)}{\partial x} + A_3(x)G(x,t) + A_4(x)\frac{\partial G(x,t)}{\partial x}\right]$$

$$-\left(\frac{\alpha_s(t)}{2\pi}\right)^2\left[B_1(x)F_2^S(x,t) + B_2(x)\frac{\partial F_2^S(x,t)}{\partial x} + B_3(x)G(x,t) + B_4(x)\frac{\partial G(x,t)}{\partial x}\right]$$

$$-\left(\frac{\alpha_s(t)}{2\pi}\right)^3\left[C_1(x)F_2^S(x,t) + C_2(x)\frac{\partial F_2^S(x,t)}{\partial x} + C_3(x)G(x,t) + C_4(x)\frac{\partial G(x,t)}{\partial x}\right] = 0$$
(12)

where,

$$A_1(x) = 2x + x^2 + 4\ln(1-x), \qquad A_2(x) = x - x^3 - 2x\ln x,$$

$$A_3(x) = 2N_f\left(\frac{2}{3} - x + x^2 - \frac{2}{3}x^3\right) \qquad A_4(x) = 2N_f\left(-\frac{5}{3}x + 3x^2 - 2x^3 + \frac{2}{3}x^4 - x\ln x\right),$$

$$B_1(x) = x\int_0^1 f(\omega)d\omega - \int_0^x f(\omega)d\omega + \frac{4}{3}N_f\int_x^1 F_{qq}(\omega)d\omega,$$

$$B_2(x) = x\int_x^1\left[f(\omega) + \frac{4}{3}N_f F_{qg}^S(\omega)\right]\frac{1-\omega}{\omega}d\omega,$$

$$B_3(x) = \int_x^1 F_{qg}^S(\omega)d\omega \qquad B_4(x) = x\int_x^1\frac{1-\omega}{\omega}F_{qg}^S(\omega)d\omega,$$

$$C_1(x) = N_f\int_0^{1-x}\frac{d\omega}{1-\omega}C(\omega) \qquad C(x) = N_f\int_0^{1-x}\frac{\omega xdx}{(1-\omega\hat{\omega})^2}C(\omega),$$

$$C_3(x) = N_f\int_0^{1-x}\frac{d\omega}{1-\omega}C'(\omega) \qquad C_2(x) = N_f\int_0^{1-x}\frac{\omega xdx}{(1-\omega\hat{\omega})^2}C'(\omega),$$

here,

$$C(\omega) = \begin{bmatrix} \ln\omega\ln(1-\omega)[-173.1 + 46.18\ln(1-\omega)] + 178.04\ln(1-\omega) + 6.892\ln^2(1-\omega) \\ + \dfrac{40}{27}(\ln^4(1-\omega) - 2\ln^3(1-\omega)) \end{bmatrix}$$

$$+ \omega\left\{ \begin{array}{l} \ln\omega[-163.9(1-\omega)^{-1} - 7.208(1-\omega)] + 151.49 + 44.51(1-\omega) - 43.12(1-\omega)^2 + 4.82(1-\omega)^3 - 5.926\ln^3\omega \\ - 9.751\ln^2\omega - 72.11\ln\omega + 177.4 + 392.9(1-\omega) - 101.4(1-\omega)^2 - 57.04\ln(1-\omega)\ln\omega - 661.6\ln(1-\omega) \\ + 131.4\ln^2(1-\omega) - \dfrac{400}{9}\ln^3(1-\omega) + \dfrac{160}{27}\ln^4(1-\omega) - 506(1-\omega)^{-1} - \dfrac{3584}{27}(1-\omega)^{-1}\ln(1-\omega) \end{array} \right\}$$

$$+ N_f\omega\begin{bmatrix} 1.778\ln^2\omega + 5.944\ln\omega + 100.1 - 125.2(1-\omega) + 49.26(1-\omega)^2 - 12.59(1-\omega)^3 - 1.889\ln(1-\omega)\ln\omega \\ + 61.75\ln(1-\omega) + 17.89\ln^2(1-\omega) + \dfrac{32}{27}\ln^3(1-\omega) + \dfrac{256}{81}(1-\omega)^{-1} \end{bmatrix}$$

$$C'(\omega) = \left\{ \begin{array}{l} \dfrac{100}{27}\ln^4\ln\omega - \dfrac{70}{9}\ln^3\omega - 120.5\ln^2\omega + 104.42\ln\omega + 2522 - 3316(1-\omega) + 2126(1-\omega)^2 \\ - 252.5(1-\omega)\ln^3(1-\omega) + \ln\omega\ln(1-\omega)(1823 - 25.22\ln(1-\omega)) + 424.9\ln(1-\omega) \\ + 881.5\ln^2(1-\omega) - \dfrac{44}{3}\ln^3\omega + \dfrac{536}{27}\ln^4(1-\omega) - 1268.3(1-\omega)^{-1} - \dfrac{896}{3}(1-\omega)^{-1}\ln(1-\omega) \end{array} \right\}$$

$$+ N_f\left\{ \begin{array}{l} \dfrac{20}{27}\ln^3\omega + \dfrac{200}{27}\ln^2\omega - 5.496\ln\omega - 252 + 158(1-\omega) + 145.4(1-\omega)^2 - 139.28(1-\omega)^3 \\ - 98.07(1-\omega)\ln^2(1-\omega) + 11.70(1-\omega)\ln^3(1-\omega) - \ln\omega\ln(1-\omega)(53.09 + 80.616\ln(1-\omega)) \\ - 254\ln(1-\omega) - 90.80\ln^2(1-\omega) - \dfrac{376}{27}\ln^3(1-\omega) - \dfrac{16}{9}\ln^4(1-\omega) + \dfrac{1112}{243}(1-\omega)^{-1} \end{array} \right\}$$

Let us assume for simplicity [1-4]

$$G(x, t) = K(x)\, F_2^S(x, t) \tag{13}$$

where $K(x)$ is a function of x. In this connection, earlier we considered [1-3] $K(x) = k,\ ax^b,\ ce^{-dx}$, where k, a, b, c, d are constants. Agreement of the results with experimental data is found to be excellent for $k = 4.5$, $a = 4.5$, $b = 0.01$, $c = 5$, $d = 1$ for low-x in leading order and $a = 10$, $b = 0.016$, $c = 0.5$, $d = -3.8$ in next-to-leading order. Also we can consider two numerical parameters T_0 and T_1 such that

$$T^2(t) = T_0 T(t) \text{ and } T^3(t) = T_0 T(t)\, T(t) = T_1 T(t), \tag{14}$$

where,
$$T(t) = \frac{\alpha_S(t)}{2\pi}$$

By suitable choice of T_0 and T_1, we can reduce the error to a minimum. Hence equation (12) becomes

$$\frac{\partial F_2^S(x,t)}{\partial t} - P_S(x)\frac{\partial F_2^S(x,t)}{\partial x} - Q_S(x)F_2^S(x,t) = 0 , \tag{15}$$

where,
$$P_S(x) = T(t)[(A_2 + KA_4) + T_0(B_2 + KB_4) + T_1(C_2 + KC_4)] ,$$

$$Q_S(x) = T(t)\left[\left(A_1 + KA_3 + A_4\frac{\partial K}{\partial x}\right) + T_0\left(B_1 + KB_3 + B_4\frac{\partial K}{\partial x}\right) + T_1\left(C_1 + KC_3 + C_4\frac{\partial K}{\partial x}\right) \right]$$

Secondly, using equations (11) and (14) in equations (6), (7) and (8) and performing u-integration equation (2) becomes

$$\frac{\partial F_2^{NS}(x,t)}{\partial t} - P_{NS}(x)\frac{\partial F_2^{NS}(x,t)}{\partial x} - Q_{NS}(x)F_2^{NS}(x,t) = 0 \tag{16}$$

where,

$$P_{NS}(x) = T(t)[A_2 + T_0 B_2 + T_1 C_2],$$

$$Q_S(x) = T(t)[A_1 + T_0 B_1 + T_1 C_1]$$

The general solutions [19, 20] of equations (15) is $F(U, V) = 0$, where F is an arbitrary function and $U(x, t, F_2{}^S) = C_1$ and $V(x, t, F_2{}^S) = C_2$ where, C_1 and C_2 are constant and they form a solution of equations

$$\frac{dx}{P_S(x,t)} = \frac{dt}{-1} = \frac{dF_2^S(x,t)}{-Q_S(x,t)}.$$

(17)

We observed that the Lagrange's auxiliary system of ordinary differential equations [19, 20] occurred in the formalism can not be solved without the additional assumption of linearization (equation (14)) and introduction two numerical parameters T_0 and T_1. These parameters does not effect in the results of t- evolution of structure functions. Solving equation (17) we obtain,

$$U(x,t,F_2^S) = t^{\left(1 + \frac{b}{t} - \frac{c}{2t^2} \ln t\right)} \exp\left[\frac{N_S(x)}{a} + \frac{b}{t} + \frac{1}{t^2}\left(\frac{c}{2} - \frac{d}{2}\right)\right] \text{ and}$$

$$V(x,t,F_2^S) = F_2^S(x,t) \exp[M_S(x)]$$

where,

$$a = \frac{2}{\beta_0}, \qquad b = \frac{\beta_1}{\beta_0^2}, \qquad c = \frac{\beta_1}{\beta_0^4}, \qquad d = \frac{\beta_2}{\beta_0^3},$$

$$N_S(x) = \int \frac{dx}{[(A_2 + KA_4) + T_0(B_2 + KB_4) + T_1(C_2 + KC_4)]}$$

and

$$M_S(x) = \int \frac{(A_1 + KA_3 + A_4 \frac{\partial K}{\partial x}) + T_0(B_1 + KB_3 + B_4 \frac{\partial K}{\partial x}) + T_1(C_1 + KC_3 + C_4 \frac{\partial K}{\partial x})}{(A_2 + KA_4) + T_0(B_2 + KB_4) + T_1(C_2 + KC_4)} dx.$$

2. (a) Particular Solutions

If U and V are two independent solutions of equation (17) and if α and β are arbitrary constants, then $V = \alpha U + \beta$ may be taken as a complete solution of equation (15). Then the complete solution [19, 20]

$$F_2^S(x,t) \exp[M_S(x)] = \alpha t^{\left(1 + \frac{b}{t} - \frac{c}{2t^2} \ln t\right)} \exp\left[\frac{N_S(x)}{a} + \frac{b}{t} + \frac{1}{t^2}\left(\frac{c}{2} - \frac{d}{2}\right)\right] + \beta$$

(18)

is a two-parameter family of planes. The one parameter family determined by taking $\beta = \alpha^2$ has equation

$$F_2^S(x,t) \exp[M_S(x)] = \alpha t^{\left(1 + \frac{b}{t} - \frac{c}{2t^2} \ln t\right)} \exp\left[\frac{N_S(x)}{a} + \frac{b}{t} + \frac{1}{t^2}\left(\frac{c}{2} - \frac{d}{2}\right)\right] + \alpha^2.$$

(19)

Differentiating equation (19) with respect to α, we obtain

$$\alpha = -\frac{1}{2} t^{\left(1 + \frac{b}{t} - \frac{c}{2t^2} \ln t\right)} \exp\left[\frac{N_S(x)}{a} + \frac{b}{t} + \frac{1}{t^2}\left(\frac{c}{2} - \frac{d}{2}\right)\right]$$

Putting the value of α again in equation (19), we obtain envelope

$$F_2^S(x,t)\exp[M_S(x)] = -\frac{1}{4}\left[t^{\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)}\exp\left(\frac{N_S(x)}{a}+\frac{b}{t}+\frac{1}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)\right)\right]^2.$$

Therefore,

$$F_2^S(x,t) = -\frac{1}{4}\left[t^{2\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)}\exp\left(\frac{2b}{t}+\frac{2}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{2N_S(x)}{a}-M_S(x)\right)\right]$$

(20)

which is merely a particular solution of the general solution. Now, defining

$$F_2^S(x,t_0) = -\frac{1}{4}\left[t_0^{2\left(1+\frac{b}{t_0}-\frac{c}{2t_0^2}\ln t_0\right)}\exp\left(\frac{2b}{t_0}+\frac{2}{t_0^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{2N_S(x)}{a}-M_S(x)\right)\right].$$

at $t = t_0$, where, $t_0 = \ln(Q_0^2/\Lambda^2)$ at any lower value $Q = Q_0$, we get from equation (20)

$$F_2^S(x,t) = F_2^S(x,t_0)\left(\frac{t^{(1+b/t-\frac{c}{2t^2}\ln t)}}{t_0^{(1+b/t_0-\frac{c}{2t_0^2}\ln t_0)}}\right)^2 \exp\left[2b\left(\frac{1}{t}-\frac{1}{t_0}\right)+2\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(21)

which gives the t-evolution of singlet structure function $F_2^S(x, t)$ in NNLO for $\beta = \alpha^2$.

Proceeding exactly in the same way, and defining

$$F_2^{NS}(x,t_0) = -\frac{1}{4}\left[t_0^{2\left(1+\frac{b}{t_0}-\frac{c}{2t_0^2}\ln t\right)}\exp\left(\frac{2b}{t_0}+\frac{2}{t_0^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{2N_{NS}(x)}{a}-M_{NS}(x)\right)\right]$$

where,

$$N_{NS}(x) = \int\frac{dx}{A_2+T_0B_2+T_1C_2} \quad \text{and} \quad M_{NS}(x) = \int\frac{A_1+T_0B_1+T_1C_1}{A_2+T_0B_2+T_1C_2}\,dx,$$

we get,

$$F_2^{NS}(x,t) = F_2^{NS}(x,t_0)\left(\frac{t^{(1+b/t-\frac{c}{2t^2}\ln t)}}{t_0^{(1+b/t_0-\frac{c}{2t_0^2}\ln t_0)}}\right)^2 \exp\left[2b\left(\frac{1}{t}-\frac{1}{t_0}\right)+2\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(22)

which gives the t-evolution of non-singlet structure function $F_2^{NS}(x, t)$ in NNLO for $\beta = \alpha^2$.

We observe that if b, c and d tends to zero, then equations (21) and (22) tends to LO equation [1] and if c and d tends to zero then these equations tends to NLO equation [2-3]. Physically b, c and d tends to zero means number of flavours is high.
Again defining,

$$F_2^S(x_0,t) = -\frac{1}{4}\left[t^{2\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)}\exp\left(\frac{2b}{t}+\frac{2}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{2N_S(x)}{a}-M_S(x)\right)\right]_{x=x_0}.$$

we obtain from equation (20)

$$F_2^S(x,t) = F_2^S(x_0,t)\exp\int_{x_0}^{x}\left[\frac{2}{a}.N_S(x)-M_S(x)\right]dx,$$

(23)

which gives the *x*-evolution of singlet structure function $F_2^S(x, t)$ in NNLO for $\beta = \alpha^2$.
Similarly defining,

$$F_2^{NS}(x_0,t) = -\frac{1}{4}\left[t^{2\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)}\exp\left(\frac{2b}{t}+\frac{2}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{2N_{NS}(x)}{a}-M_{NS}(x)\right)\right]_{x=x_0}.$$

We get

$$F_2^{NS}(x,t) = F_2^{NS}(x_0,t)\exp\int_{x_0}^{x}\left[\frac{2}{a}.N_{NS}(x)-M_{NS}(x)\right]dx,$$

(24)

which gives the *x*-evolution of non-singlet structure function $F_2^{NS}(x, t)$ in NNLO for $\beta = \alpha^2$.

Deuteron, proton and neutron structure functions measured in deep inelastic electro-production can be written in terms of singlet and non-singlet quark distribution functions [21] as

$$F_2^d(x, t) = 5/9\ F_2^S(x, t),$$ (25)
$$F_2^p(x, t) = 5/18\ F_2^S(x, t) + 3/18\ F_2^{NS}(x, t),$$ (26)
$$F_2^n(x, t) = 5/18\ F_2^S(x, t) - 3/18\ F_2^{NS}(x, t)$$ (27)

and
$$F_2^p(x, t) - F_2^n(x, t) = 1/3\ F_2^{NS}(x, t).$$ (28)

Now using equations (21) and (23) in equation (25) we will get *t* and *x*-evolution of deuteron structure function $F_2^d(x, t)$ at low-x in NNLO as

$$F_2^d(x,t) = F_2^d(x,t_0)\left(\frac{t^{(1+b/t-\frac{c}{2t^2}\ln t)}}{t_0^{(1+b/t_0-\frac{c}{2t_0^2}\ln t_0)}}\right)^2 \exp\left[2b\left(\frac{1}{t}-\frac{1}{t_0}\right)+2\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(29)

and

$$F_2^d(x,t) = F_2^d(x_0,t)\exp\int_{x_0}^{x}\left[\frac{2}{a}.N_S(x)-M_S(x)\right]dx,$$

(30)

where, the input functions are

$$F_2^d(x,t_0) = \frac{5}{9}F_2^S(x,t_0) \qquad\text{and}\qquad F_2^d(x_0,t) = \frac{5}{9}F_2^S(x_0,t).$$

Similarly using equations (21) and (22) in equations (26), (27) and (28) we get the *t* – evolutions of proton, neutron, and difference and ratio of proton and neutron structure functions at low-x in NNLO as

$$F_2^p(x,t) = F_2^p(x,t_0) \left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}} \right)^2 \exp\left[2b\left(\frac{1}{t}-\frac{1}{t_0}\right) + 2\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right) \right],$$

(31)

$$F_2^n(x,t) = F_2^n(x,t_0) \left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}} \right)^2 \exp\left[2b\left(\frac{1}{t}-\frac{1}{t_0}\right) + 2\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right) \right],$$

(32)

$$F_2^p(x,t) - F_2^n(x,t) = [F_2^p(x,t_0) - F_2^p(x,t_0)] \left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}} \right)^2 \exp\left[2\left\{ b\left(\frac{1}{t}-\frac{1}{t_0}\right) + \left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right) \right\} \right],$$

(33)

and

$$\frac{F_2^p(x,t)}{F_2^n(x,t)} = \frac{F_2^p(x,t_0)}{F_2^n(x,t_0)} = R(x),$$

(34)

where R(x) is a constant for fixed-x. And the input functions are

$$F_2^p(x,t_0) = \frac{5}{18}F_2^S(x,t_0) + \frac{3}{18}F_2^{NS}(x,t_0),$$

$$F_2^n(x,t_0) = \frac{5}{18}F_2^S(x,t_0) - \frac{3}{18}F_2^{NS}(x,t_0),$$

and

$$F_2^p(x,t_0) - F_2^n(x,t_0) = \frac{1}{3}F_2^{NS}(x,t_0).$$

For the complete solution of equation (15), we take $\beta = \alpha^2$ in equation (18). We observed that if we take $\beta = \alpha$ in equation (18) and differentiate with respect to α as before, we can not determine the value of α. In general, if we take $\beta = \alpha^y$, we get in the solutions,

the powers of $\left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}} \right)$ and the co-efficient of $\left[b\left(\frac{1}{t}-\frac{1}{t_0}\right) + \left(\frac{c}{2}-\frac{d}{2}\right)\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right) \right]$ in exponential part in t-evolutions of deuteron, proton, neutron, and difference of proton and neutron structure functions be $y/(y-1)$ and the numerators of the

first term inside the integral sign be $y/(y-1)$ for x-evolutions in NNLO. Hence if y varies from minimum (=2) to maximum (= ∞) then $y/(y-1)$ varies from 2 to 1.

Thus by this methodology, instead of having a single solution we arrive a band of solutions, of course the range for these solutions is reasonably narrow.

2. (b) Unique Solutions

Due to conservation of the electromagnetic current, F_2 must vanish as Q^2 goes to zero [21, 22]. Also $R \to 0$ in this limit. Here R indicates ratio of longitudinal and transverse cross-sections of virtual photon in DIS process. This implies that scaling should not be a valid concept in the region of very low-Q^2. The exchanged photon is then almost real and the close similarity of real photonic and hadronic interactions justifies the use of the Vector Meson Dominance (VMD) concept [23-24] for the description of F_2. In the language of perturbation theory, this concept is equivalent to a statement that a physical photon spends part of its time as a 'bare', point-like photon and part as a virtual hadron [22]. The power and beauty of explaining scaling violations with field theoretic methods (i.e., radiative corrections in QCD) remains, however, unchallenged in as much as they provide us with a framework for the whole x-region with essentially only one free parameter Λ [25]. For Q^2 values much

larger than Λ^2, the effective coupling is small and a perturbative description in terms of quarks and gluons interacting weakly makes sense. For Q^2 of order Λ^2, the effective coupling is infinite and we cannot make such a picture, since quarks and gluons will arrange themselves into strongly bound clusters, namely, hadrons [21] and so the perturbation series breaks down at small-Q^2 [21]. Thus, it can be thought of Λ as marking the boundary between a world of quasi-free quarks and gluons, and the world of pions, protons, and so on. The value of Λ is not predicted by the theory; it is a free parameter to be determined from experiment. It should expect that it is of the order of a typical hadronic mass [21]. Since the value of Λ is so small we can take at $Q = \Lambda$, $F_2^S(x, t) = 0$ due to conservation of the electromagnetic current [22]. This dynamical prediction agrees with most ad hoc parameterizations and with the data [25]. Using this boundary condition in equation (18) we get $\beta = 0$ and

$$F_2^S(x,t) = \alpha t^{\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)} \exp\left[\frac{N_S(x)}{a}+\frac{b}{t}+\frac{1}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)-M_S(x)\right].$$

(35)

Now, defining

$$F_2^S(x,t_0) = \alpha\left[t_0^{\left(1+\frac{b}{t_0}-\frac{c}{2t_0^2}\ln t_0\right)} \exp\left(\frac{b}{t_0}+\frac{1}{t_0^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{N_S(x)}{a}-M_S(x)\right)\right].$$

at $t = t_0$, we get from equation (35)

$$F_2^S(x,t) = F_2^S(x,t_0)\left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}}\right)\exp\left[b\left(\frac{1}{t}-\frac{1}{t_0}\right)+\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(36)

which gives the t-evolution of singlet structure function $F_2^S(x, t)$ in NNLO.

Proceeding exactly in the same way, we get

$$F_2^{NS}(x,t) = F_2^{NS}(x,t_0)\left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}}\right)\exp\left[b\left(\frac{1}{t}-\frac{1}{t_0}\right)+\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(37)

which gives the t-evolution of non-singlet structure function $F_2^{NS}(x, t)$ in NNLO.

Again defining,

$$F_2^S(x_0,t) = \alpha \left[t^{\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)} \exp\left(\frac{b}{t}+\frac{1}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{N_S(x)}{a}-M_S(x)\right)\right]_{x=x_0} .$$

we obtain from equation (35)

$$F_2^S(x,t) = F_2^S(x_0,t)\exp\int_{x_0}^{x}\left[\frac{1}{a}.N_S(x)-M_S(x)\right]dx,$$

(38)

which gives the x-evolution of singlet structure function $F_2^S(x,t)$ in NNLO.
Similarly,

$$F_2^{NS}(x_0,t) = \alpha \left[t^{\left(1+\frac{b}{t}-\frac{c}{2t^2}\ln t\right)} \exp\left(\frac{b}{t}+\frac{1}{t^2}\left(\frac{c}{2}-\frac{d}{2}\right)+\frac{N_{NS}(x)}{a}-M_{NS}(x)\right)\right]_{x=x_0} .$$

we get

$$F_2^{NS}(x,t) = F_2^{NS}(x_0,t)\exp\int_{x_0}^{x}\left[\frac{1}{a}.N_{NS}(x)-M_{NS}(x)\right]dx,$$

(39)

which gives the x-evolution of non-singlet structure function $F_2^S(x,t)$ in NNLO.
Therefore corresponding results for t-evolution of deuteron, proton, neutron, difference and ratio of proton and neutron structure functions are

$$F_2^d(x,t) = F_2^d(x,t_0)\left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}}\right)\exp\left[b\left(\frac{1}{t}-\frac{1}{t_0}\right)+\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(40)

$$F_2^p(x,t) = F_2^p(x,t_0)\left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}}\right)\exp\left[b\left(\frac{1}{t}-\frac{1}{t_0}\right)+\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(41)

$$F_2^n(x,t) = F_2^n(x,t_0)\left(\frac{t^{\left(1+b/t-\frac{c}{2t^2}\ln t\right)}}{t_0^{\left(1+b/t_0-\frac{c}{2t_0^2}\ln t_0\right)}}\right)\exp\left[b\left(\frac{1}{t}-\frac{1}{t_0}\right)+\left(\frac{1}{t^2}-\frac{1}{t_0^2}\right)\left(\frac{c}{2}-\frac{d}{2}\right)\right],$$

(42)

$$F_2^p(x,t) - F_2^n(x,t) = [F_2^p(x,t_0) - F_2^p(x,t_0)] \left(\frac{t \frac{(1+b/t - \frac{c}{2t^2}\ln t)}{}}{t_0 (1+b/t_0 - \frac{c}{2t_0^2}\ln t_0)} \right) \exp\left[b\left(\frac{1}{t} - \frac{1}{t_0}\right) + \left(\frac{1}{t^2} - \frac{1}{t_0^2}\right)\left(\frac{c}{2} - \frac{d}{2}\right) \right],$$

(43)

and

$$\frac{F_2^p(x,t)}{F_2^n(x,t)} = \frac{F_2^p(x,t_0)}{F_2^n(x,t_0)} = R(x),$$

(44)

Again x-evolution of deuteron structure function in NNLO is

$$F_2^d(x,t) = F_2^d(x_0,t)\exp\int_{x_0}^x \left[\frac{1}{a}.N_S(x) - M_S(x) \right] dx,$$

(45)

Already we have mentioned [1-4] that the determination of x-evolutions of proton and neutron structure functions like that of deuteron structure function is not suitable by this methodology. It is to be noted that unique solutions of evolution equations of different structure functions are same with particular solutions for y maximum ($y = \infty$) in $\beta = \alpha^y$ relation.

III.   RESULTS AND DISCUSSION

In the present paper, we compare our results of t-evolution of deuteron, proton, neutron and difference and ratio of proton

and neutron structure functions with the HERA [9] and NMC [10] low-x and low-Q^2 data. In case of HERA data [9] proton and neutron structure functions are measured in the range $2 \le Q^2 \le 50$ GeV^2. Moreover here $P_T \le 200$ MeV, where P_T is the transverse momentum of the final state baryon. In case of NMC data proton and deuteron structure functions are measured in the range $0.75 \le Q^2 \le 27$ GeV^2. We consider number of flavours $N_f = 4$. We also compare our results of t-evolution of proton structure functions with recent global parameterization [11]. This parameterization includes data from H1-96 \ 99, ZEUS-96/97(X0.98), NMC, E665 data.

Fig.1:   Results of t-evolutions of deuteron structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. For convenience, value of each data point is increased by adding $0.2i$ where $i = 0, 1, 2, 3, \ldots$ are the numberings of

curves counting from the bottom of the lowermost curve as the 0-th order. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation.

In Fig.1, we present our results of t-evolutions of deuteron structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation. Agreement with the data [10] is found to be good. NNLO results for $y = 2$ are of better agreement with experimental data in general.
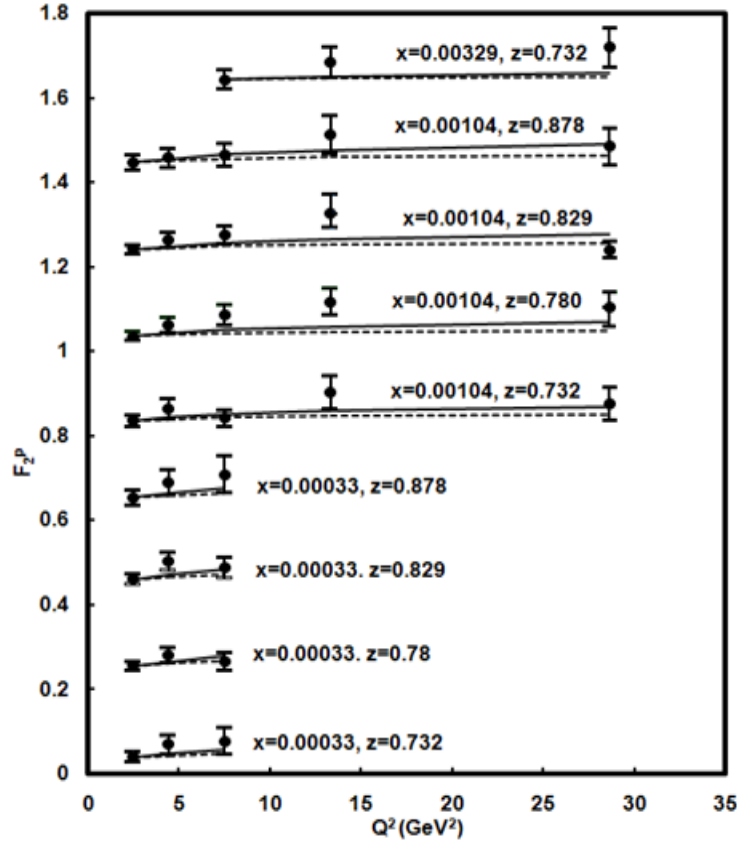
Fig.2: Results of t-evolutions of proton structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. For convenience, value of each data point is increased by adding $0.2i$, where $i = 0, 1, 2, 3, ...$ are the numberings of curves counting from the bottom of the lowermost curve as the 0-th order. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation.

In Fig.2, we present our results of t-evolutions of proton structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation. Agreement with the data [9] is found to be good. NNLO results for $y = 2$ are of better agreement with experimental data in general.

In fig.3 we compare our results of t-evolutions of proton structure functions F_2^p with recent global parameterization [11] (long dashed lines) for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation. Agreement with the results is found to be good.

In Fig.4, we present our results of t-evolutions of neutron structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation. Agreement with the data [10] is found to be good. NNLO results for $y = 2$ are of better agreement with experimental data in general.
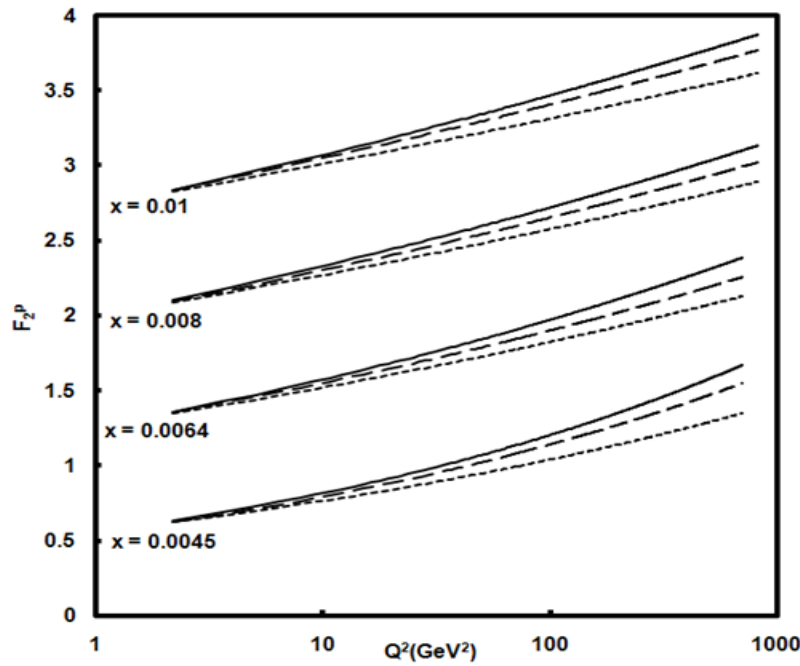
Fig.3: Results of *t*-evolutions of proton structure functions F_2^p with recent global paramatrization (long dashed lines) for the representative values of *x* given in the figures for *y* = 2 (solid lines) and *y* maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. Data points at lowest-Q^2 values in the figures are taken as input. For convenience, value of each data point is increased by adding 0.5*i*, where *i* = 0, 1, 2, 3, ... are the numberings of curves counting from the bottom of the lowermost curve as the 0-th order.
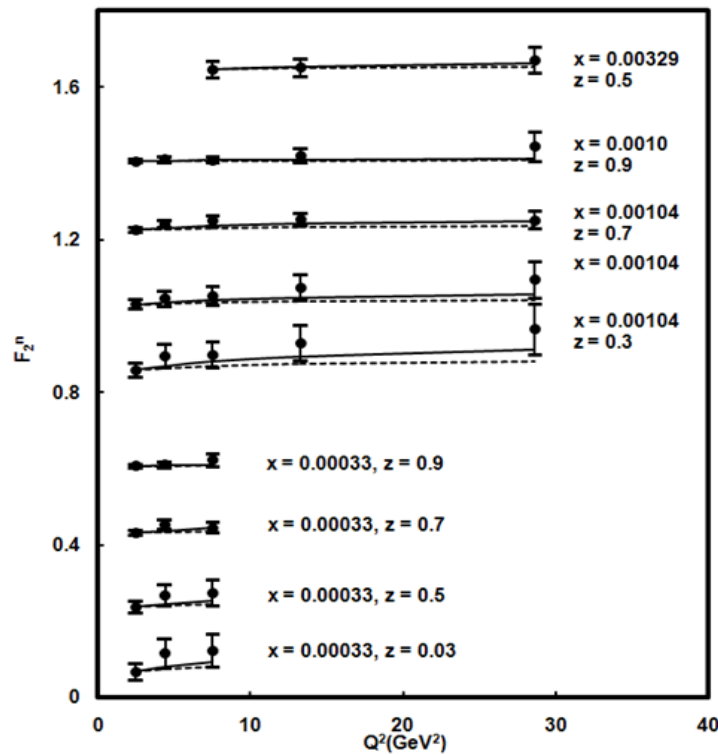
Fig.4: Results of *t*-evolutions of neutron structure functions for the representative values of *x* given in the figures for *y* = 2 (solid lines) and *y* maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. For convenience, value of each data point is increased by adding 0.2*i*, where *i* = 0, 1, 2, 3, ... are the numberings of curves counting from the bottom of the lowermost curve as the 0-th order. Data

points at lowest-Q^2 values in the figures are taken as input to test   the evolution equation.
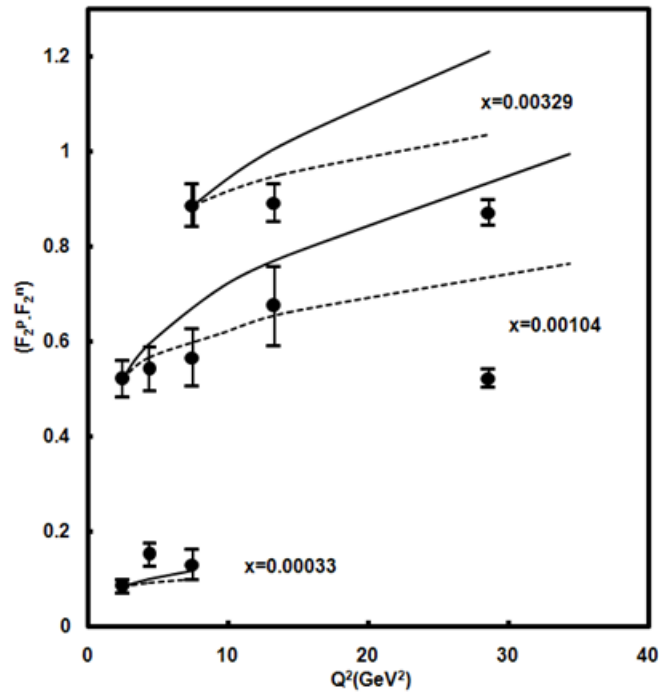
Fig.5: Results of t-evolutions of difference of proton and neutron structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. For convenience, value of each data point is increased by adding and $0.4i$, where $i = 0, 1, 2, 3, ...$ are the numberings of curves counting from the bottom of the lowermost curve as the 0-th order. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation.
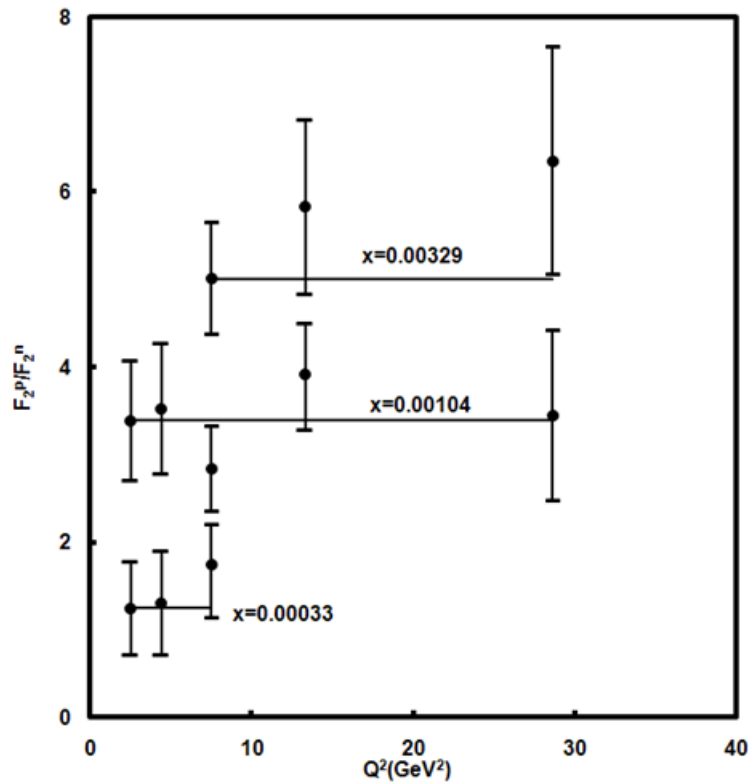
Fig.6: Results of t-evolutions of ratio of proton and neutron structure functions F_2^p / F_2^n (solid lines) for the representative values of x given in the figures. Data points at lowest-Q^2 values in the figures are taken as input.

In Fig.5, we present our results of t-evolutions of difference of proton and neutron structure functions for the representative values of x given in the figures for $y = 2$ (solid lines) and y maximum (dashed lines) in $\beta = \alpha^y$ relation. The dashed line also represents results of unique solution. Data points at lowest-Q^2 values in the figures are taken as input to test the evolution equation. Agreement with the data [10] is found to be good. NNLO results for y maximum are of better agreement with experimental data in general.

In fig.6 we present our results of t-evolutions of ratio of proton and neutron structure functions F_2^p / F_2^n (solid lines) for

the representative values of x given in the figures. Though according to our theory the ratio should be independent of t, due to the lack of sufficient amount of data and due to large error bars, a clear cut conclusion can not be drawn.

Though we compare our results which $y = 2$ and y maximum in $\beta = \alpha^y$ relation with data, agreement of the result with experimental data is found to be excellent with $y = 2$ for t-evolution in next-to-next-to leading order.

In fig.7 we plot $T^2(t)$ (solid line) and $T_0 T(t)$ (dotted line), $T^3(t)$ (solid line) and $T_1 T(t)$ (dotted line) where $T(t) = \alpha_s(t)/2\pi$ against Q^2 in the Q^2 range $0.75 \leq Q^2 \leq 50$ GeV^2 . Though the explicit values of $T_1(t)$, T_0 are not necessary in calculating t-evolution of, yet we observe that for $T_1 = .0028$ and $T_0 = 0.05$, errors become minimum in the Q^2 range $0.5 \leq Q^2 \leq 50$ GeV^2.
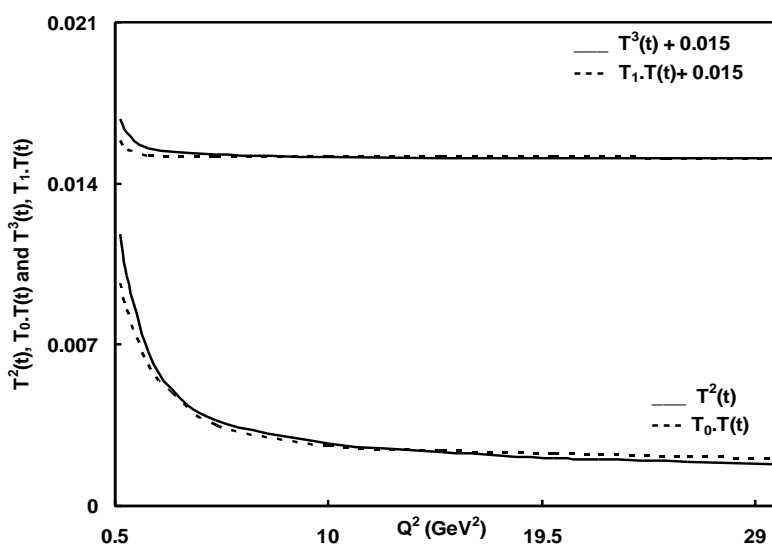
Fig.7: $T^2(t)$ (solid line) and $T_0 T(t)$ (dotted line), $T^3(t)$ (solid line) and $T_1 T(t)$ (dotted line),where $T(t) = \alpha_s(t)/2\pi$ against Q^2 in the Q^2 range $0.75 \leq Q^2 \leq 50$ GeV^2.

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AUTHORS

First Author – Dr. Rasna Rajkhowa, Ph. D., Assistant Professor, Physics Department, T.H.B. College, Jamugurihat, Sonitpur, Assam, India., E-mail:rasna.rajkhowa@gmail.com

Impact of Ready to Eat Food Taken By Single Living Male and Female

Poonam Muktawat[1], Dr .NilimaVarma[2]

[*] Department of Home Science, Sri R.D.A.K.(P.G.)College Hathras (U.P.)
[**] Professor, Department of Home Science Govt. M.L.B. (P.G.) Girls   College Bhopal (M.P.)

Abstract- The present study was made to assess the intake and preference of ready to eat food by single living male and female in Bhopal town. The study was conducted in selected areas in Bhopal town. A sample of 300 single living male and female (Widow/Widower, Divorcee, Unmarried and Separated) aged 25-45years were selected randomly for the study. The multistage stratified purposive technique was used for the selection of the sample. The developed questionnaire was used to collect the data. The data were analyzed by using chi- square, significant level. The result of the study showed that majority of single living male and female used different type of ready to eat food due to their own reason.

Index Terms- single living male and female, ready to eat food,widow

I. INTRODUCTION

This study is focused upon intake of ready to food by single living male and female. The single living male and female come under these categories i.e. unmarried, divorcee, widowed and separated. The food pattern of single living male and female may change in comparison to the male and female who live with their family. The cause of change of food pattern of single living persons may be work load, no interest in taking food and mainly tension with some other causes in life etc. Due to their improper food pattern, the health may be affected. Such people are not taking balanced diet, they may face the deficiency of nutrients and this may cause many diseases. The personality of single living person is entirely different from others. Depending on conditions, single living persons either take food more than normal or in a lesser quantity.

Ready-to-eat (RTE) foods are foods intended to be consumed as they are. These foods do not require additional cooking and are usually stored in refrigeration or at room. "Ready-to-eat food" means food that is in a form that is edible without additional preparation. Ready-to-eat foods are foods that will not be cooked or reheated before serving. These include salads, cooked meats such as ham, desserts, sandwiches, cheese and foods that you have cooked in advance to serve cold. Taste the combined benefits of convenience, health and variety. only with MTR Foods' Ready-To-Eat range. Our range of products cover wide range of delicious North Indian and South Indian recipes, to give you a taste of food which taste just like fresh home cooked food. It is your ready help in kitchen for authentic taste, variety of choices in different Indian cuisines and high on convenience. The range ofcurrently comprises of Soups, Vegetable curries, Paneer gravies and various rice items. Each item of Ready-to-eat menu is natural, preservative-free and 100% vegetarian. The brand of ready to eat food   which are available in market i.e. amul, heritage food, mother dairy etc. Since 1990's, the number of marriages that end in divorce in the Netherlands as well as in other western societies has strongly increased. In the period between 1990 and 1995, the number of divorces in the Netherlands rose from 6,000 to 34000 a year. Recent estimates indicate that one in four of today's marriages will end in divorce. To copy with the insecurity and stress involved in a divorce, people usually seek support in relationships. The presence of a network of relationships and the support exchanged there in are there by important for adjusting success fully to the psychosocial effects of a divorce (Amato, 2000), after a divorce the personal network becomes smaller, and undergoes fluctuations, consolidating in a different composition, with different patterns of connections and interactions. They have successful carrier and high salaries; they are in metropolitan cities and come from upper class or at least higher middle class background. For most of these women, single hood is not forever, nor do single profession have it all that easy, there are extra burden and stresses to "going it alone" (Anjali Roy, 2004). Terhell (2004) explained in his study the differences in changes in the network of personal relationships over the long term after divorce. The study includes a comparison of network changes in the short and long term after divorce.

II. RESEARCH METHODS

The data were collected with the help of questionnaire cum interview technique. A pretested and predesigned questionnaire having all relevant information was collected from 300 single living male and female aged 25-45 years. These respondents were selected from 8 represervative areas of Bhopal town. Purposive multistage stratified sampling technique was employed for selection of single living male and female respondents. The present study highlighted the single living male and female were taking ready to eat food. An interview schedule to elicit the information of the respondents was requested to fill the performa with full assurance about his confidentially and anonymity of his/her information.

III. RESEARCH FINDING AND DISCUSSION

The findings obtained from the present study have been presented and discussed under the following subheads:
- **General information regarding the respondents**:
It was found from table 1 that all 300 single living male and female who participated in this study. It was noted that out of all

300 respondents of this study, 122 single living male and 178 single living female were interviewed. Out of 122 single living male respondents, 8.20% male were of age group 25 - 30 years, 28.69% male were noted in age group 30 -35 years, 23.77% male of age group and 39.34% male of age group 40-45 years participated in this present study. Out of 178 single living female respondents, 3.37 female were of age group25 - 30 years, 25.84% female of age group 30 -35 years, 28.09% female of age group 35- 40 years and 42.70% female were of age group 40-45 years in this study. It was noted that 40.67% single living male respondents and 59.33% single living female respondents from all four age group participated in this study.

Table 1: Age group wise distribution of single living male and female.

Age group (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
25-30	10	8.20	6	3.37	16	5.33
30-35	35	28.69	46	25.84	81	27.00
35-40	29	23.77	50	28.09	79	26.33
40-45	48	39.34	76	42.70	124	41.34
Total	**122**	**40.67**	**178**	**59.33**	**300**	**100.00**

$\chi^2 = 4.083$, df = 3, p >0.05

Statistically, no significant difference was observed regarding the age groups between single living male and female.($\chi^2 = 4.083$, df = 3, p>0.05).

Table 2: Marital Status of single living male and female.

Category	Male		Female		Total	
	No.	%	No.	%	No.	%
Unmarried	70	57.38	69	38.76	139	46.33
Widow	14	11.47	45	25.29	59	19.67
Divorcee	32	26.23	62	34.83	94	31.33
Separated	6	4.92	2	1.12	8	2.67
Total	**122**	**40.67**	**178**	**59.33**	**300**	**100.00**

$\chi^2 = 18.851$, df = 3, p<0.05

Table 2 shows the distribution of all three hundred single living male and female respondents according to their status and marital category. All male and female respondents were divided into two category i.e. unmarried and married. The married category was further divided into widowed, divorcee and separated sub categories.   Out of 122 single living male respondents 57.38% were unmarried. In married category of male respondents, 11.47% were widow, 26.23% were divorcee and 4.92% were separated. In 178 single living female respondents of this study, 38.76% were of unmarried category.

25.29% widowed, 34.83% divorcee and 1.12% separated female respondents were of married class. 46.33% unmarried male and female respondents participated in this study while 19.67% widowed, 31.33% divorcee and 2.67% separated male and female of married class were included for study. Statistically, significant difference was observed regarding the marital status between single living male and female (χ^2 = 18.851, df = 3, p<0.05).

- **Preference given ready to eat food**

Table 3 shows the preference for ready to eat food by single living male and female**.** Out of 300 single living respondents,

25.34% respondents did not use any ready to eat food, 8.34% respondents used ready to eat food vegetable pulav and idli. 7.34% respondents preferred ready to eat shahi paneer,6.34% respondents used dalmakhni and palak paneer. 8.00% and 7.00% respondents used upma and dosa respectively.5.00% respondents preferred methi aloo and chhole, 5.34% respondents used vegetable mix curry,7.67% respondents preferred soup.

Table 3: Preference given by Single living male and female for taking   ready to eat food.

Ready to eat food	Male		Female		Total	
	No	%	No	%	No	%
Vegetable pulav	10	8.19	15	8.43	25	8.34
Shahi paneer	8	6.56	14	7.86	22	7.34
Dalmakhni	7	5.74	12	6.74	19	6.34
Upma	9	7.48	15	8.43	24	8.00
Idli	8	6.56	17	9.55	25	8.34
Dosa	7	5.74	14	7.86	21	7.00
Methi aloo	5	4.09	10	5.62	15	5.00
Palak paneer	8	6.56	11	6.18	19	6.34
Vegetable mix curry	7	5.74	9	5.05	16	5.34
Chhole	6	4.91	9	5.05	15	5.00
Soup	11	9.01	12	6.74	23	7.67
None	36	29.50	40	22.57	76	25.34
Total	**122**	**40.67**	**178**	**59.33**	**300**	**100.00**

Out of 122 single living males, 29.50% males did not use ready to eat food, 8.19% males preferred vegetable pulav,6.56% males used shahi paneer, idli and palak paneer. 5.74% males used dalmakhani, dosa and vegetable mix curry.7.48% male respondents preferred upma, 4.09% males used methi aloo, 4.91% and 9.01% male respondents preferred ready to eat food chhole and soup respectively.

Out of 178 single living female respondents, 22.57% females did not use ready to food, 8.43% female respondents preferred in ready to eat food vegetable pulav and upma,7.86% females used shahi paneer and dosa ,6.74% females used / dalmakhani, 9.55% females used idli,5.62% and 6.18% female respondents preferred   methi aloo and palak paneer respectively.5.05% female respondents used vegetable mix curry and chhole. 6.76% females preferred soup.

IV.   CONCLUSION

The present study was restricted only to the single living males and females in Bhopal town. As regard the preferences given by single living male and female for taking ready to eat food, the result showed that majority of respondents 23.34% preferred   upma, idli and dosa, followed by 22.02% liked vegetable pulao, shahi panner and dalmakhani. 16.68% respondents preferred methi aloo, palak paneer, vegetable mix curry.12.67% respondents used chhole and soup. Now a day, the importance of ready to eat food or processed food is increasing because working class people do not want to spend more time on food preparations. Higher percentage of female respondents (25.85%) than male (19.78%) for upma, idli etc showed that low fat ready to eat south Indian food were preferred by females. Chhole, shahi paneer etc. were given more preference by male than female because they were careless for fat consumption. More females than males liked pulav, upma and soup etc because it was considered as light Indian food.

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AUTHORS

First Author – Poonam Muktawat, Department of Home Science, Sri R.D.A.K.(P.G.)College Hathras (U.P.)
Second Author – Dr. NilimaVarma, Professor, Department of Home Science Govt. M.L.B. (P.G.) Girls   College Bhopal (M.P.)   nvarma44@gmail.com

On variation of diversity of soil oribatids (Acari, Oribatida) in three differently used soil habitats- a waste disposal site, a natural forest and a tea garden in the northern plains of Bengal, India.

M. N. Moitra

Department of Zoology, P. D. Women's College, Jalpaiguri-735101, West Bengal, India

Abstract- Soil samples were collected from three different habitats at monthly intervals. Order Oribatida was the highest numerically abundant group of acrarines followed by order Mesostigmata. ANOVA indicated significant difference (p<0.05) in population density of oribatid mites among the sites. Five, eight and ten species of oribatid mites were recorded from the waste disposal site at Panga, Denguajhar tea estate and Bodaganj forest respectively. *Tectocepheus velatus, Lamellobates palustris* and the species of genus *Scheloribates* were dominant in all the sites. Species abundance distribution at waste disposal site fitted well to geometric series while log normal model appeared applicable at tea estate and forest site. Population density as well as Shannon's index of diversity (H') was highest at forest site. Right tailed sum diversity ordering showed following order-forest floor > tea estate > waste disposal site. Richness and evenness indices were also highest at Bodaganj forest for the higher number of species and population density. Dominance index was highest at the waste disposal site. Greater similarity was recorded between tea estate and waste disposal site. Beta diversity was a moderately high in the sampling region.

Index Terms- Diversity, Oribatid mite, Soil habitats.

I. INTRODUCTION

Order Oribatida is often found to be the single largest group in abundance among soil microarthropods in various types of ecosystems (Wallwork, 1983; Lamoncha and Crossley, 1998). Their role in maintaining physicochemical dynamics of soil is well illustrated which particularly involves their active participation in the decomposition process of organic debris in soil (Sanyal and Bhaduri, 1998; Renker *et al.*, 2005). They are found to occur in a wide range of area from tropics to Antarctic regions and from desert to high mountains (Wallwork, 1967b; Buryn and Usher, 1986; Sanyal *et al.*, 2002; Sanyal, 2004; Moitra *et al.*, 2006, 2007). Their uses as effective bio-indicator have also been addressed (Franchini and Rockett, 1996; Van Straalen and Herman, 1997). Haq (2007) highlighted their use in increasing fertility of soil. Abundance and diversity of oribatid mites are found to vary depending upon the nature of soil and environment and conspicuous change is observed even in local level. It is therefore necessary to record basic information on them that may be employed in further studies or applications and future assessment of soil condition and the present study was attempted keeping this aspect as major consideration.

II. MATERIALS AND METHODS

Three different sites were selected at Jalpaiguri district ($26^{o}16''$N to 27° N and 88° 4' E to 89° 53'' E) in the state of West Bengal - a waste disposal site at Panga (Site-I) run under Jalpaiguri Municipal corporation, a tea garden at Denguajhar (Site-II) and a natural forest at Bodaganj (Site-III). Average maximum and minimum temperatures in the region are 30.9^{o}C in summer and 10.8^{o}C in winter and average annual rainfall is 3160 mm.

Five samples were collected from each site at 30 days interval from March, 2008 to February, 2009. A total of 180 samples were collected by stainless steel core (Dhillon and Gibson, 1962) and soil fauna was extracted using modified Tullgren funnel apparatus (Macfadyen, 1953). Soil fauna was collected in 90% alcohol and oribatid mites were separated using a fine brush. Prior to identification, oribatids were placed in 1:1 Lactic acid and alcohol and left for an hour to a few days depending upon their pigmentation.

Diversity indices - Shannon's diversity index (Shannon and Weaver, 1963), Richness (Menhinick, 1964), Dominance (Simpson, 1949), Evenness (Pielou, 1966), Simiarity (Sorenson, 1948) and Whittaker's β_w (Whittaker, 1960) were worked out. Right-tailed sum method was applied for the diversity ordering. This method may be considered preferable for practical purposes (Liu *et al.*, 2007).

Logarithmic transformations of data were made to meet the requirement of parametric statistical analyses (ANOVA and Tukey test).

III. RESULTS AND DISCUSSION

Relative abundance of oribatid mites (Order Oribatida) was highest among the soil acarines, followed by order Mesostigmata. Other two groups of mites (Prostigmata, Astigmata) were fewer in abundance and of them astigmatid mites were recorded only from Site-III (Fig. 1). Higher abundance of oribatids in soil earlier have been reported by many workers (Bhattacharya and Chakraborti, 1994; Moitra *et. al.*, 2007).

Mean density and fluctuation (coefficient of variation) of oribatid mites were highest at Site-III probably because of the presence of natural forest (Table 1, Fig. 2). It is generally found

that the oribatids are more numerous in forest floor (Colman *et al*., 1999; Crossley and Coleman, 1999). Population maxima of oribatids were recorded during the post monsoons and the minima was observed during the summer in all the three sites (Fig. 2). Similar observations earlier were made by a few workers (Choudhuri and Banerjee, 1977; Bhattacharya and Raychaudhuri, 1979). One way ANOVA revealed statistically significant difference between the oribatid populations of the sites (p< 0.05) and further, Tukey test indicated significant difference between the mean populations of Sites-II and III (Table 2).

A total of fifteen species of oribatid mites were recorded from three sites. Highest number of species (10 species) was collected from Site-III, Site-II was the next (8 species) while the waste disposal site (Site-I) had the least (5 species). *Tectocepheus velatus* was the most abundant species in the sites, having highest abundance at Site-I and also comprised a considerable part of oribatid fauna at other two sites. Other major components included *Scheloribates albialatus, Lamellobates palustris, Galumna* sp*., Rostrozetes foveolatus* etc (Table 3). *Tectocepheus velatus* have a wide range of tolerance to various environmental factors like humus content, pH, mechanical disturbance etc that enable them to dwell at various types of environments (Block, 1966; Hagvar and Amundsen, 1981; Maraun *et al*., 1999). Most of the other species recorded from the sites were also more or less common in the soil of West Bengal (Sanyal and Bhaduri, 1998).

Geometric model fitted well to the species abundance distribution at Site-I and at two other sites, log normal distribution was applicable (Fig. 3). Log normal distribution is relatively common in nature whereas geometric model is generally encountered in the communities under comparatively adverse or stressed environment. Only few species become highly dominant in such condition (Southwood, 1978; Sugihara, 1980; Magurran, 1988). Diversity indices estimated at the sites also substantiate this observation. Dominance index (Simpson, 1949) was highest at Site-I. This index becomes higher as the adversity of the environment rise (Bhattacharya and Chakraborti, 1994). Shannon's diversity index (Shannon and Weaver, 1963) was highest at Site-III, Site-II and Site-I exhibited the least value. Highest richness (Menhenick, 1964) and evenness (Pielou, 1966) were also recorded at Site-III. Beta diversity was moderately high in the region (Table 4) (Table 3). Sites-I and II exhibited highest value of similarity (Sorenson, 1948) and Sites-I and III had the least (Fig. 4). Diversity ordering by right-tailed sum method showed all the sites were comparable to one another and clearly could be ordered as Site-III> Site-II> Site-I in terms of diversity in oribatid communities (Fig. 5). The reasons for the low diversity at Sites-I and II could be attributed to the less complexity in vegetations and polluted condition (Hazra and Choudhuri, 1990; Hansen and Coleman, 1998; Hooper *et. al*., 2000).

Oribatid community in the natural forest floor was more diverse and had higher density in comparison to other two sites probably for higher diversity in vegetation and relatively undisturbed environment. The selected waste disposal site was a dumping ground for both organic and inorganic garbage of a township. Though the lowest diversity and fitting to geometric distribution indicated a stressed condition here, the density of

oribatids however was higher than that of tea garden. It may be inferred that the dumping of garbage lowered diversity in oribatid community but did not affect too much the density as did the periodical chemical treatment in the well maintained tea garden.

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AUTHORS

First Author – Manabendra Nath Moitra, Ph. D. Assistant Professor, Dept. of Zoology, P. D. Women's College, Jalpaiguri, West Bengal, India, (manab.moitra@gmail.com), (+91) 9831592641

Table 1: Shows the abundance, fluctuation and relative abundance of oribatid mites at the sites.

	S-I	S-II	S-III
Mean Abundance (per core $\pm$ SE)	7.83 $\pm$ 0.87	5.74 $\pm$ 0.65	12.23 $\pm$ 1.73
Mean density (N/ m2) $\pm$ SE	3986.25$\pm$ 445.21	2922.23 $\pm$ 333.57	6226.29 $\pm$ 884.3
CV	33.32	32.65	55.55
RA (on total mites)	57.06	60.36	66.43

SE= Standanrd error, N= Number of individuals, CV= Coefficient of variation, RA= Relative abundance.

Table2: Shows the results of ANOVA and Tukey test on abundance of oribatid mites.

One-way ANOVA: S-I, S-II, S-III						**Tukey test**		
							S-I	S-II
Source	DF	SS	MS	F	P	S-II	-0.1501	
Factor	2	2.021	1.011	5.79	0.007		0.6866	
Error	33	5.756	0.174			S-III	-0.7299	-0.9982
Total	35	7.777					0.1068	-0.1615

Table3: Shows the species of oribatid mites collected from three sites and their respective relative abundances.

Genera / species	S-I (%)	S-II (%)	S-III (%)	Total (%)
Tectocepheus velatus	66.28	20.04	24.4	36.91
Scheloribates albialatus	23.22	-	28.43	17.22
Lamellobates palustris	0.86	24.25	19.13	14.75
Scheloribates sp.	-	36.47	0.98	12.48
Galumna sp.	7.12	11.04	-	6.05
Rostrozetes foveoloatus	-	-	12.33	4.02
Hoplophorella sp.	-	-	7.8	2.6
Allonothrus russeolus	-	5.35	-	1.78
Setoxylobates foveolatus	-	0.69	3.14	1.28
Xylobates seminudus	-	1.88	-	0.72
Haplochthonius intermedius	2.5	-	-	0.83
Nothrus sp.	-	-	1.68	0.56
Galumna grenata	-	-	1.23	0.41
Rhysotritia sp.	-	-	0.88	0.29
Platynothrus sp.	-	0.28		0.09

Table 4: Shows the diversity indices of oribatid communities at the sites.

	S-I	S-II	S-III
Dominance	0.4990	0.2473	0.1991
Richness	0.0834	0.1195	0.1359
Evenness	0.5358	0.7536	0.7969
Diversity	0.8623	1.5507	1.8070
β- Diversity	3.75		
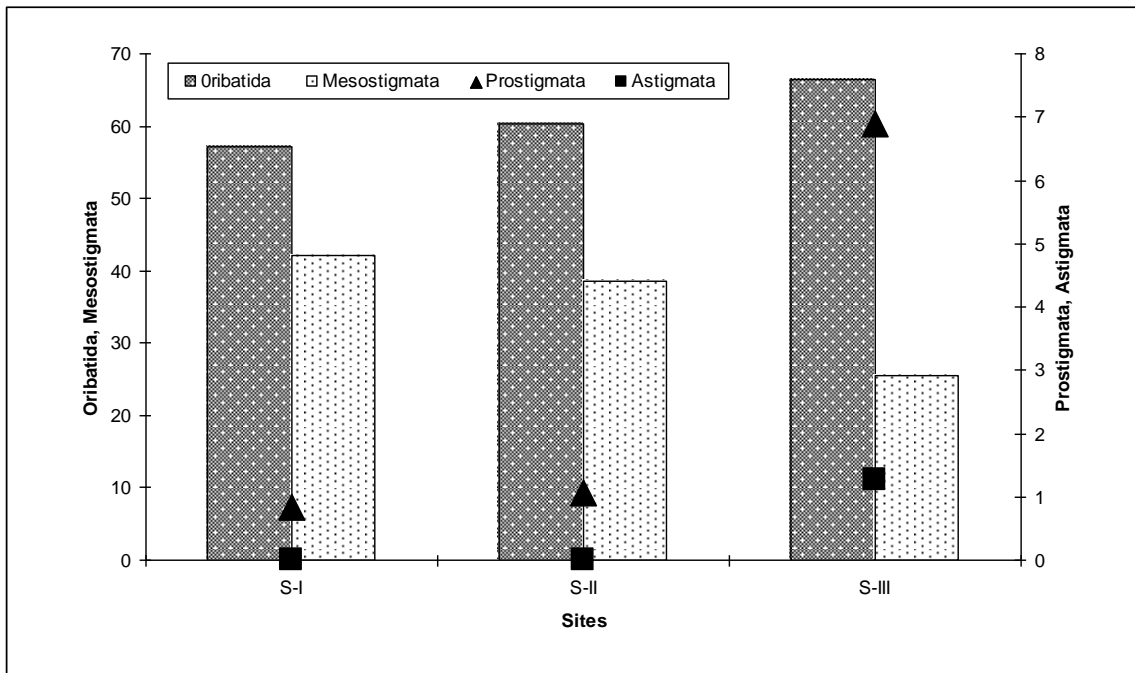
Figure 1: Shows the relative abundances (%) of different orders of soil mites at the sites.
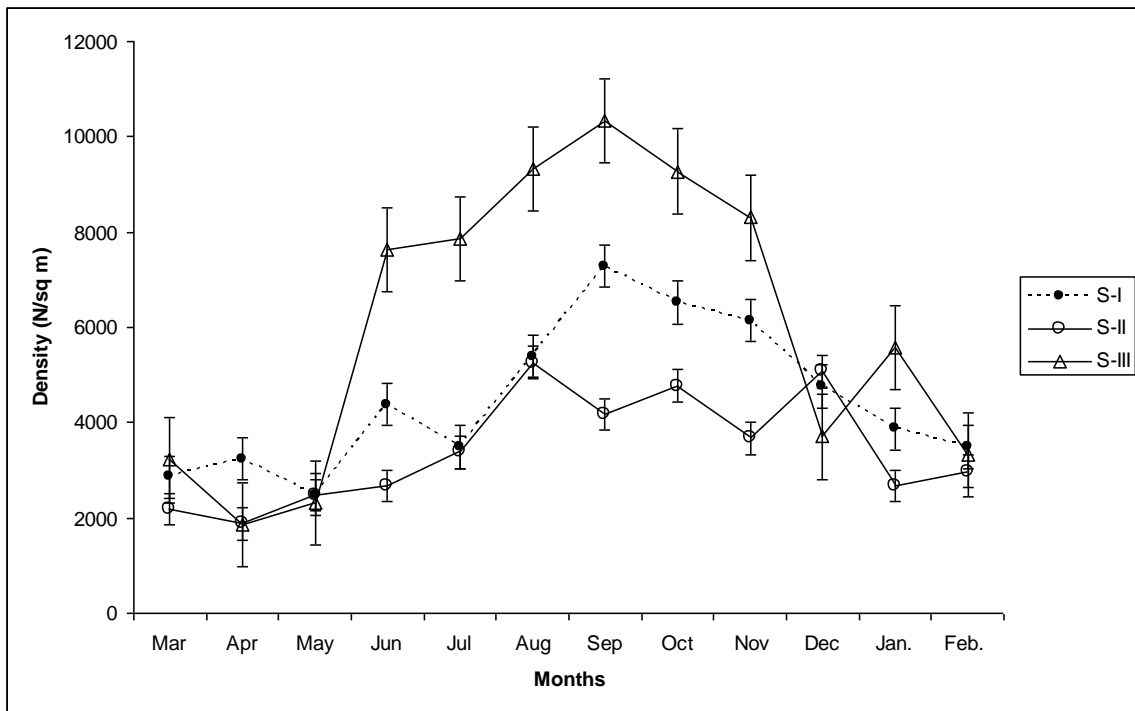
Figure 2: Shows the monthly fluctuation of the density (Individuals/ m^2) oribatid mites at the sites.
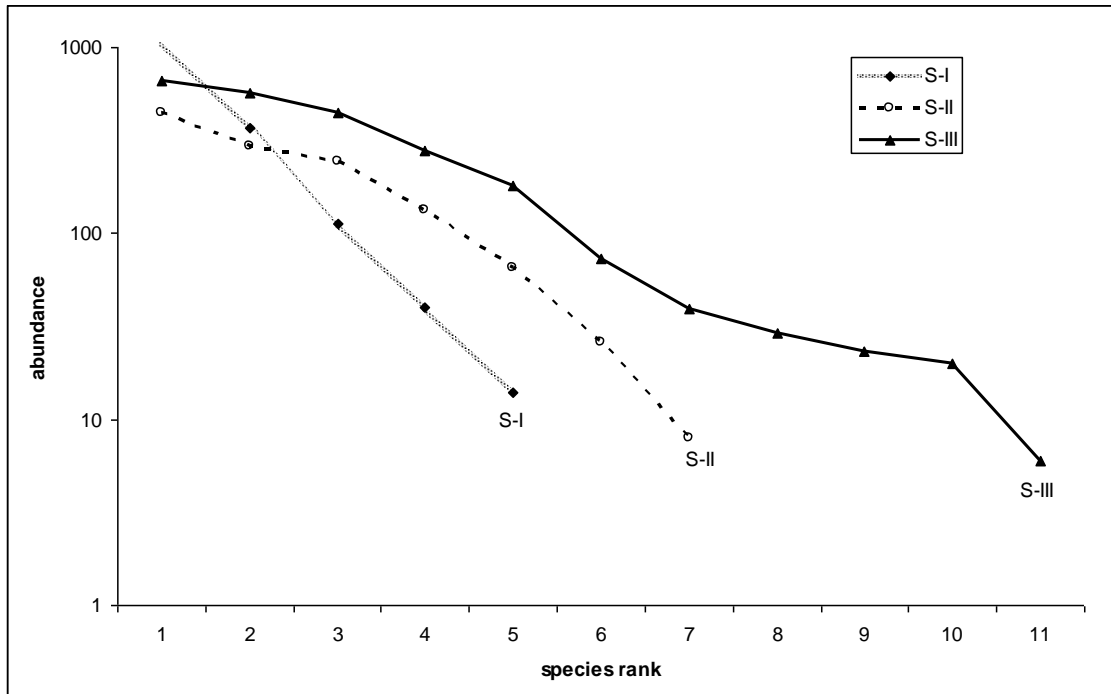
Figure 3: Shows the rank abundance distribution of oribatid species at three sites.
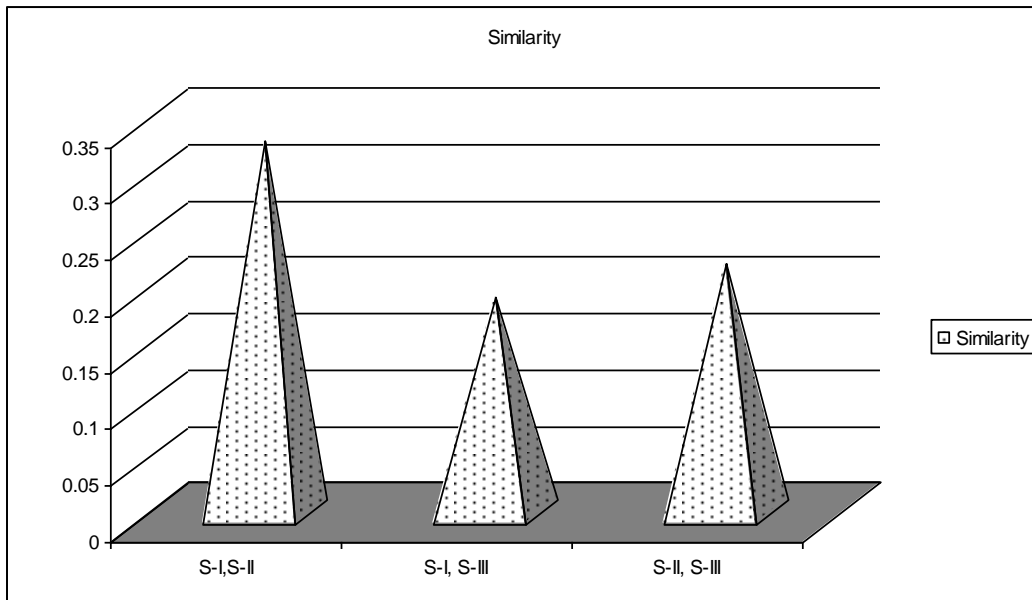
Figure 4: Shows the qualitative similarity (Sorenson, 1948) between the oribatid communities of the sites.
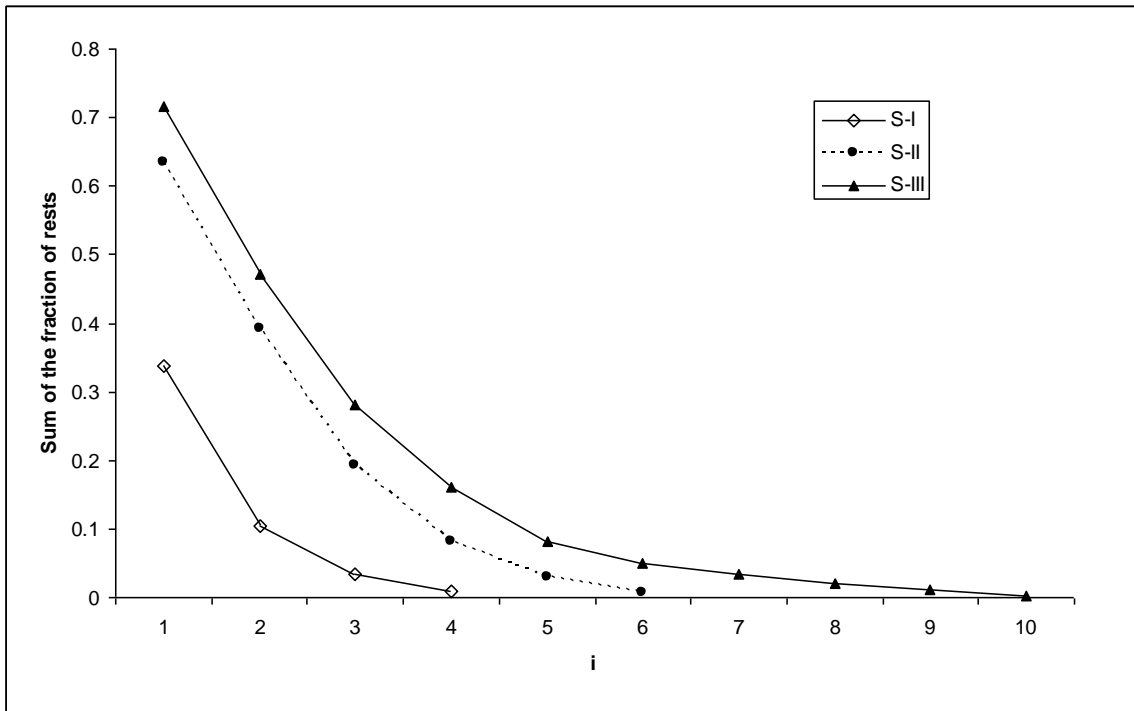
Figure 5: Shows the result of diversity ordering (right-tailed sum method) among the sites. (i = order of species)

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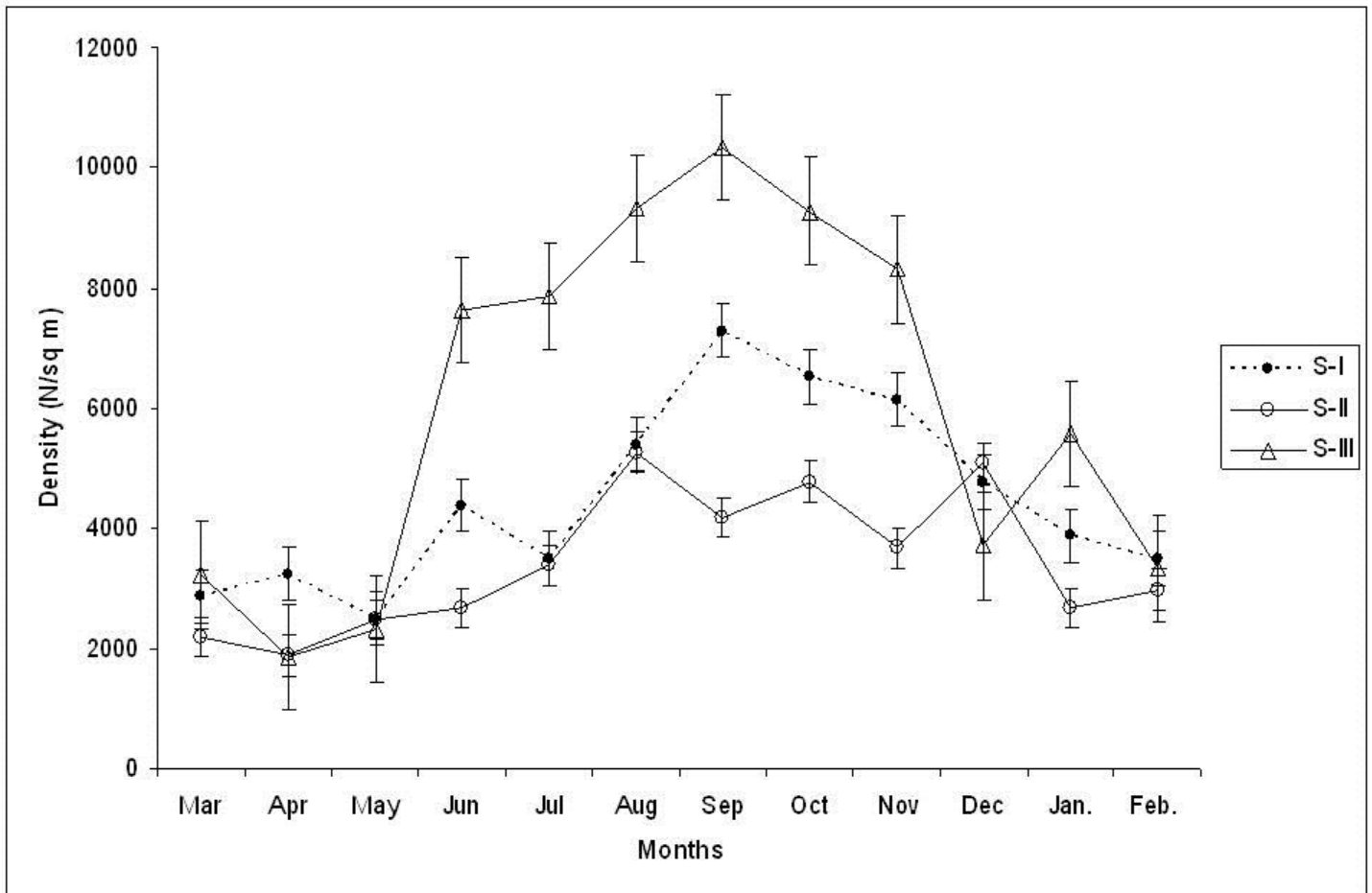
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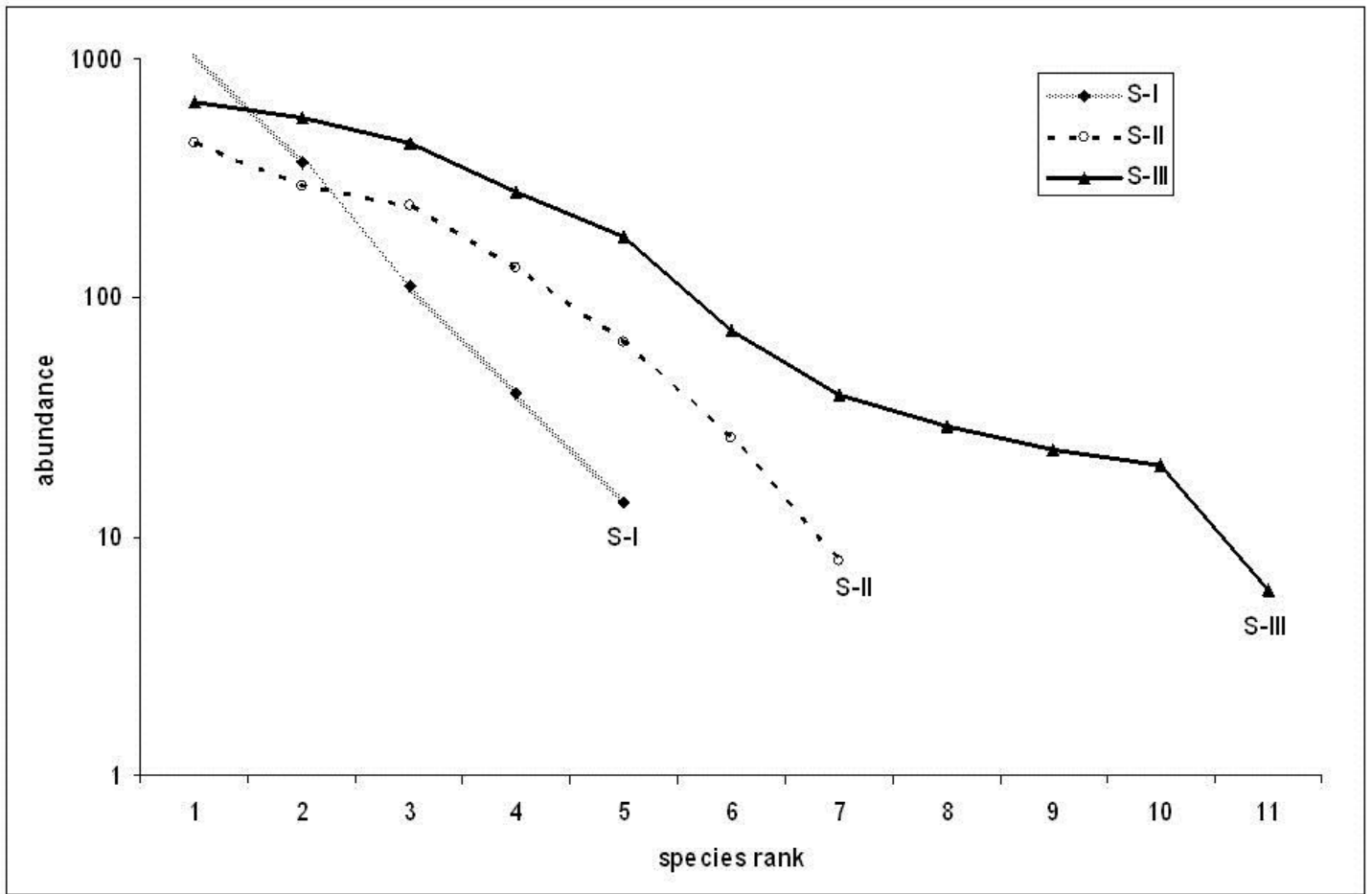
Figure 3: Shows the rank abundance distribution of oribatid species at three sites.
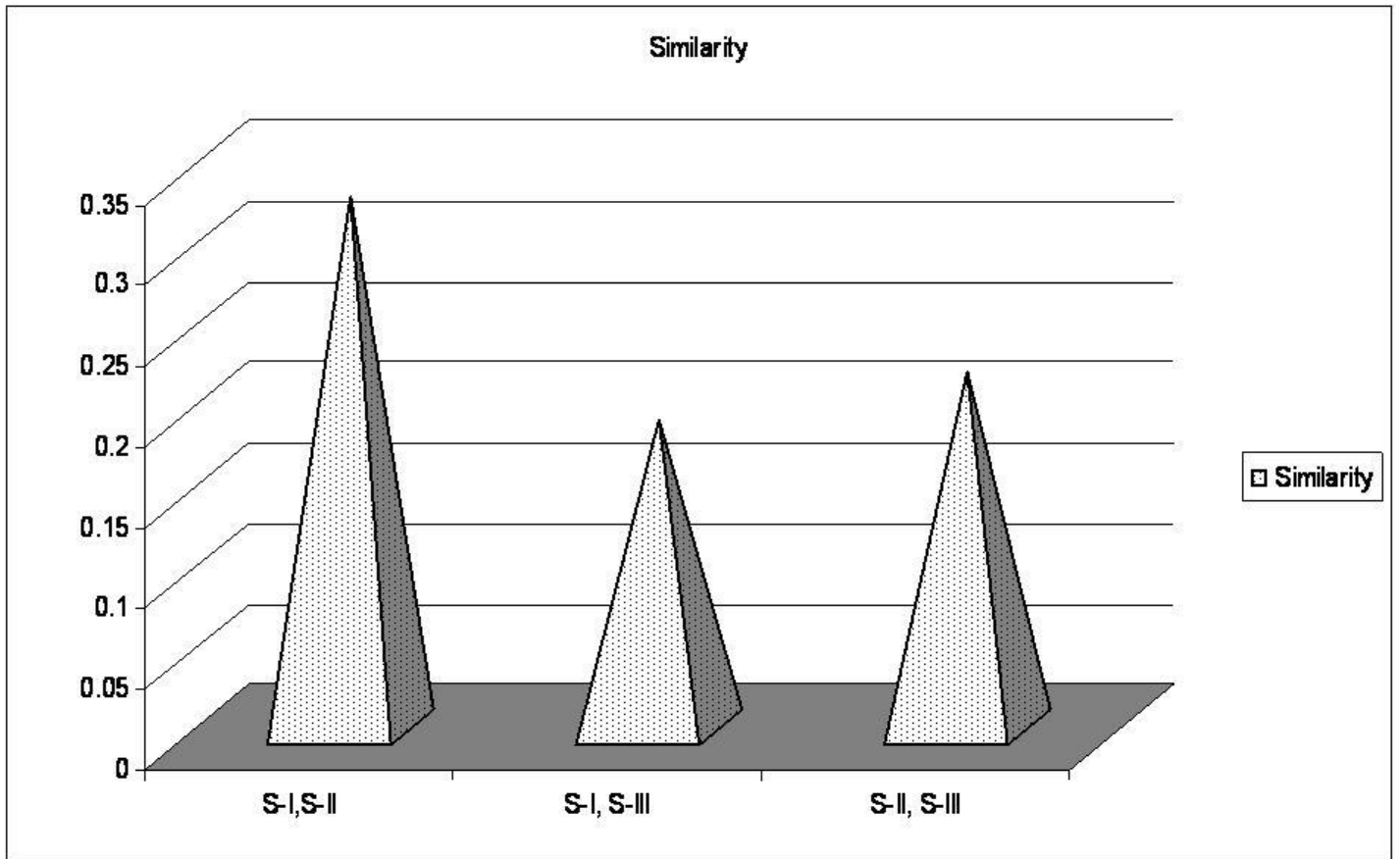
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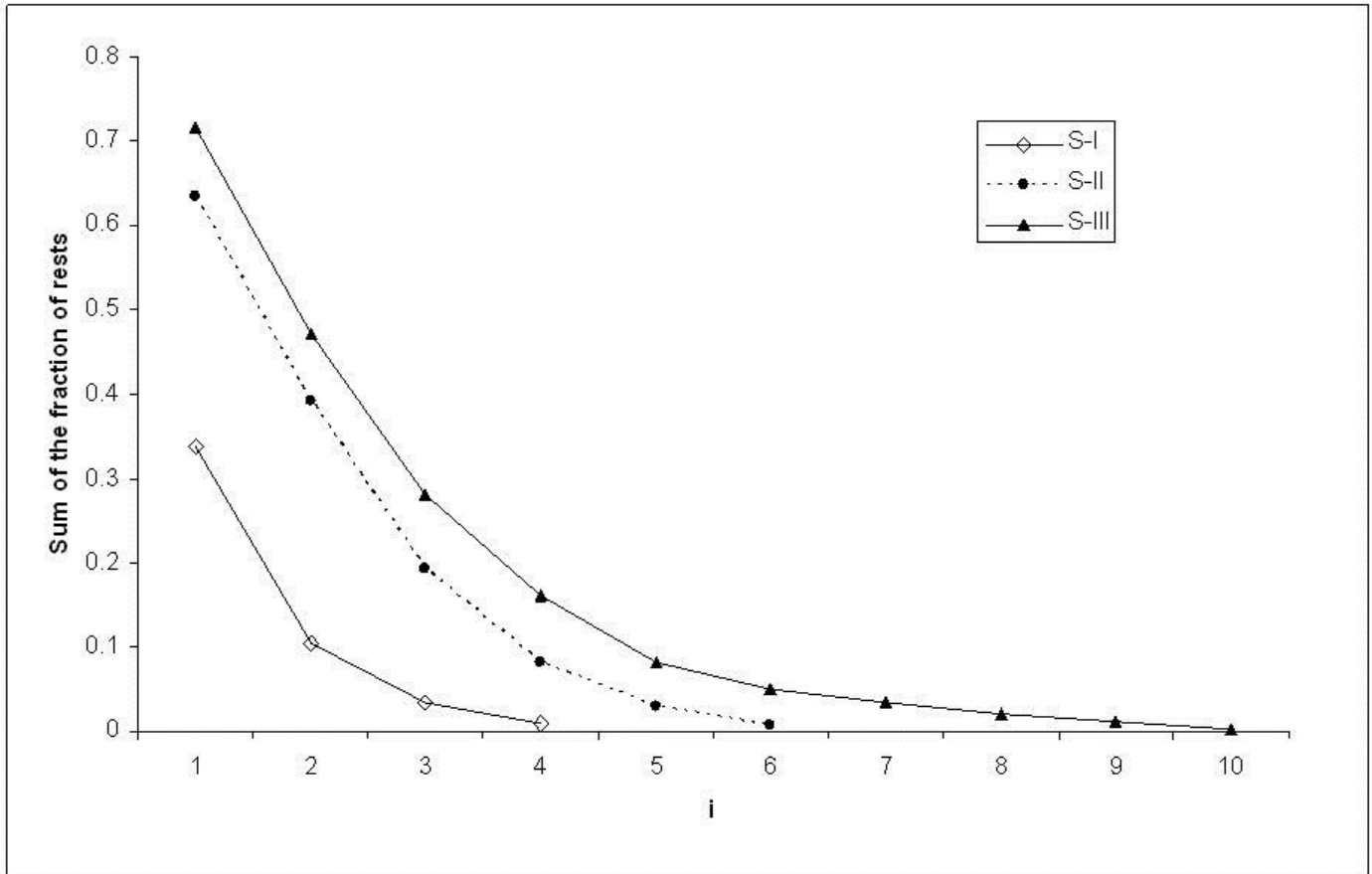
Figure 5: Shows the result of diversity ordering (right-tailed sum method) among the sites. (i = order of species)

Ajanta caves: Deterioration and Conservation Problems (A Case Study)

Garima Bharti

Research Scholar, Department of Ancient Indian History and Archaeology, University of Lucknow, Uttar Pradesh, India

Abstract- **S**ince millennia India has been the land of Cultural tradition and religious value, which spreads rich and varied cultural heritage. This heritage have scattered all over the India in the form of Archaeological Monuments and sites of various type like Temples, Mosques, Churches, Monasteries, Stupas, Step Wells, Megalithic Pillars, Kos Minar, Mausoleums, Forts and Fortification, Tombs and ancient sites belonging to Pre-historic, historical and Medieval period. Among all these monuments Ajanta caves (which are located in Maharashtra state) are one of the most significant examples of Buddhist site and has been the proud of our cultural history related to 2 century B.C. to 4 century A.D. Not only its structure, painting, carving, stone work, sculptures are peculiar but also its paintings which are related to Buddhist are the most authentic example of our Buddhist Indian History. They have its own identity which told the story of its magnificent past. Yet Ajanta caves are in deterioration process but there are so many conservation work is being conducted by chemical branch of Archaeological Survey of India which are very laudable. So the main aspect of my paper is to throw some light on deterioration and conservation problems related to Ajanta caves.

Index Terms- Peculiar location of Ajanta cave and its History, Paintings of Ajanta caves, Structural work of Ajanta, Conservation work of Ajanta.

I. INTRODUCTION

Heritage presents the prominence culture of any country. They reflect the individuality of any monument. Among all those, Ajanta caves are one of them, which indicate history of 2 B.C. to 4 A.D. These caves were made during VAKATAKAS period and are related with Buddhist religion. These caves are built in basalt stone of Western Ghats. Ajanta caves tucks a lot of peculiarity in it like structural and sculpture, and painting related to Buddha, Bodhisattva, Buddhist deities and specially Jataka stories which are related to Buddha's birth. From a long time these caves were negligible Heritage of our Country before in 1819 AD it has been discovered by John Smith (Officer of British battalion). At that time condition of Ajanta caves were very wretched after which a lots of work have been done to conserve these cave but most prominent work have been done by Archaeological survey of India after Independence which is very laudable. So in this case study paper I would like to discuss some aspects of deterioration and conservation problems related to Ajanta caves.

The main theme of my paper is:

- Abstract
- Introduction
- Peculiar location of Ajanta caves
- Deterioration causes of caves
- Conservation work related to cave
- Conclusions

II. PECULIAR LOCATION OF AJANTA CAVES

The Ajanta caves are located about 8 to 10 km of Faradapur town about 110 km of Aurangabad district of Maharashtra. The caves have been carved on the vertical and conclave slopes of the basalt plateau of Deccan trap which is one of the great volcanic formations, known in Indian geology. The term trap is a vague general term which denotes many igneous rocks of widely different nature but here it is used not in that sense but in Swedish meaning of stairs or steps like aspect of the weathered flat topped hills of basalt which are common features in the scenery of Deccan. Ajanta caves are the series of 29 cave related with Buddhist. It was carved in 2 century B.C. out of horseshoe shaped cliff along with Waghora River which streamed directly to caves. The Ajanta caves are situated at the head of one of the Ghats that lead down from the Indhyadri Hills, dividing the tableland of the Deccan Trap in the Tapi Valley.

III. DETERIORATION CAUSES OF CAVES

The survey of environment conditions around these caves brought into light different kind of deteriorations. Since the caves are located in the valley, the calamities of this area is reported to be arid or semiarid having little climatic fluctuations.

Biological effects

Roots of vegetation growth such as trees, weeds, bushes, cause disruption to the rock, but fortunately in this case the vegetation growth of plants is not very deep except the shallow root which too because of the nature of rock having less deposit of soil.

Micro organism

The insect activities in this caves is one of the most effecting process, as the several of these bacteria draw the energy which is necessary for this vital activities, from inorganic chemical reactions of reduction or oxidation that they have ability to produce, such reactions results in humid condition. Most algae need the energy of light to carry out their living function, so in these caves they have been developed on the

illuminated surfaces. The excreta of bats infesting the caves have stained the rock tremendously.

Physical

The presence of Chlorophate in basalt rock has the tendency to absorb moisture in humid condition. In summer, thin scales developed on the rock surface and thus have disfigured the carving and sculpture. This is found more pronounced on the facade of the rock. In some other caves, in the past, the seepage of water has been noticed from the top of the rock to the inner region which has been clogged now as a result of conservation measures taken.

Geological factors (Inherent Weaknesses)

The massive amygdaloidal and vesicular basalt of about 10-20 meters thick deposit have been laid with a layer of fine and course grained basalt of dark, grey color and is jointed. It is seen that more weathering has taken place in vertical joint resulting separation or flecking from the body of the main rock whereas the horizontal planes shows no sign of weathering.

Temperature variation

On test performed on this stone, it has been noticed that if salt are present, temperature and moisture change can initiate disruptive forces associated with the crystallization and hydration of the salts. These changes can also set up different sheer stresses in the stone which cause a breakdown of weathered material close to the surface of masonry.

Deterioration of paintings

From the fragments of the remains of the painting, it is observed that all caves at Ajanta were originally adorned with painting of tempera technique. These painting were executed over mud mortar plaster laid in two layers. The first one is ground layer is of ferruginous earth and second one is on a clay strengthened with cow dung and rice husk overlaid with a thin coat of fine clay. This was further smoothened and covered with a coating of grounded colors mixed with binding material on which the design were then drawn and painted. The paintings have been smoked and covered with dust dirt and insect nests. The flaking and peeling of painted surface is common. There is damage due to human vandalism like scratches and greasiness on the painting. The insect activities which is more pronounced has created the hole and weakened the caves and the presence of organic matters admixed with the mud plaster has proved to be a good breeding place for insects. The bats are the other form of nuisance in these caves as their excreta has not only disfigured the painting but the surface of the rock also.

Conservation work related to caves

A lot of conservation works have been done by chemical branch of Archaeological Survey of India and some conservation activities are still in process.

Conservation Measure of Painting:

The studies are being made to monitor the relative humidity and maximum minimum temperature. The studies so far indicated that there is not much of fluctuation in the temperature and it varies generally between 20 deg to 28 deg whereas there is a great change in relative humidity and the humid condition have given rise to the insect activity and microbiological growth.

The works being attended are spraying of insecticides and repellants, consolidation of weak and loose plaster, fixing of bulging and filleting and chemical treatment for the removal of superficial accretions and removing old preservative coat followed by applications of fresh/preservative coat and to make the color look bright and details more visible which is a continuous process being carried out every year.

General Conservation Measures:

These rock cut caves though no doubt are achievements but they counteract no trust. Thus on the whole no structural ability is required except the knowledge of geology of the rock of which the caves are hewn. Some of the portions of facade have fallen. The columns which gave away leaving the basis as indication for the pillars, have to be restored by the reinforced cement concrete work in order to support the decayed hanging porting and to maintain the aesthetic harmony and the unity of structure so that the replaced ones integrate harmoniously with the adjacent rock. It becomes essential to adopt artificial means of toning and staining the new work while the shaping of molded architecture, cornices, broken corners, broken parts of the facade, pillars and beams. To drain out water from top of the caves the concealed drain and drip courses were provided, the trees roots were uprooted and poisoned and the opened joints and crakes were consolidated by grouting. The preservative coat to the stone surface was applied after chemical cleaning. Being a continuous process, this work is continued to be attended.

Conservation of Rock

To conserve rock following factors to be kept in mind:

1. The weathered stone surface should be treated for restoration with a similar or chemically related material.
2. The restoration material must be able to react chemically with the original rock surface, but also with weathering products being above and within the surface, only a chemically bond ensure longevity, however it is too kept in mind that total elimination and cleaning of weathering product is impossible.
3. The restoration materials have the same or smaller modulus of elasticity than the material being restored. It should also have the capacity to penetrate into the pores of the natural stone. The diffusion resistance of the restoration material must be extremely low against water.
4. To check the erosion, it is necessary to grow the type of plants over the bare rock which will not only check the ingress of water into the cave but will also give protection against heat, cold, rain, wind, pests, etc. and shall also maintain the ecology of the area.

IV. CONCLUSION

In nutshell, the heritage is the mirror of any culture and it reflects the story of its past, but it is our responsibility to conserve it. It is also very true that conserving monument is not an easy task because we have to first identify that what is the

quality of the monument, its architecture, various material used for construction and causes of its deterioration. Only then we have to think on how we can conserve it. So all these aspects are very important not only to know but are also for perseverance of these Monuments. The chemical branch of Archaeological Survey of India is doing an incredible work to conserve and preserve Ajanta cave.

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AUTHORS

First Author – Garima Bharti, Research Scholar, Department of Ancient Indian History and Archaeology, University of Lucknow, Uttar Pradesh, India

The Impact of Interest Based Banking on Socio-Economic Environment and Its Solution through Islamic Finance Concepts

Mohd Saleem*, Matloob Ullah Khan**, Dr. Sadaf Siraj**

*VAG Management Services, DDE Sikkim Manipal University, New Delhi, India
**Department of Management, Jamia Hamdard, New Delhi, India

Abstract- The main objectives of this paper are to trace the emergence and importance of interest based banking and it impact on socio-economic environment. The impact of interest based banking system was focused and analyzed with best efforts and also tries to define the working mechanism of Interest based system. How interest and banking system affects the society and how it propelled the society to go to hazardous situation? How do the lives of the people get affected by this system due to which so many social evils such as depression, anxiety and even suicide are growing rapidly among the borrowers? This paper also suggests the solutions of interest based banking system on the basis of Islamic finance concept. The authors of this paper also tried to touch some other parameters such as- tax implication of interest and focused on relationship between lenders and borrower. All these descriptive study provide better inside view of interest based banking system

Descriptive and Qualitative Research Methodologies are used in this paper on the basis of readings of many research papers, journals, newspaper, online material provided by websites and some personal experience.

While reading this paper, one will easily understand the interest based banking and it mechanism with its impact on society and economy and also reached to its solution with reference of Islamic finance.

Index Terms- Banking, Interest, Islamic Finance, Regulatory System and Tax;

I. INTRODUCTION

As it is well known that in current scenarios most of the businesses are facing some challenging issues. In the era of globalization and privatization, most of the firms or businesses face a high degree of competition. This competition may be of many types such as operational competition, productivity competition, market competition and so on. To cope with these types of competitions or challenges and to survive in this competitive world, the business firms are required to manage their resources properly and utilization of these limited resources should be channelized and allocated in such a way that it may produce desired results. For accomplishing the targets, the adequate amount of fund and resources are very much required. When it is talked about fund and resources in any business, it may be in physical form- men, machine and material; in paper form-mainly cash or money cannot be ignored. In this research paper, money/cash will be focused. The money plays a very crucial role while deciding the future course of action because proper allocation of cash justifies maximum and desired results. For growth and development, a firm should have proper and adequate amount of money or cash to run its operation without any fail. In business world money/cash is termed in many ways and finance interchangeably used for it. As blood is so important for life same case is with finance in business. In lack of proper circulation of blood, human body may become sick, paralyzed and even dead; the same system is followed in business for finance. It means that if a business is running short on finance or has not proper circulation of finance into its functioning, it may be harmful to the business and may be a cause of business collapse or winding up.

The finance needs may be met out by two ways. It may be through equity capital or by way of debt capital. Most of the business firms have limited equity capital and to accomplish their goals they are required to have some extra amount beyond equity capital. This extra amount of money or fund may be arranged by way of debts. For debts, the business firms or needy persons may approach the financial institutions. Most of the businesses have a need for a line of credit or debts financing with financial institutions or banks. When it is talked about financial institutions, bank one of the main players of this segment, cannot be ignored. Banks are those financial institutions that do the work of accepting, depositing the money of the public and granting loans to the needy section of the society. Financing with banks or other financial institutions become more important and crucial in case when business firms are running on short finance, business is slow or the company or firm is in same way struggling.

In general, banks are very important for economy and country. They make bridge between savings and needs of money. They mobilize the savings and these savings are contributed towards capital formation. Capital formation guides and leads to the new opportunities which is most important and motivational factor in the development of economy and provides more opportunities for employments. When all sections of society get a chance to employment, the poverty will reduce and disappear. Apart from this, better employment opportunities provide a solid base for entrepreneurship and rapid economic growth and development. All this happen due to proper allocation and circulation of fund in the economy in form of healthy financial services. Banks are very prominent in providing these financial services. From this point, the role and importance of banks can be understood. The contribution of banks in the development and growth of economy and country cannot be avoided. This is one

side of the coin showing the positive face of the banking system prevailing in current and in general most of the banking system is based on interest system which itself is a very controversial issue.

Now, the other side of the coin should be shown as Modern banking is based on interest banking system and interest banking system itself is a symbol which represents such results due to which economy and society had to suffer and born losses. There are so many instances where the cruel face of interest based banking system has emerged. The quantum and degree of loss and damage caused by interest system may vary and differ according to the amount financed. In general, when fund was arranged based on interest system, the final results were not favourable for both the parties- the lender and the borrower. The results may be fruitful for lender but it's an appeasement of borrower.

II. LITERATURE REVIEW

Banking sector has been remained an attractive destination for research. The research on banking has produced some interesting facts and figure which shows the contribution of it in the development and growth of the economy as well as the negative impact on economy and society. Modern banking system has been analyzed on different aspect and scholars have given different-different views on this. Some have found the hidden curial face of interest based banking resulting adverse effects on economy. Interest based banking system harm society as well as also creates Non-Performing Assets (NPA) to the banks or lenders because customers are not able to pay premium sometime or generally, which was the sum of interest and principle amount. It means that interest based banking affect both borrowers and lenders of organised and unorganized sectors as well.

[1] According to Mishkin (1997) contrary to adverse selection, moral hazard is an asymmetric information problem that occurs after the transaction and when a principle commission an agent to act on his behalf but the agent engages in shirking, pursues self interest to the determinant of the principal's interest or indulges in dishonest or immoral behaviour. [2] Akoi (1997) refers to moral hazard as a hidden action problem arising because investor cannot distinguish the effect of event that management cannot control from the effect of management actions taken in implementing an investment project, financial intermediaries may be able to reduce their problem by monitoring management activities. Moral hazard is a disposition on the part of individuals or organization to engage in riskier behaviour, than they otherwise would because of a tacit assumption that someone else will bear part of all of the costs and consequences if the incurred risk turns out badly [3](Wolf, 1999). Effect of Interest is defined in the economic literature as "action by economic agents in maximising their own utility to the detriment of others in situation where they do not bear the full consequences of their actions" (See, [4] Ivan and Manuel 2004, [5] Pindyck and Rubinfield 1998).

More moral hazard occurs because the borrower has incentives to invest in high-risk projects where the borrower does well if the project succeeds but the lender bears most of the loss if the project fails. The borrower also has incentives to misallocate funds for personal use, for instance to undertake investment in unprofitable projects that increase the borrower power structure.

The conflict of interest between borrower and lender, steaming from moral hazard or the agency problem implies that many lenders will decided that they would rather not make loans, so that lending and investment will be at sub-optimal levels. Mishkin (1997), [6] Sandmo (1998) and Wolf (1999) conducted that insurance is a major cause of moral hazard, where insurance companies have to realise that an insurance policy may change the behaviour of the insured in a way which makes the event converted by the insurance policy more likely to happen. [7] Corsetti et al (1999a) stresses that moral hazard become a source of crises when there is over-investment, excessive external borrowing and current account deficits in a poorly supervised and regulated economy. [8] According to Ely (1999) moral hazard produce financial crises in three situations. First, bad management (poor interval control, self-dealing, bad landing and investment decisions, and excessive rapid expansions) is the main cause of isolated or non-contagion financial features. Second, an economic contagion, almost always triggered by a decline in the market value of assets, caused the financial sector to fail when in normal economic time it would not. Third, government restrictions on assets and geographical risk dispersion limit the ability of individual banks or financial institutions to diversify their assets risk in order to protect themselves against contagion events such as regional assets deflation made worse by assets fire sales.

[9] Justice Muhammad Tqui Usmani (2012) also studies the effects of interest on society on the histories judgement on interest in the Supreme Court of Pakistan. This was considering the Islamisation of the country's financial system. [10] Imam Al-Gazzali (d. 505 A.H) the renowned jurist and philosopher of Islamic history discussed the nature of money in an early period when the westerns theorems of money were not existent at all. He was taken the concept of medium of exchange to its logical end and also conducted that when money is exchanged for money of the same denomination it should never be made as instrument generating profit by such exchange. This approach of Imam Al-Gazzali, fully backed the clear direction of the Holly Quran and Sunnah, has never been admitted to be true by some realistic scholars, and even in societies dominated by interest. Many of them after facing the reverse consequences of their financial system based on trade in money have admitted that their economic plight was caused interlaid by the fact that money was not restricted to be used for its primary function as a medium of exchange.

[11] During the horrible depression of 1930s an "Economic Crises Committee was formed by Southampton Chamber of Commerce in January 1933". The committee consisted of ten members headed by Mr. Dennis Mundy. In its report the committee had discussed the root causes of the calamitous depression in national and international trade due to the interest rate change. This committee also give suggestion that this problem will be removed if transaction will don without the foundation of interest based concept.

III. OBJECTIVES

The main objectives of the study are given as:

- Banking system in India and Its Development;

- Interest and its mechanism;
- Focus on relationship between Lender(Bank) and Borrower- A monster Face of Lender;
- Show the impacts of changes in Interest Rate on Socio-Economic Environment;
- How to reduce the dependency on Interest Based Banking through Islamic Finance Concept;
- Interest system and social evils; and
- Tax implication of interest in India;

IV. RESEARCH METHODOLOGY

Research Methodologies used in this research paper are based on the combination of descriptive and qualitative research. In descriptive research, researchers have to used data and information given in various research journals, newspapers, books and online materials and in qualitative research section researcher have to do personal experience with banks and financier. Apart from this, other parallel lending-borrowing system is also analyzed so as to gain deep knowledge of lending and borrowing system and for better comparison. This paper is developed while keeping in mind that it will be useful and beneficial for whole mankind who are interested to know all about Interest based Banking and its alternatives. This is basically a common approach paper which provides a brief knowledge about banking system based on interest and its impacts on society and other alternatives to this system so that dependency may be reduced and this system may be developed in a new way for mankind. This paper also focuses on inside and outside impacts of interest banking on common men.

V. BANKING SYSTEM IN INDIA AND ITS DEVELOPMENT

The banking system in the modern form is originated in the last decades of the 18th century. The first bank in India was Bank of Hindustan (1770-1829) and General Bank of India (1786).There is so many evidences of loans and activities related to lending and borrowings from the Vedic Period in ancient India. During the Maurya dynasty, the uses of debt instruments were found. An instrument called '*Adesha*' was in use in that period which was an order of payment to a banker, ordering him to pay the money of the note to a third person. This type of instruments in current is known as bill of exchange. Buddhist period also had provided the same evidences that show considerable use of these instruments.

        The development and growth of banking system in India can be divided into two parts: Pre-Independence Era and Post-Independence Era.

Pre-Independence Era
The conception and birth of modern banking system can trace back to British Rule. Most of the modern banks in India were established in that period. In current, some are in the same form with little change as they were developed and some had gone different phase or shape with change in their structure and name and have been surviving since then. During the period of British Rule, merchants established many banks-some were private sector and some were joint stock associations. Banking

institutions like, The Allahabad Bank, Punjab National Bank, Bank of India, Corporation Bank, Indian Bank, Bank of Baroda, Canara Bank, Central Bank of India are surviving to the present and contributing in the development of country as well as banking sector. There were so many foreign banks also which were established during that period.

Post-Independence Era
The partition of India adversely affected the economy and especially the banking sector of the nation due to which all banking activities had gone paralyzed for months. The Government of India took the charge of economy and banking sector and initiated so many measures for the revival and survival of them. Some most of the important and memorable event after the independence of India are

- The Reserve Bank of India, a central banking regulatory body which was established in April 1935 nationalized on 1 January 1949 by passing the Reserve Bank of India (Transfer to Public Ownership) Act , 1948
- The Banking Regulation Act was passed in 1949 which empowered the Reserve Bank Of India to regulate, control and inspect the banks in India
- The Banking Regulation Act also provided that no new bank or branch of an existing bank could not be opened without the license issued by the Reserve Bank Of India
- The three main banks from pre-independence era namely Bank of Bengal, Bank of Madras and Bank of Bombay were merged to form Imperial Bank of India in 1921 and this bank was nationalized in 1955
- The nationalization of 14 largest commercial banks in India took place on 19 July 1969. Before nationalization all of the bank in India except State Bank of India were owned and operated privately in spite of the provisions, control and regulation of the Reserve Bank of India.
- Introduction of Liberalization in Indian Economy in early 1990s resulting the licensing a small number of private banks in India. This moves were to be known as *New Generation Tech-savvy banks*, and included Global Trust Bank (the first of such new generation banks to be set up), which were later amalgamated with Oriental Bank of Commerce, Axis Bank(UTI Bank at that time), ICICI Bank and HDFC Bank. This move of liberalization pushed rapid growth in Indian Economy and energized the banking sector which includes Government Banks, Private Banks and Foreign Banks.

These were some important points which show how banking industry come to present and some other changes or measures are taken which cannot be ignored. The use of technology was introduced in banking sectors so that transparency and accuracy may be achieved. Information technology contributed a lot in formation of modern form of banking. Now a day's banking is known with some prefix such as e-banking, net-banking, mobile-banking, core banking. These are some form of modern banking which made banking an easy play due to which the customer of the bank are free to easy withdrawal, deposit, money transfer, online purchasing and many more. In bank's perspective, there are so many benefits such as less paperwork, reduction in workload, more customer satisfaction, tech-savvy working environment etc. That is the current scenario of Indian banking

sector. The modern form of banking sector has been very attractive and productive. In current, banks are expanding their size by expanding its business. They are opening new branches in India and abroad also. In spite of commercial banking services, they are also providing some other services as merchant banking, forex exchange services, and credit facilities for export related activities.

VI. INTEREST AND ITS MECHANISM

The current mechanism of banking system, which is existing in India or most of the part of the world, is based on interest rate system. In India, lending-borrowing activities can be divided in two groups. The first one as termed as indigenous bankers and second one is organized banking. Indigenous banking is that which comprises the traditional practices of lending-borrowings performed by Sahukar or influential locals of the area. The organized sector represents well defined structure of banking institutions governed by a central regulatory body like Reserve Bank of India.

The interest is a fee or compensation for using the borrowed money and is chargeable by the lender. It is commonly known that interest is the price for the use of borrowed money from a person or an institution. When money is borrowed, interest is paid to the lender as a percentage of amounts given as loan and this amount is called principal amount. The percentage of the principal amount paid to the lender or the owner of the money (on monthly, quarterly, half yearly or yearly basis) is called rate of interest. The fixation of the rate of interest mainly depends on the relation of lender and borrower in case of indigenous banking. The interest may be charged by two methods-simple interest method or compound interest method. That is the case for individual or indigenous banking or unorganized banking.

Now the organized sector of banking should be focused. The organized sector of banking mainly is governed, controlled and regulated by a central regulatory body with effects of monetary policy. The financial and monetary activities in financial system of India are mainly governed by the Reserve Bank of India. It means that all policies and activities of banking institutions of India work according to the guidelines and regulations of Reserve Bank of India. So the interest rate chargeable by the banks for providing loans and advances to the public or organizations is decided by the central regulatory body e.g. Reserve Bank of India. Time to time RBI takes steps to effectively regulate the financial activities. The banks can decide the rate of interest on the basis of guidelines provided by the RBI. The lending rate of interest is very crucial for both lender and borrower. As in case of indigenous banking, organized banking also uses the two methods for charging interest. Simple interest and compound interest are two method used for charging interest.

VII. FOCUS ON RELATIONSHIP BETWEEN LENDER (BANK) AND BORROWER- A MONSTER FACE OF LENDER

The needs and aspirations induce the individual or the organization to go beyond its capacity and use that amount which is not belonged to him or it. And in this situation, the needs are met out with the help of debt with or with interest. The role of lender cannot be avoided but some factors make it worse and bitter. People want to go to get debt without considering the future consequences and results thereafter. The process of lending money in lieu of interest totally profit oriented but this process involves so many types of risk related to risk and return. Among this factor of risk, the risk of losing money is very much aggressive and apart from this, the irregular payments of instalments with interest, fear of conversion of the assets into NPV (Non Performing Assets) are some other factors which are very crucial for lender. In most of the cases, the risk factor remains vital and alarming.

As it is pointed out earlier that interest based banking system is purely profit-oriented process so it has some complication and perils for borrower also and it cannot be avoided. It means whatever might be the conditions; the borrower should discharge his/her liabilities as to pay interest with specified amount without any fail or delay. If borrower makes such mistakes, he/she is liable to face consequences which again puts extra financial burden. On one side the borrower is not able to pay the specified amount with interest and on the other side the lender asks him/her to give extra money as a penalty due to default in payment. It means that the lender always expects to receive his/her amount irrespective the ability or capacity of the borrower. In this process, the humanity is killed. That is the reality of interest based banking and its existence. In most of the cases, the lending is based on collateralized debt and the lender has the right to realized his/her amount from that collateralized asset. So, borrowers have some perils that if they don't pay the loan, their assets will be sold out and the amount will be used to discharge their liabilities in the form of loan. That is the extreme point which could be to the borrower. But before this, the borrower faces so many problems or can say some sort of torture mainly the mental torture, depression and social fear. If borrower does not able to pay, he/she may lose his/her belongings specially the collateralized asset. This fear may induce or compel the borrower to kill the life and there are so many instances where it is find that due to insufficient earnings and lack of funds to pay the loans, the people opted to suicide so that he/she may avoid social injustice and torture of lender. This is because of lender does not want to lose his/her amount and not to be financially sick and to avoid this condition of loss and sickness; it induces the lender to recover his/her amount with interest at any cost or anyhow. The loans are recovered irrespective of social and human values.

VIII. THE IMPACTS OF CHANGES IN INTEREST RATE ON SOCIO-ECONOMIC ENVIRONMENT

In this segment of research paper, it is tried to focus on the impacts of interest and its changes on Socio-Economic Environments. The main motive behind this is to show the practices and its adverse effects on environments and how to reduce the effects. The cases of banks in USA and Europe which collapsed and caused a lot of loss, panic and instability worldwide, due to which so many economies had been affected very badly and adversely, cannot be avoided. There are some important points which may explain the areas related to interest and its impacts of changes.

Banks and Interest Rate- In India, the banks and interest rates are regulated by a central regulatory body known as Reserve Bank of India. This is the main body which takes decisions regarding the fixation of interest rate in the country. Banking is the main area where the degree of impacts due to changes in interest rate is very high and this sector faces higher volatility and uncertainty. Due to this change, the bank faces so many problems and always adjusts their lending rates with RBI guidelines. This change in lending rates causes many problems for borrowers. Their monthly budget gets disturb and they have plan accordingly. In banks' perspective, it is very hectic to match RBI interest rate regulation frequently and this causes to banks extra burden of work. A lot of calculation is made to get accurate figures.

Interest Rate and Price Level Change- Interest rate can be understood or assumed as a portion of money or capital borrowed from the lenders. At which rate this portion is charged is called interest rate. Thereafter assuming a fixed amount of money in the economy, when price level increases, the real income will decrease and the extra amount of money will be required. To meet the extra demand and to match the requirements, one has to borrow the money to maintain real income. Because there is a fixed amount of money in the economy, the demand for money will be more than supply. So in this way, the increase in price level increases the demand of money and also the price of it which is the rate of interest. When there is a demand of money, the price of it or rate of interest would be high and that would lead to an adverse impact on overall cost of production.

Interest Rate and Inflation-As it is well known that the entire financial and banking system is based on interest so any change in interest rate deliberately will affect the financial market mainly the money market. It means if there is any increase in interest rate, it will have adverse impact on overall cost of production because borrowed capital becomes more expensive. On the other hand as interest rate drops, consumers' spending increases and subsequently it will stimulate economic growth. In general, it is assumed that excessive economic growth can be detrimental and may hamper the economy deliberately. At a point where economy is growing so fast, can experience hyperinflation, resulting higher cost and price of goods and services. Generally it is seen that in most of the cases when financial requirements arises out of the pocket, these requirements are fulfilled by that capital which is arranged as loan. Most of the investments and expansion plans may be accomplished with the help of a good capital structure that comprises debt also. Business houses basically borrow fund to meet out their capital expenditures such as factory establishment, plant & machinery acquisition, technological developments etc. Sometimes the debt fund is also used for household requirements such as car, AC, furniture etc. The consumption basically depends on the purchasing power of the consumer and the purchasing power is very much affected by inflation and interest rate prevailing into the system. The rate of interest has direct impact on the final cost of production hence on consumption also.

Interest Rate and Employment-The fluctuation in interest rate

is bad signal for employments and growth. This scenario can be understood with the help of some economic and monetary measures taken by the government. When interest rate is high, people prefer to deposit their money into banks instead of spending on durable goods or luxurious goods. Due to this tendency of the consumer, the demand for durable or luxurious goods tends to come down as well as slows down the growth and development plans of the business organizations. When people avoid the purchase of durable and luxurious goods, business firms face lower customers resulting reduction in overall revenue. That is the tough time for firms to manage its operations and activities properly because they are having a lack of fund. To manage and sustains its activities in crisis, they prefer the techniques of cost cutting hence reduces the manpower. That is how the interest rate system affects the production, growth and employments adversely. From different perspective when interest rates are very high, firms do not prefer to borrow due to high cost of capital as interest which is expensive for them. In this situation, the firms generally reject or postpone their expansion or developments plans and again the cost cutting policies are adopted. According to this policy, the employers tend to fire old employees or terminate the future plans of fresh hiring. Again the cruel effects of interest are appeared due to which, the people have to lose job opportunities even their jobs also. The rate of unemployment rises and the fear of social security and social sickness arise also. For any economy whether it is under-developed, developing or developed, it is very important to have an adequate growth and employment rate to that social demand should be matched. Employment is very crucial for the sustainable development and for a civilized society as well.

IX. HOW TO REDUCE THE DEPENDENCY ON INTEREST BASED BANKING THROUGH ISLAMIC FINANCE CONCEPTS

There is a need to find and adopt such type of system which may reduces the dependency on interest culture and minimizes the impact of interest rate fluctuations on economy and its different sectors. This system should be of such type which comprises the features of a sound financial system and lesser dependency on other factors. There are some banking services out of interest baking's ambit which might be a perfect substitute for this.

- **Bai' al 'inah (sale and buyback agreement)-**Bai' al inah is a financing facility with the underlying buy and sell transactions between the financier and the customer.
- **Bai' bithaman ajil (deferred payment sale)-**Under this, the sale of goods is made on a deferred payment on the basis of predetermined price which includes a profit margin agreed to buy by both parties.
- **Mudarabah -** It is a special kind of partnership agreement where one partner gives money to other to invest in commercial enterprises. It is a profit sharing agreement/contract where one party provides 100 percent of the capital and other party provides its specialized knowledge and expertise to manage investment.
- **Bai' muajjal (credit sale) -** It is meant for credit sale. It is a financing method adopted by Islamic Banks in which banks earns profit margin on the purchasing price

and allows the buyer to pay the price of the commodity at a future date in lump sum or in instalments.

- **Istisna(Manufacturing Finance)**-It is a process where payments are made in stages to facilitate the manufacturing or processing or construction works.
- **Ijarah(Lease or Rent)-** It is like selling the benefits to use the assets.
- **Musharakah (joint venture) -** It is relationships between two or more than two parties where capital is contributed to a business and profit and loss is shared on pro rata basis.

There are so many other products or services which may be the alternative to interest based banking such as Qard hassan/ Qardul hassan (good loan/benevolent loan), Sukuk (Islamic bonds), Takaful (Islamic insurance), Wadiah (safekeeping), Wakalah (power of attorney) and many more.

X. INTEREST SYSTEM AND SOCIAL AND ECONOMIC EVILS

In general, it is felt by the people that interest based banking tortures the borrowers more than its benefits. There are so many cases where it can be seen that borrower had to suffer a lot due to loan taken from bank or from other lender under this system. The borrower had to lose his/her assets, relief in life and even his/her life due to this cruel system of interest. In 2008 when the major banks of USA collapsed and overall panic and uncertainty created, the curse of interest came out in full face and so many societies and economies criticized this system. There are some points which may describe the actual adverse effects of interest based banking.

- Ignorance of humanity and well being
- Induces the greed and selfishness
- Exploitation of poor and weak
- Negative impact on performance of small and individual business
- Capitalist control on Institutions, Resources, Production and National Income
- Improper circulation of wealth and income in society
- Barrier to social collective development
- Social instability

Here, the main concern is that on one side the Interest based banking sector providing many opportunities of funding and investing and on the other hand, it also is causing such dangerous effects to the economy as well as the society.

XI. TAX IMPLICATIONS ON INTEREST IN INDIA

As per Income Tax Act 1961, there are so many tax benefits in regard of interest payments. This act provides many opportunities to the taxpayer in context of interest paid on loan. If the terms and conditions are fulfilled, interest amount can be deducted up to a limit from income and tax liability can be reduced. There is a list of main sections which provide these opportunities for tax reduction-

- **Section 80E: Education loan interest**- Under this, payments of interest in respect of Education Loan for education in India or abroad is allowed as deduction.

- **Section 80TTA : Interest on Savings Account**- This allows the taxpayer to deduct the amount of interest (up to 10000) received from saving account in banks, post office or a co-operative society.
- **Section 24: Interest on housing loans-** For self occupied properties, interest paid on a housing loan up to Rs 150,000 per year is exempt from tax. This deduction is in addition to the deductions under sections 80C, 80CCF and 80D.

Apart from this the Income Tax Act 1961 allows on many occasions to get the tax benefits while having calculations of taxable income for a particular year.

XII. FINDINGS

There are some findings while doing this research work. These findings are grouped into points and explained below:

- Though the banking and financial institutions are contributing and nourishing to the development of the society but also generating a lot of obstacles due to which the society is suffering very much.
- On one side, it is funding the development and growth plans and on the other side, it is making such environment where borrowers are feeling unsafe, anxiety, depression at the same time.
- In current scenario, the banks and financial institutions are adopting such types of system of recovery which violates major of the norms of human rights.
- Due to restrict imposition of recovery policies, the borrowers are feeling themselves depressed unsafe.
- The suffocated environment to borrowers is making so many hurdles in the development or boom of banking and financial institutions mainly micro finance.
- The small and big loans have become curse to many families due to which the cases of death and suicide have been increasing day by day.
- The banking and financial institutions have a big impact on society. In each group of population, the funds are required and sought as a loan. But proper and equal distribution of funds is not found.
- This system has very traditional approach and practices for recovery of the loans as it includes the threatening practices, abusing and exploitation of the borrowers.
- The banking and financial system sometime has adverse impact on income, employment, prices and production in general.

XIII. DISCUSSION

The role and importance of banks and financial institutions cannot be avoided. Every section of the society wants to get such financial benefits which are offered by the bank time to time. Though banking is contributing and has been attractive place for the people to meet out their household and business needs and requirements but the more banks are given loans, the more they generating non-performing assets (NPA). The non performing assets (NPA) of banks are rising very fast and rapidly. As per the

records, there is a shocking figure of NPA in Indian banks of Rs 2.06 trillion till August 2013. That is the main reasons why banks are so frustrated and restrict while recovering the loans.

The NPA induces the banks and financial institutions to recover their loans at any cost or anyhow. This system cannot be justified but amounts should be recovered with some leniency and dignity. Banks and financial institutions should consider the financial status of the borrowers at the time of granting loans and most important while recovery of the loans. In this process, it should be keep in mind that the human and values must be respected. No borrower cannot be tortured in the name of recovery and he or she cannot be humiliated or mishandled. Due to the humiliation and torture of the borrowers by the lenders, the borrowers are compelled and induced to choose the option of suicide. At least 17,368 Indian farmers killed themselves in 2009, the worst figure for farm suicides in six years, according to data of the National Crime Records Bureau. Suicide rates among Indian farmers were a chilling 47 per cent higher than they were for the rest of the population in 2011. In some of the State's worst hit by the agrarian crisis, they were well over 100 per cent higher. The new Census 2011 data reveal a shrinking farmer population.

If it is talked about the fortune and fate of the financial institutions and banking sector, there is a strong factor behind this and it is growing nature of the economy and developing society which will boost and induce the growth and development of this sector. But there are some factors also which developing gap between lenders and borrowers are. There is need of the time to develop such tools and techniques which may bridge the gap between lenders and borrowers. This system should be of such type which include the proper distribution of the fund into the society and unbiased practices while recovery of the loans. The exploitation of the borrowers must be stopped and adequate time should be provided to him/her. The concept of participative banking may be analyzed and adopted so that both parties may get equal or agreed benefits from it. The concept of Islamic Banking is most attractive in this regard where social values are important. As discussed above that bank are contributing on one hand and also misbalancing the social structure. Interest based banking has some adverse impacts on production, income, employments, prices, demand and supply,

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AUTHORS

First Author – **Mohd Saleem**,
Lecturer (*Finance and Accounts*),
VAG Management Services,
DDE Sikkim Manipal University, New Delhi,
Email: *saleem0642@gmail.com*;
Contact No.: 91-9350997142

Second Author – **Matloob Ullah Khan**,
Research Scholar,
Department of Management,
Jamia Hamdard University, New Delhi- 110062;
Email: *matloobullah.khan@gmail.com*;
Contact No: 91-8800553488

Third Author – **Dr. Sadaf Siraj**,
Assistant Professor (*Marketing*),
Department of Management,
Jamia Hamdard University, New Delhi- 110062;
Email: *sirajsadaf@gmail.com*;

Contact No: 91-9990575157

Correspondence Author – Matloob Ullah Khan,
Email: matloobullah.khan@gmail.com,
Contact No.: 91-8800553488

Robustness to Non-Normality and AR (2) Process of Control Charts

Singh J.R. and Singh D.P

Vikram University, Ujjain, 456010, India

Abstract- In this paper we investigate the effect of non-normality and auto-correlation on the OC function of mean chart with known coefficient of variation. We synthesize the second order auto-correlation process by its three different roots. In particular, the shift in the auto-correlation structure from independent data to a random walk, this is a special case of the structural shift occurring in the process. For various values of roots the values of OC functions are tabulated with known coefficient of variation.

Index Terms- Mean chart, non-normality, OC function, auto-correlation, coefficient of variation.

I. INTRODUCTION

Control charts are widely used to monitor manufacturing processes with the objective of detecting any change in a process that may affect the quality of the output. The statistic plotted on a control chart is frequently based on samples (subgroups) of n > 1 observations that are taken at regular sampling intervals. For example, a sample of n = 5 observations might be taken hourly. There are many practical situations, however, where control charts are applied using individual observations (n = 1), such as when repeated process measurements differ very little (as in many chemical and process industries) or when the rate of production is slow (Montgomery, 1997) and (Ryan , 2000) for other situations where using individual observations is appropriate. In most applications in which a continuous process characteristic, say x is being measured, it is assumed that x is approximately normally distributed, and that the observations from the process at different sampling times are independent random variables. If x is approximately normally distributed and a special cause affects the distribution of x, then the special cause may change the mean μ of x, the standard deviation σ of x, or both μ and σ. When individual observations are taken to monitor μ and σ, the standard practice to simultaneously use a Shewhart X chart for monitoring μ and a. Shewhart moving range (MR) chart for monitoring σ. These two Shewhart charts are simple to implement and effective in detecting large changes in μ or σ, but have two drawbacks which can seriously hinder their practical usefulness.

(i)The X and MR charts are ineffective in detecting small or moderate shifts in μ or σ. There is also recent evidence that there is little or no benefit to using an MR chart when an X chart for μ is also being used,(Albin et al., 1997) and (Reynolds and Stoumbos, 2000).

(ii)The statistical performance of the X and MR charts is very sensitive to deviation from the normality assumption, (Montgomery, 1997) and (Borror et al., 1999).

The usual independence assumption may be unrealistic in industries, such as the pharmaceutical and chemical industries, where many processes inherently produce auto correlated data. The presence of autocorrelation in the process data can result in considerable changes in the statistical performance of the X and MR charts, when these charts are developed under the assumption of independence, (Maragah and Woodall , 1992) , (Lu and Reynolds , 1999), and references there in efficient detection of small and moderate shifts in μ or σ requires that the control statistics in some way incorporate information from current and past sample statistics. Runs rules, which are based on patterns of points in a Shewhart chart, improve the ability of Shewhart charts to detect small and moderate shifts in μ or σ (Champ and Woodall, 1987) and (Lowary et al., 1995), but use of these rules is not the best method for detecting small and moderate shifts in μ or σ. A much better method of accumulating information across sampling points employs a control statistic that is an exponential weighted moving average (EWMA) of current and past sample statistics. (Reynolds and Stoumbos , 2001) considered various combination of Shewhart and other control charts, in order to determine which chart combinations are most effective for detecting shifts in μ or σ when single independent and normally distributed observations are taken. They showed that the common practice of using the Shewhart X and MR charts to monitor μ and σ is ineffective at detecting small and moderate shifts in these parameters, and that much better alternative for monitoring μ and σ are based on combinations of charts that involve at least one EWMA chart. There are many other contributions by (Amin and Ethridge, 1998), (Box et al., 1994), (Champ and Woodall , 1987), (Domangue and Patch, 1991), (Lucas and Saccucci , 1990), (Macgregor and Harris, 1993), (Reynolds, 1996b), (Regdon et al., 1994), (Stoumbos and Reynolds, 1997), (Sullivan and Woodall, 1996), and (Zhang , 1998) on control charts to detect shift in mean chart. If the underlying distribution is not normal, three different approaches are suggested to deal this problem. One approach is to transform the original data so that the transformed data more closely modeled by the normal distribution, and then proceed with the standard control charts using the transformed data. However, the difficulties of this approach is how to identify an appropriate transformation and justify the transformation appear more suitable than with the following alternatives. Another approach is to design control charts based on heuristic methods. Some heuristic control charts are developed for monitoring the non-normal process, for

example, the weighted variance (WV) control chart proposed by (chang and Bai,1995), the weighted standard deviation (WSD) control chart proposed by (Chang and Bai, 2001) and Skewness correction (SC) control chart proposed by (Chan and Cui, 2003). The design of heuristic control charts depend on some approximation procedures so that these control charts may not work well for some specified processes, for example, the skew normal process. A third approach is to increase the sample size until the distribution of the sample average is well modeled by the normal distribution, regardless of the amount of deviation from normality of individual units. Larger sample sizes, however, may not be operationally feasible and they are obviously more costly. Measurements come from production process often follow skewed distribution. This situation makes the standard $\overline{X}$ control chart results in a high false alam rate (Azzalini ,1985, 1986, 1999), (Bittanti et al., 1998), (Chang ,1994), (Chou et al.,2005), (Cowden, 1957), (Dodge and Rousson, 1999), (Genton et al., 2001), (Gunter,1989), (Gupta and Brown, 2001), and (Pyzdek, 1995)) for more details.

The objective of this paper to investigate the effect of non-normality and autocorrelation on the statistical performance of control charts for monitoring the mean μ with known *cv* of a continuous process characteristic x. For the numerical results that pertain to investigating the effects of non-normality, both heavy-tailed symmetric and skewed non-normal distributions are used as first four terms an Edgeworth series. While for the numerical result in this chapter that pertain to investigating the effect of autocorrelation, the observations are represented as a second order autoregressive (AR(2)) process. This time - series model is relatively simple, but it has been used in a wide variety of applications. The level of autocorrelation considered in the numerical results were chosen with the general objective of considering autocorrelation that is sufficiently high to have a significant effect on the performance of the charts, yet not so high that the patterns of points in a control chart look very unusual.

II. MATERIALS AND METHODS

2.1 Second order Autoregressive model: Consider a manufacturing process where a quality characteristic is measured at equidistance time points 1, 2, 3, ... n. This situation may occur in a discrete manufacturing process which produces discrete time 1, 2, 3, ... n, with one quality characteristic of interest. It may also occur in a continuous manufacturing process where the quality characteristic of interest is measured at discrete equidistant time points. We denote the behavior of the quality characteristic as $x_1, x_2, ... x_n$. It will assumed that on EPC control action can be represented by some controllable variable or factor x_t, such that

$$x_t = \mu + \xi_t, \tag{1}$$

where μ is a constant, and ξ_t is a stationary time series with zero mean and standard deviation σ. A (Durbin and Watson , 1950) "d" statistic can be used to detect the presence or absence of serial correlation. The problem, however, is that to do once the suspicion of dependence via the serial correlation test is confirmed. If serial correlation exist we use identification techniques to define the nature of ξ_t. When identification is complete, the likelihood function can provide maximum likelihood estimate of the parameters of the identified model.

Suppose that a correlation test revealed the presence of data dependence and identification technique suggested autoregressive model of order two AR(2) say, then we can express ξ_t of equation (1) as

$$\xi_t = \alpha_1 \, \xi_{t-1} + \alpha_2 \, \xi_{t-2} + \in_k, \; t = 1, 2, ... n \tag{2}$$

where

(i) $\qquad \in_t \, \sim \, N\left(0, \, \sigma_\in^{\,2}\right)$

$$\text{cov}\left(\in_t, \in_\gamma\right) = \begin{cases} \sigma_\in^{\,2} & t = \gamma \\ 0 & t \neq \gamma \end{cases} \tag{3}$$

(ii)

The class of stationary models that assume the process to remain in equilibrium about a constant mean level μ. The variance of AR (2) process is given by:

$$\sigma^2 = \left(\frac{1-\alpha_2}{1+\alpha_2}\right) \frac{\sigma_\in^{\,2}}{\left[(1-\alpha_2)^2 - \alpha_1^{\,2}\right]}. \tag{4}$$

Following Kendall and Stuart (1976) it can be shown that for stationarity, the roots of the characteristic equation of the process in equation (2)

$$\phi(B) = 1 - \alpha_1 B - \alpha_2 B^2 \tag{5}$$

must lies outside the unit circle, which implies that the parameters α_1 and α_2 must satisfy the following conditions :

$$\alpha_2 + \alpha_1 \; < 1$$
$$\alpha_2 - \alpha_1 \; < 1$$

$$-1 < \alpha_2 < 1 \tag{6}$$

Now If G_1^{-1} and G_2^{-1} are the roots of the characteristic equation of the process given by equation (5) then

$$G_1 = \frac{\alpha_1 + \sqrt{\alpha_1^2 + 4\alpha_2}}{2} \tag{7}$$

$$G_2 = \frac{\alpha_1 - \sqrt{\alpha_1^2 + 4\alpha_2}}{2} \tag{8}$$

For stationarity we require that $|G_i| < 1, \ i = 1, 2.$ Thus, three situations can theoretically arise :

(i)   Roots G_1 and G_2 are real and distinct $\left(i.e., \alpha_1^2 + 4\alpha_2 > 0\right)$

(ii)   Roots G_1 and G_2 are real and equal $\left(i.e., \alpha_1^2 + 4\alpha_2 = 0\right)$

(iii)   Roots G_1 and G_2 are complex conjugate $\left(i.e., \alpha_1^2 + 4\alpha_2 < 0\right)$.

When the serial correlation is present in the data, we have for the distribution of the sample mean $\bar{x}$, its mean and variance is given by,

$$E\left(\bar{x}\right) = \mu$$

$$\text{Var}\left(\bar{x}\right) = \frac{\sigma^2}{n}\lambda_{ap}\left(\alpha_1, \alpha_2, n\right), \tag{9}$$

where $\lambda_{ap}\left(\alpha_1, \alpha_2, n\right)$ depends on the nature of the roots G_1 and G_2 , and for different situations is given as follows :

(i)   If G_1 and G_2 are real and distinct,

$$\lambda_{ap}\left(\alpha_1, \alpha_2, n\right) = \left[\frac{G_1\left(1-G_2^2\right)}{\left(G_1-G_2\right)\left(1+G_1G_2\right)}\lambda\left(G_1, n\right) - \frac{G_2\left(1-G_1^2\right)}{\left(G_1-G_2\right)\left(1+G_1G_2\right)}\lambda\left(G_2, n\right)\right]$$

$$= \lambda_{rd}\left(\alpha_1, \alpha_2, n\right), \tag{10}$$

Where,

$$\lambda\left(G, n\right) = \left[\frac{1+G}{1-G} - \frac{2G}{n}\frac{\left(1-G^n\right)}{\left(1-G\right)^2}\right]$$

(ii)   If G_1 and G_2 are real and equal

$$\lambda_{ap}\left(\alpha_1, \alpha_2, n\right) = \left(\frac{1+G}{1-G}\right) - \frac{2G\left(1-G^n\right)}{n\left(1-G\right)^2}\left[1 + \frac{\left(1+G\right)^2\left(1-G^n\right) - n\left(1-G^2\right)\left(1+G^n\right)}{\left(1+G^2\right)\left(1-G^n\right)}\right]$$

$$= \lambda_{re}\left(\alpha_1, \alpha_2, n\right) \tag{11}$$

(iii)   If G_1 and G_2 and complex conjugate

$$\lambda_{ap}\left(\alpha_1, \alpha_2, n\right) = \left[\gamma\left(d, u\right) + \frac{2d}{n}\left(W\left(d,u,n\right) + z\left(d,u,n\right)\right)\right]$$

$$= \lambda_{cc}\left(\alpha_1, \alpha_2, n\right) \tag{12}$$

Where

$$\gamma\left(d, u\right) = \frac{1 - d^4 + 2d\left(1-d^2\right)\cos u}{\left(1+d^2\right)\left(1+d^2 - 2d\cos u\right)},$$

$$W\left(d,u,n\right) = \frac{2d\left(1+d^2\right)\sin u - \left(1+d^4\right)\sin 2u - d^{n+4}\sin\left((n-2)u\right)}{\left(1+d^2\right)\left(1+d^2 - 2d\cos u\right)^2 \sin u},$$

$$Z(d,u,n) = \frac{2d^{n+3}\sin(n-1)u - 2d^{n+1}\sin(n+1)u + d^n\sin((n+2)u)}{(1+d^2)(1+d^2-2d\cos u)^2 \sin u} \quad ,$$

$$d^2 = -\alpha_2,$$

$$u = \cos^{-1}\left(\frac{\alpha_1}{2d}\right).$$

and

The x_t denote the change in the level of the compensating variable model at the time t, i.e., the adjustment made at the time point t. The ε_t is Gaussian white noise with variance $\sigma_\in^2$. Throughout, we suppose that the noise variance is known. In practice, this is justified if reliable estimates of $\sigma_\in^2$ are available from the evaluation of a large number of previous values of the process, e.g., during the setup phase. The real - valued parameters α_1 and α_2 (the autoregressive parameters) determines the influence of the preceding time point (t - 1) and (t - 2) on the present time point t. We assume an in-control value $\alpha_1 = \alpha_2 = O$ for the autoregression parameters. It is possible that the autoregression parameters may shift to an out-of-control value $(\alpha_1, \alpha_2) \neq 0$.

2.2 The effect of Non-Normality and AR (2) process on control charts for monitoring the mean : We consider the effect of autocorrelation equation (9). The AR(2) process will be used to model the data taken from auto correlated process of interest with known cv Further, we assume that the non-normal population is represented by the first four terms of an Edgeworth series. To study the robustness of the control chart to non normality under AR(2) process, we examined the effect of non-normality and dependency on the OC and error of the first kind with known cv mean chart. We assumes that the observations $x_t \ (t = 1, 2... n)$ are address the problem of non-normality and

dependency with known cv in the control statistics $\bar{x}^*$. Following (Srivastava and Banarasi, 1982)

$$MSE(\bar{x}^*) = \frac{\sigma^2}{n}\left(1 - \frac{v^*\lambda_{ap}(\alpha_1, \alpha_2, n)}{n}\right) \quad v = \frac{\sigma}{\mu}.$$

where

The OC of the control chart is derived from the sampling distribution of mean with the probability density function of the non-normal variables as the first four terms of an Edgeworth series. The control chart for mean is set up by drawing the control line at the process average μ and the control limits at

$$\mu \pm k\frac{\sigma}{\sqrt{n}},$$

where cv is known. The OC function gives the probability that the control chart indicates the process average as μ when it is actually not μ but

$$\mu' = \mu + \gamma\,\sigma\frac{\sqrt{1 - \frac{v^*\lambda_{ap}(\alpha_1, \alpha_2, n)}{n}}}{\sqrt{n}}$$

(say) and it is device by integrating the distribution of mean with μ' as the process average between the limits of the control chart.

In case of known cv the non-normal population is represented by the first four terms on Edgeworth series by (Rao and Bhatt, 1989) as,

$$f(x) = \frac{1}{\sigma}\left[\phi\left(\frac{x-\mu}{\sigma}\right) - \frac{\lambda_3}{6\sqrt{n}}\phi^{(3)}\left(\frac{x-\mu}{\sigma}\right) + \frac{\lambda_4}{24n}\phi^{(4)}\left(\frac{x-\mu}{\sigma}\right) + \frac{\lambda_3^2}{72n}\phi^{(6)}\left(\frac{x-4}{\sigma}\right)\right] \quad (13)$$

Following the $MSE(\bar{x}^*)$ the distribution of sample mean $\bar{x}^*$ is given by   Gayen (1949), as

$$g(\bar{x}^*) = \frac{\sqrt{n'}}{\sigma}\left[\phi\left(\frac{\bar{x}^*-\mu}{\sigma/\sqrt{n'}}\right) - \frac{\lambda_3}{6\sqrt{n'}}\phi^{(3)}\left(\frac{\bar{x}^*-\mu}{\sigma/\sqrt{n'}}\right) + \frac{\lambda_4}{24n^1}\phi^{(4)}\left(\frac{\bar{x}^*-\mu}{\sigma/\sqrt{n'}}\right)\right]$$

$$+ \frac{\lambda_3^2}{72n'}\phi^{(6)}\left(\frac{\bar{x}^*-\mu}{\sigma/\sqrt{n'}}\right)$$

(14)

$$M^2 = \left(1 - \frac{v^*\lambda_{ap}(\alpha_1, \alpha_2, n)}{n}\right), \ n' = \frac{M^2}{n}, \ \phi(x) = \frac{1}{\sqrt{2x}}\exp\left(\frac{-x^2}{2}\right)$$

where,

$$\phi^{(r)}(x) = \left(\frac{d}{dx}\right)^r \phi(x).$$

and

The OC function is obtained, after replacing μ in equation (14) by n' and integrating between the limits of control charts we get

$$L' = L_N - L'_u + L'_b \tag{15}$$

Where,

$$L_N = \phi\left(\frac{k}{m} + \mu\right) + \phi\left(\frac{k}{m} - \mu\right) - 1 \quad \phi(x) = \int_{-\infty}^{x} \phi(t)\, dt.$$

L_N is the OC of the control chart when the underlying population is normal with know *cv* and

$$L'_u = \frac{n'}{72}\left[\frac{12\,\lambda_3}{\sqrt{n'}}\,\phi^{(3)}\left(\frac{k}{m} - \mu\right) - 3\lambda_4\,\phi^{(3)}\left(\frac{k}{m} - \mu\right) - \lambda_3^2\,\phi^{(5)}\left(\frac{k}{m} - \mu\right)\right] \tag{16}$$

$$L'_b = \frac{n'}{72}\left[\frac{12\,\lambda_3}{\sqrt{n'}}\,\phi^{(3)}\left(\frac{k}{m} + \mu\right) + 3\lambda_4\,\phi^{(3)}\left(\frac{k}{m} + \mu\right) + \lambda_3^2\,\phi^{(5)}\left(\frac{k}{m} + \mu\right)\right] \tag{17}$$

$$\alpha' = 1 - \int_{\mu - k\,\sigma/\sqrt{n}}^{\mu + k\frac{\sigma}{\sqrt{n}}} g\left(\bar{x}^*\right) d\bar{x}^*$$

$$= \alpha_N - c \tag{18}$$

where,

$$\alpha_N = 2\Phi\left(-\frac{k}{m}\right) \tag{19}$$

and

$$C = \frac{n'}{36}\left[3\lambda_4\,\phi^{(3)}\left(\frac{k}{m}\right) + \lambda_3^2\,\phi^{(5)}\left(\frac{k}{m}\right)\right] \tag{20}$$

is the non-normality correction for the error of the first kind.

The error of the first kind gives the probability of searching for assignable causes when is fact there are no such causes exist.

If α'_u is the probability of exceeding, the upper control limit and α'_b, that lying below the lower control limit, when the process is in control, then positively skewed population $\alpha'_u \geq \alpha'_b$ and negatively skewed population $\alpha'_u \leq \alpha'_b$ are given as the expressions for α'_u and α'_b are given as

$$\alpha'_u = \frac{\alpha}{2} + \frac{n'}{72}\left[12\,\lambda_3\,\sqrt{n'}\,\phi^{(2)}\left(\frac{k}{m}\right) - 3\lambda_4\,\phi^{(3)}\left(\frac{k}{m}\right) - \lambda_3^2\,\phi^{(5)}\left(\frac{k}{m}\right)\right] \tag{21}$$

$$\alpha'_b = \frac{\alpha}{2} - \frac{n'}{72}\left[12\,\lambda_3\,\sqrt{n'}\,\phi^{(2)}\left(\frac{k}{m}\right) + 3\lambda_4\,\phi^{(3)}\left(\frac{k}{m}\right) + \lambda_3^2\,\phi^{(5)}\left(\frac{k}{m}\right)\right] \tag{22}$$

it is evident from the above equation that α'_u becomes α'_b and α'_b becomes α'_u, when the sign of λ_3 changed. That is $\alpha' = \alpha'_u + \alpha'_b$ is independent of the sign of skewness.

III. RESULTS AND DISCUSSION

To investigate the robustness of the control chart schemes for the normality assumption, both heavy-tailed symmetric and skewed distribution i.e. (λ_3, λ_4) will be used. For non-normal with three different situation of autoregressive parameter along with independent observation, the values of type-I error and OC function have been computed and given in Table (1) and Table (4) respectively.

Table-1: Values of OC Function under AR(2) Process with Known cv for (n=7, k=1.0232)

v	Independent Observations (α_1=0.0, α_2=0.0)									
	λ_3=0,λ_4=0		λ_3=-0.6,λ_4=0		λ_3=0.6,λ_4=0		λ_3=0,λ_4=-1.0		λ_3=0,λ_4=2.0	
	p	L(p)	p	L(p)	p	L(p)	p	L(p)	p	L(p)
0	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9500	0.0284	0.9572	0.0636	0.9439	0.0521	0.9497	0.0458	0.9506
	0.1000	0.7529	0.0902	0.7449	0.1127	0.7576	0.1127	0.7496	0.0746	0.7594
	0.1500	0.5140	0.1548	0.4988	0.1583	0.5289	0.1694	0.5137	0.1112	0.5145
	0.2000	0.3155	0.2181	0.3067	0.2018	0.3274	0.2225	0.3183	0.1550	0.3098
	0.2500	0.1781	0.2787	0.1779	0.2441	0.1808	0.2727	0.1812	0.2046	0.1720
	0.3000	0.0935	0.3364	0.0982	0.2860	0.0889	0.3207	0.0951	0.2586	0.0902
	0.3500	0.0457	0.3912	0.0518	0.3281	0.0384	0.3670	0.0459	0.3161	0.0454
	0.4000	0.0208	0.4432	0.0261	0.3709	0.0142	0.4120	0.0201	0.3761	0.0222
0.4	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9549	0.0284	0.9620	0.0636	0.9489	0.0521	0.9550	0.0458	0.9551
	0.1000	0.7593	0.0902	0.7520	0.1127	0.7635	0.1127	0.7623	0.0746	0.7654
	0.1500	0.5144	0.1548	0.4996	0.1583	0.5288	0.1694	0.5146	0.1112	0.5149
	0.2000	0.3104	0.2181	0.3021	0.2018	0.3217	0.2225	0.3077	0.1550	0.3050
	0.2500	0.1710	0.2787	0.1712	0.2441	0.1730	0.2727	0.1682	0.2046	0.1653
	0.3000	0.0871	0.3364	0.0920	0.2860	0.0821	0.3207	0.0857	0.2586	0.0843
	0.3500	0.0411	0.3912	0.0470	0.3281	0.0339	0.3670	0.0411	0.3161	0.0411
	0.4000	0.0180	0.4432	0.0229	0.3709	0.0119	0.4120	0.0187	0.3761	0.0194
0.8	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9597	0.0284	0.9667	0.0636	0.9540	0.0521	0.9598	0.0458	0.9596
	0.1000	0.7662	0.0902	0.7596	0.1127	0.7699	0.1127	0.7633	0.0746	0.7720
	0.1500	0.5148	0.1548	0.5005	0.1583	0.5289	0.1694	0.5146	0.1112	0.5153
	0.2000	0.3049	0.2181	0.2971	0.2018	0.3155	0.2225	0.3074	0.1550	0.2997
	0.2500	0.1635	0.2787	0.1641	0.2441	0.1648	0.2727	0.1661	0.2046	0.1583
	0.3000	0.0804	0.3364	0.0854	0.2860	0.0752	0.3207	0.0816	0.2586	0.0781
	0.3500	0.0365	0.3912	0.0421	0.3281	0.0296	0.3670	0.0363	0.3161	0.0368
	0.4000	0.0152	0.4432	0.0197	0.3709	0.0097	0.4120	0.0145	0.3761	0.0167
1.2	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9646	0.0284	0.9713	0.0636	0.9591	0.0521	0.9648	0.0458	0.9642
	0.1000	0.7737	0.0902	0.7678	0.1127	0.7769	0.1127	0.7709	0.0746	0.7791
	0.1500	0.5153	0.1548	0.5015	0.1583	0.5289	0.1694	0.5151	0.1112	0.5158
	0.2000	0.2988	0.2181	0.2915	0.2018	0.3088	0.2225	0.3013	0.1550	0.2939
	0.2500	0.1554	0.2787	0.1564	0.2441	0.1560	0.2727	0.1578	0.2046	0.1507
	0.3000	0.0736	0.3364	0.0787	0.2860	0.0681	0.3207	0.0745	0.2586	0.0718
	0.3500	0.0319	0.3912	0.0373	0.3281	0.0253	0.3670	0.0316	0.3161	0.0324
	0.4000	0.0126	0.4432	0.0167	0.3709	0.0077	0.4120	0.0119	0.3761	0.0141

Table-2: Values of OC Function under AR(2) Process with Known cv for (n=7, k=1.0232)

v	Roots are Real and Distinct ($\alpha_1=0.3$, $\alpha_2=0.6$)									
	$\lambda_3=0,\lambda_4=0$		$\lambda_3=-0.6,\lambda_4=0$		$\lambda_3=0.6,\lambda_4=0$		$\lambda_3=0,\lambda_4=-1.0$		$\lambda_3=0,\lambda_4=2.0$	
	p	L(p)	p	L(p)	p	L(p)	p	L(p)	p	L(p)
0	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9500	0.0284	0.9572	0.0636	0.9439	0.0521	0.9497	0.0458	0.9506
	0.1000	0.7529	0.0902	0.7449	0.1127	0.7576	0.1127	0.7496	0.0746	0.7594
	0.1500	0.5140	0.1548	0.4988	0.1583	0.5289	0.1694	0.5137	0.1112	0.5145
	0.2000	0.3155	0.2181	0.3067	0.2018	0.3274	0.2225	0.3183	0.1550	0.3098
	0.2500	0.1781	0.2787	0.1779	0.2441	0.1808	0.2727	0.1812	0.2046	0.1720
	0.3000	0.0935	0.3364	0.0982	0.2860	0.0889	0.3207	0.0951	0.2586	0.0902
	0.3500	0.0457	0.3912	0.0518	0.3281	0.0384	0.3670	0.0459	0.3161	0.0454
	0.4000	0.0208	0.4432	0.0261	0.3709	0.0142	0.4120	0.0201	0.3761	0.0222
0.4	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9760	0.0284	0.9817	0.0636	0.9714	0.0521	0.9765	0.0458	0.9752
	0.1000	0.7945	0.0902	0.7906	0.1127	0.7964	0.1127	0.7922	0.0746	0.7989
	0.1500	0.5168	0.1548	0.5042	0.1583	0.5292	0.1694	0.5166	0.1112	0.5172
	0.2000	0.2817	0.2181	0.2758	0.2018	0.2899	0.2225	0.2839	0.1550	0.2774
	0.2500	0.1336	0.2787	0.1357	0.2441	0.1325	0.2727	0.1353	0.2046	0.1301
	0.3000	0.0562	0.3364	0.0613	0.2860	0.0505	0.3207	0.0566	0.2586	0.0555
	0.3500	0.0212	0.3912	0.0257	0.3281	0.0157	0.3670	0.0207	0.3161	0.0222
	0.4000	0.0072	0.4432	0.0101	0.3709	0.0038	0.4120	0.0066	0.3761	0.0084
0.8	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9961	0.0390	0.9900	0.0636	0.9945	0.0521	0.9964	0.0458	0.9900
	0.1000	0.8653	0.0902	0.8680	0.1127	0.8639	0.1127	0.8644	0.0746	0.8673
	0.1500	0.5226	0.1548	0.5132	0.1583	0.5318	0.1694	0.5224	0.1112	0.5229
	0.2000	0.2188	0.2181	0.2166	0.2018	0.2221	0.2225	0.2200	0.1550	0.2163
	0.2500	0.0680	0.2787	0.0716	0.2441	0.0641	0.2727	0.0683	0.2046	0.0673
	0.3000	0.0165	0.3364	0.0196	0.2860	0.0128	0.3207	0.0162	0.2586	0.0171
	0.3500	0.0032	0.3912	0.0046	0.3281	0.0017	0.3670	0.0029	0.3161	0.0037
	0.4000	0.0005	0.4432	0.0009	0.3709	0.0001	0.4120	0.0004	0.3761	0.0007
1.2	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	1.0000	0.0290	1.0000	0.0636	1.0000	0.0521	1.0000	0.0458	1.0000
	0.1000	0.9939	0.0902	0.9670	0.1127	0.9930	0.1127	0.9940	0.0746	0.9780
	0.1500	0.5511	0.1548	0.5470	0.1583	0.5551	0.1694	0.5510	0.1112	0.5512
	0.2000	0.0391	0.2181	0.0408	0.2018	0.0372	0.2225	0.0390	0.1550	0.0391
	0.2500	0.0004	0.2787	0.0005	0.2441	0.0002	0.2727	0.0003	0.2046	0.0004
	0.3000	0.0000	0.3364	0.0000	0.2860	0.0000	0.3207	0.0000	0.2586	0.0000
	0.3500	0.0000	0.3912	0.0000	0.3281	0.0000	0.3670	0.0000	0.3161	0.0000
	0.4000	0.0000	0.4432	0.0000	0.3709	0.0000	0.4120	0.0000	0.3761	0.0000

Table-3: Values of OC Function under AR(2) Process with Known cv for (n=7, k=1.0232)

v	Roots are Real and Equal ($\alpha_1=0.8$, $\alpha_2=-0.16$)									
	$\lambda_3=0,\lambda_4=0$		$\lambda_3=-0.6,\lambda_4=0$		$\lambda_3=0.6,\lambda_4=0$		$\lambda_3=0,\lambda_4=-1.0$		$\lambda_3=0,\lambda_4=2.0$	
	p	L(p)	p	L(p)	p	L(p)	p	L(p)	p	L(p)
0	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9500	0.0284	0.9572	0.0636	0.9439	0.0521	0.9497	0.0458	0.9506
	0.1000	0.7529	0.0902	0.7449	0.1127	0.7576	0.1127	0.7496	0.0746	0.7594
	0.1500	0.5140	0.1548	0.4988	0.1583	0.5289	0.1694	0.5137	0.1112	0.5145
	0.2000	0.3155	0.2181	0.3067	0.2018	0.3274	0.2225	0.3183	0.1550	0.3098
	0.2500	0.1781	0.2787	0.1779	0.2441	0.1808	0.2727	0.1812	0.2046	0.1720
	0.3000	0.0935	0.3364	0.0982	0.2860	0.0889	0.3207	0.0951	0.2586	0.0902
	0.3500	0.0457	0.3912	0.0518	0.3281	0.0384	0.3670	0.0459	0.3161	0.0454
	0.4000	0.0208	0.4432	0.0261	0.3709	0.0142	0.4120	0.0201	0.3761	0.0222
0.4	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9651	0.0284	0.9717	0.0636	0.9596	0.0521	0.9653	0.0458	0.9647
	0.1000	0.7744	0.0902	0.7686	0.1127	0.7775	0.1127	0.7717	0.0746	0.7798
	0.1500	0.5154	0.1548	0.5016	0.1583	0.5289	0.1694	0.5152	0.1112	0.5158
	0.2000	0.2982	0.2181	0.2910	0.2018	0.3081	0.2225	0.3007	0.1550	0.2933
	0.2500	0.1546	0.2787	0.1557	0.2441	0.1552	0.2727	0.1570	0.2046	0.1500
	0.3000	0.0729	0.3364	0.0780	0.2860	0.0674	0.3207	0.0738	0.2586	0.0712
	0.3500	0.0314	0.3912	0.0368	0.3281	0.0249	0.3670	0.0311	0.3161	0.0320
	0.4000	0.0124	0.4432	0.0164	0.3709	0.0075	0.4120	0.0117	0.3761	0.0138
0.8	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9796	0.0284	0.9848	0.0636	0.9753	0.0521	0.9801	0.0458	0.9787
	0.1000	0.8024	0.0902	0.7991	0.1127	0.8038	0.1127	0.8003	0.0746	0.8065
	0.1500	0.5174	0.1548	0.5052	0.1583	0.5293	0.1694	0.5172	0.1112	0.5178
	0.2000	0.2751	0.2181	0.2696	0.2018	0.2827	0.2225	0.2771	0.1550	0.2710
	0.2500	0.1256	0.2787	0.1280	0.2441	0.1240	0.2727	0.1271	0.2046	0.1225
	0.3000	0.0504	0.3364	0.0553	0.2860	0.0447	0.3207	0.0506	0.2586	0.0500
	0.3500	0.0179	0.3912	0.0221	0.3281	0.0129	0.3670	0.0174	0.3161	0.0189
	0.4000	0.0057	0.4432	0.0082	0.3709	0.0028	0.4120	0.0051	0.3761	0.0067
1.2	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9918	0.0420	0.9820	0.0636	0.9892	0.0521	0.9922	0.0458	0.9910
	0.1000	0.8407	0.0902	0.8401	0.1127	0.8402	0.1127	0.8393	0.0746	0.8434
	0.1500	0.5204	0.1548	0.5100	0.1583	0.5306	0.1694	0.5202	0.1112	0.5207
	0.2000	0.2417	0.2181	0.2383	0.2018	0.2466	0.2225	0.2432	0.1550	0.2386
	0.2500	0.0892	0.2787	0.0926	0.2441	0.0858	0.2727	0.0899	0.2046	0.0877
	0.3000	0.0271	0.3364	0.0311	0.2860	0.0224	0.3207	0.0269	0.2586	0.0276
	0.3500	0.0069	0.3912	0.0093	0.3281	0.0042	0.3670	0.0065	0.3161	0.0077
	0.4000	0.0015	0.4432	0.0025	0.3709	0.0005	0.4120	0.0012	0.3761	0.0019

Table-4: Values of OC Function under AR(2) Process with Known cv for (n=7, k=1.0232)

v	Roots are Complex Conjugate (α_1=0.8, α_2=-0.6)									
	λ_3=0,λ_4=0		λ_3=-0.6,λ_4=0		λ_3=0.6,λ_4=0		λ_3=0,λ_4=-1.0		λ_3=0,λ_4=2.0	
	p	L(p)	p	L(p)	p	L(p)	p	L(p)	p	L(p)
0	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9500	0.0284	0.9572	0.0636	0.9439	0.0521	0.9497	0.0458	0.9506
	0.1000	0.7529	0.0902	0.7449	0.1127	0.7576	0.1127	0.7496	0.0746	0.7594
	0.1500	0.5140	0.1548	0.4988	0.1583	0.5289	0.1694	0.5137	0.1112	0.5145
	0.2000	0.3155	0.2181	0.3067	0.2018	0.3274	0.2225	0.3183	0.1550	0.3098
	0.2500	0.1781	0.2787	0.1779	0.2441	0.1808	0.2727	0.1812	0.2046	0.1720
	0.3000	0.0935	0.3364	0.0982	0.2860	0.0889	0.3207	0.0951	0.2586	0.0902
	0.3500	0.0457	0.3912	0.0518	0.3281	0.0384	0.3670	0.0459	0.3161	0.0454
	0.4000	0.0208	0.4432	0.0261	0.3709	0.0142	0.4120	0.0201	0.3761	0.0222
0.4	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9556	0.0284	0.9627	0.0636	0.9497	0.0521	0.9555	0.0458	0.9558
	0.1000	0.7603	0.0902	0.7532	0.1127	0.7645	0.1127	0.7573	0.0746	0.7664
	0.1500	0.5145	0.1548	0.4998	0.1583	0.5288	0.1694	0.5142	0.1112	0.5149
	0.2000	0.3095	0.2181	0.3013	0.2018	0.3207	0.2225	0.3122	0.1550	0.3042
	0.2500	0.1698	0.2787	0.1701	0.2441	0.1717	0.2727	0.1726	0.2046	0.1642
	0.3000	0.0860	0.3364	0.0909	0.2860	0.0810	0.3207	0.0874	0.2586	0.0833
	0.3500	0.0404	0.3912	0.0462	0.3281	0.0332	0.3670	0.0403	0.3161	0.0404
	0.4000	0.0175	0.4432	0.0224	0.3709	0.0115	0.4120	0.0168	0.3761	0.0190
0.8	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9613	0.0284	0.9681	0.0636	0.9556	0.0521	0.9614	0.0458	0.9611
	0.1000	0.7685	0.0902	0.7622	0.1127	0.7721	0.1127	0.7657	0.0746	0.7742
	0.1500	0.5150	0.1548	0.5008	0.1583	0.5289	0.1694	0.5148	0.1112	0.5155
	0.2000	0.3030	0.2181	0.2954	0.2018	0.3134	0.2225	0.3055	0.1550	0.2979
	0.2500	0.1609	0.2787	0.1617	0.2441	0.1620	0.2727	0.1635	0.2046	0.1559
	0.3000	0.0782	0.3364	0.0833	0.2860	0.0729	0.3207	0.0793	0.2586	0.0761
	0.3500	0.0350	0.3912	0.0406	0.3281	0.0282	0.3670	0.0348	0.3161	0.0354
	0.4000	0.0144	0.4432	0.0187	0.3709	0.0090	0.4120	0.0136	0.3761	0.0158
1.2	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
	0.0500	0.9669	0.0284	0.9734	0.0636	0.9616	0.0521	0.9672	0.0458	0.9665
	0.1000	0.7775	0.0902	0.7720	0.1127	0.7804	0.1127	0.7748	0.0746	0.7827
	0.1500	0.5156	0.1548	0.5020	0.1583	0.5289	0.1694	0.5154	0.1112	0.5160
	0.2000	0.2957	0.2181	0.2887	0.2018	0.3053	0.2225	0.2981	0.1550	0.2909
	0.2500	0.1513	0.2787	0.1526	0.2441	0.1516	0.2727	0.1536	0.2046	0.1469
	0.3000	0.0702	0.3364	0.0753	0.2860	0.0646	0.3207	0.0710	0.2586	0.0686
	0.3500	0.0297	0.3912	0.0349	0.3281	0.0233	0.3670	0.0293	0.3161	0.0304
	0.4000	0.0114	0.4432	0.0153	0.3709	0.0068	0.4120	0.0107	0.3761	0.0128

The table(1) clearly indicates that the effect of autocorrelation and non-normality on type - I error is quite substantial and an increasing function of n. it is seen from table that for heavy tailed and skewed distributions, type - I error (false alarms) will occur much more often than anticipated. An excessive number of false alarms can lead to unneeded process adjustment, loss of confidence in the control chart scheme, and eventually low productivity and increased cost. From Table (2) it is observed that the OC function is very close to the independent observation while the OC function increases when the roots are (real and distinct, and real and equal) for increasing value of v. It is very difficult to imagine any applications where the process cv would be monitored alone without also monitoring the process mean. Thus, deviating from assumptions of normality and independence seemingly causes more harm to the performance of the $\bar{x} - chart$. The performance of $\bar{x} - chart$ is quite robust to low and moderate autocorrelation of course, these findings for the performance of the $\bar{x} - chart$ should be taken cautiously become of the increase in the number of false alarms resulting from the autocorrelation. In general, we conclude that autocorrelation and non-normality can have significant effect on the statistical performances of control charts for monitoring μ with known cv, even when the process parameters have been estimated with negligible error by a large enough sample.

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AUTHORS

First Author – Singh J.R, Vikram University, Ujjain, 456010, India, Email: chouhandharm@rediffmail.com

Second Author – Singh D.P, Vikram University, Ujjain, 456010, India

DUAL FREQUENCY HEXAGONAL MICROSTRIP PATCH ANTENNA

Sanchita Basu*, Ashish Srivastava**, Abhishek Goswami**

[*] ECE, Future Institute of Engineering & Management, Kolkata
[**] ECE, Future Institute of Engineering & Management, Kolkata

Abstract— The study of Microstrip patch antennas have made great progress in recent years. Compared with conventional antennas, Microstrip patch antennas have more advantages and better prospects. They are lighter in weight, low volume, low cost, low profile, smaller in dimension and ease of fabrication and conformity. Moreover, the Microstrip patch antennas can provide dual and circular polarizations, dual-frequency operation, frequency agility, broad band-width, feed line flexibility, and beam scanning omnidirectional patterning. In this paper we discuss the Microstrip antenna, types of Microstrip antenna, feeding techniques and application of Microstrip patch antenna with their advantage and disadvantages and the benefits of using slots.

Index Terms- Antenna, Slots, MSA, Dielectric, Patch, Substrate, Feed.

I. INTRODUCTION

An **antenna** is an electrical device which converts electric power into radio waves, and vice versa. It is usually used with a radio transmitter or radio receiver.

I.1 Microstrip Patch Antenna

The study of Microstrip patch antennas has made great progress in recent years. Compared with conventional antennas, Microstrip patch antennas have more advantages and better prospects. They are lighter in weight, low volume, low cost, low profile, smaller in dimension and ease of fabrication and conformity. Moreover, the Microstrip patch antennas can provide dual and circular polarizations, dual-frequency operation, frequency agility, broad band-width, feed line flexibility, and beam scanning omnidirectional patterning. Few points-

- A Microstrip patch antenna consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side.
- The patch is generally made of conducting material such as copper or gold and can take any possible shape.
- The radiating patch and the feed lines are usually photo etched on the dielectric substrate.
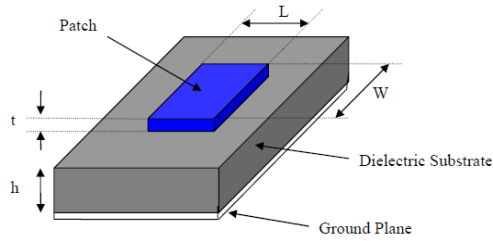
Fig:-1 Structure of Microstrip Patch Antenna

In order to simplify analysis and performance prediction, the patch is generally square, rectangular, circular, triangular, elliptical or some other common shape as shown in figure below. For a rectangular patch, the length L of the patch is usually $0.3333\lambda_0 < L < 0.5\lambda_0$, where λ_0 is the free-space wavelength. The patch is selected to be very thin such that $t << \lambda_0$ (where t is the patch thickness). The height h of the dielectric substrate is usually $0.003\lambda_0 \leq h \leq 0.05\lambda_0$. The dielectric constant of the substrate (ε_r) is typically in the range $2.2 \leq \varepsilon_r \leq 12$.
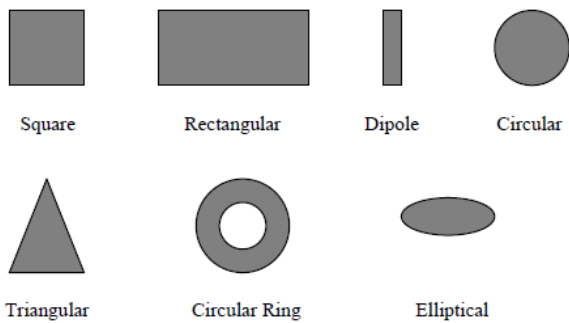
Fig-2 Common shapes of Microstrip Patch Elements

Advantages:-
Microstrip patch antennas are increasing in popularity for use in wireless applications due to their low-profile structure. Therefore they are extremely compatible for embedded antennas in handheld wireless devices such as cellular phones, pagers etc. The telemetry and Square Rectangular Dipole Circular Triangular Circular Ring Elliptical 33 communication antennas on missiles need to be thin and conformal and are often Microstrip patch antennas. Another area where they have been used successfully is in Satellite communication. Some of their principal advantages are:
• Light weight and low volume.
• Low profile planar configuration which can be easily made conformal to host surface.
• Low fabrication cost, hence can be manufactured in large quantities.
• Supports both, linear as well as circular polarization.
• Can be easily integrated with microwave integrated circuits (MICs).
• Capable of dual and triple frequency operations.
• Mechanically robust when mounted on rigid surfaces.

Disadvantages:-
Microstrip patch antennas suffer from a number of disadvantages as compared to conventional antennas. Some of their major disadvantages are:
• Narrow bandwidth
• Low efficiency

• Low Gain
• Extraneous radiation from feeds and junctions
• Poor end fire radiator except tapered slot antennas
• Low power handling capacity.

I.2 Feed Techniques

1. **Microstrip Line Feed:** In this type of feed technique, a conducting strip is connected directly to the edge of the microstrip patch.

Figure   Microstrip Line Feed
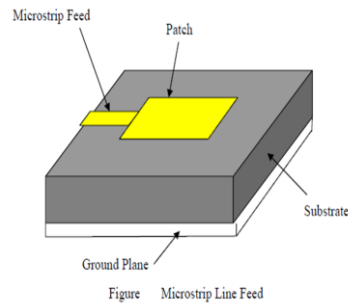
Fig:- 3

2. **Coaxial Feed:** In this type of feed technique, a coaxial feed is used. The inner conductor of the coaxial connector extends through the dielectric and is soldered to the radiating patch, while the outer conductor is connected to the ground plane.

Figure   Probe fed Rectangular Microstrip Patch Antenna
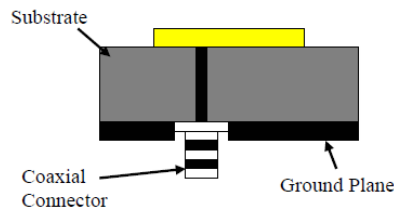
Fig:- 4

3. **Aperture Coupled Feed:** In this type of feed technique, the radiating patch and the microstrip feed line are separated by the ground plane. Coupling between the patch and the feed line is made through a slot or an aperture in the ground plane.

Figure   Aperture-coupled feed
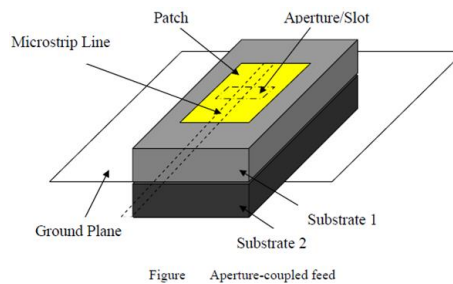
Fig:- 5

4. **Proximity Coupled Feed:** In this type of feed technique, two dielectric substrates are used such that the feed line is between the two substrates and the radiating patch is on top of the upper substrate.
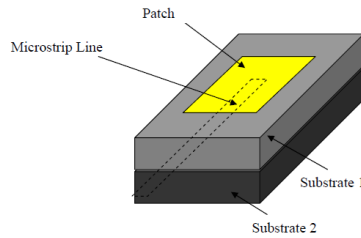
Figure   Proximity-coupled Feed

Fig:- 6

II. PROPOSED WORK

In this paper we provide the comparative study of Hexagonal Microstrip Antenna, its disadvantages and it has been overcome by Dual Frequency Hexagonal Microstrip Patch Antenna using Slots.

II.1 Hexagonal Microstrip Antennas(HMSA)

For the given patch dimension, the HMSA has higher resonance frequency as compared to RMSA. The modal distributions of HMSA are studied and it was observed that HMSAs distribution is similar to the modal distributions of circular MSA (CMSA). Therefore by equating the areas of HMSA and CMSA the resonance frequency formulation for HMSA is proposed. The formulations obtained using this method agrees closely with the simulated results for fundamental as well as higher order modes.

The HMSA is shown in Fig. 1(a). It is obtained from equivalent RMSA by changing the side length S as shown in Fig. 1(a). In this all the side lengths are not equal. A regular HMSA has all equal side length as shown in Fig. 1(b). For the dimensions shown in Fig. 1(a), the first and second order resonance frequencies are 1113 and 1425 MHz as shown in their current distributions in Fig. 2(a, b). Similarly for regular HMSA, the frequencies are 915 and 1516 MHz as shown in their surface current distributions in Fig. 2(c, d). These current distributions are similar to the current distributions of TM_{11} and TM_{21} modes in CMSA. Due to this similarity between the distributions of HMSA and CMSA, the resonance frequency formulation for HMSA is derived using frequency equation for CMSA as given below.
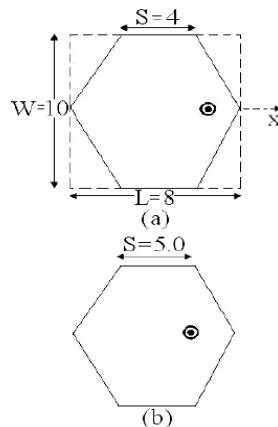
Fig. 1 (a) HMSA and its equivalent RMSA and (b) regular HMSA

Fig:- 7

(a) f = 1113 MHz

(b) f = 1425 MHz

Fig:- 8

(c) f = 915 MHz

(d) f = 1518 MHz
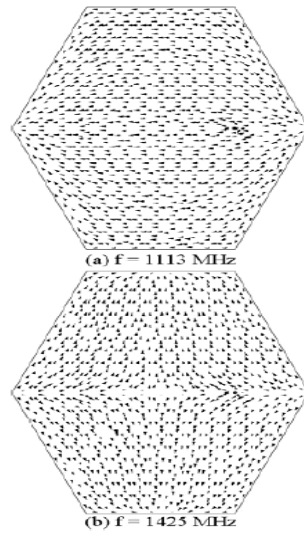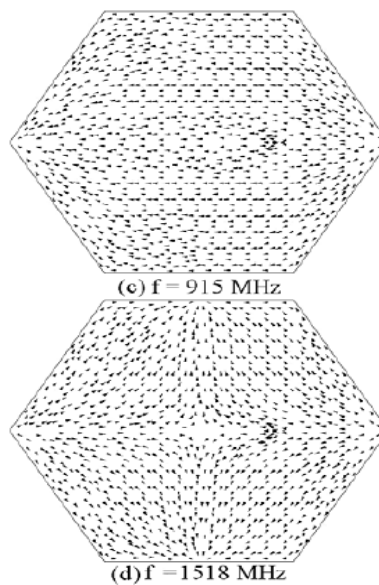
Fig. 2 Surface current distribution at first two frequencies for (a, b) HMSA
and (c, d) regular HMSA

Fig:- 9

The formulation is proposed for HMSA as well as regular HMSA. The area of HMSA (a_h) is first calculated and it is equated with the area of equivalent CMSA (a_c). Further the equivalent radius of the CMSA in terms of side length of HMSA is calculated. This equivalent radius is used in the resonance frequency equation of CMSA to formulate the resonance frequency of HMSA as given in equation (7).

for regular HMSA,

$$a_H = 2.598S^2 \qquad (1)$$

$$a_C = \pi r_c^2 \qquad (2)$$

Equating the two areas gives,

$$r_c = S\sqrt{2.598/\pi} \qquad (3)$$

for HMSA,

$$a_H = SW + \frac{(L-S)W}{2} \qquad (4)$$

$$a_C = \pi r_c^2 \qquad (5)$$

$$r_c = \sqrt{a_H/\pi} \qquad (6)$$

$$f_r = \frac{K_{mn}c}{2r_c \pi \sqrt{\varepsilon_r}} \qquad (7)$$

where,

a_H = area of HMSA
a_C = area of CMSA
r_C = equivalent radius of CMSA
K_{mn} = 1.84118 (TM$_{11}$ mode), 3.05424 (TM$_{21}$ mode)

Performance Parameters:

The performance of an antenna can be measured by a number of parameters. The followings are the critical ones.

(a) **Radiation Pattern:** The antenna pattern is a graphical representation in three dimensional of the radiation of the antenna as the function of direction. It is a plot of the power radiated from an antenna per unit solid angle which gives the intensity of radiations from the antenna. If the total power radiated by the isotropic antenna is P, then the power is spread over a sphere of radius r, so that the power density S at this distance in any direction is given as:

$$S = \frac{P}{4\pi R^2}$$

Then the radiation intensity for this isotropic antenna Ui can be written as:

$$U_i = \frac{P}{4\pi}$$

Isotropic antennas are not realizable in practice but can be used as a reference to compare the performance of practical antennas. The radiation pattern provides information on the antenna beam width, side lobes and antenna resolution to a large extent. The E plane pattern is a graphical representation of antenna radiation as a function of direction in a plane containing a radius vector from the center of the antenna to the point of maximum radiation and the electric field intensity vector. Similarly the H plane pattern can be drawn considering the magnetic field intensity vector

(b) **Gain:** Antenna gain is the ratio of maximum radiation intensity at the peak of main beam to the radiation intensity in the same direction which would be produced by an isotropic radiator having the same input power. Isotropic antenna is considered to have a gain of unity. The gain function can be described as:

$$G(\theta, \emptyset) = \frac{P(\theta,\emptyset)}{\frac{Wt}{4\pi}}$$

where$(\theta,\emptyset)$ is the power radiated per unit solid angle in the direction$(\theta,\emptyset)$ and Wt is the total radiated power. Microstrip antennas because of the poor radiation efficiency have poor gain. Numerous researches have been conducted in various parts of the world in order to obtain high gain antennas.

(c) **Directivity:** If a three dimensional antenna pattern is measured, the ratio of normalized power density at the peak of the main beam to the average power density is called the directivity. The directivity of the antenna is given by:

$$D = \frac{P_{max}}{P_{avg}}$$

The relation between directivity and gain can be given as:

$G=\eta D$, where η is the antenna efficiency.

(d) **Bandwidth:** It is defined as "The range of usable frequencies within which the performance of the antenna, with respect to some characteristic, conforms to a specified standard." The bandwidth can be the range of frequencies on either side of the center frequency where the antenna characteristics like input impedance, radiation pattern, beam width, polarization, side lobe level or gain, are close to those values which have been obtained at the center frequency. The bandwidth of narrow band and broadband antennas are defined as:

$$BW broadband = \frac{F_h}{F_l}$$
$$BW narrowband \% = \frac{F_h - F_l}{F_c} \times 100$$

Where F_h is the upper frequency, F_l is the lower frequency and F_c is the center frequency.

(e) **Return Loss:** Return loss or reflection loss is the reflection of signal power from the insertion of a device in a transmission line or optical fiber. It is expressed as ratio in dB relative to the transmitted signal power. The return loss is given by:

$$R_l(dB) = 10log(\frac{P_r}{P_i})$$

Where Pi is the power supplied by the source and Pr is the power reflected.

If Vi is the amplitude of the incident wave and Vr that of the reflected wave, then the return loss can be expressed in terms of the reflection coefficient τ as:

$$Rl = -20log|\Gamma|,$$

And the reflection coefficient г can be expressed as:

$$\Gamma = \frac{V_r}{V_i}$$

For an antenna to radiate effectively, the return loss should be less than$-10\ dB$.

(f) **VSWR:** A standing wave in a transmission line is a wave in which the distribution of current, voltage or field strength is formed by the superimposition of two waves of same frequency propagating in opposite direction. Then the voltage along the line produces a series of nodes and antinodes at fixed positions.

If $V(z)$ represents the total voltage on the line then

$$V(z) = V^+e^{-j\beta z} + V^-e^{+j\beta z}$$

Then the Voltage Standing Wave Ratio (VSWR) can be defined as:

$$VSWR = \frac{Vmax}{Vmin} = \frac{1+|\Gamma|}{1-|\Gamma|}$$

The value of VSWR should be between 1 and 2 for efficient performance of an antenna.

Antenna Design

In this project, the modal distributions of HMSA are studied and it was observed that HMSAs distribution is similar to the modal distributions of circular MSA (CMSA). Therefore by equating the areas of HMSA and CMSA the resonance frequency formulation for HMSA is proposed. The formulations obtained using this method agrees closely with the simulated results for fundamental as well as higher order modes. Also the dual band dual polarized configuration of HMSA by cutting the rectangular slot in the center of the patch is proposed. The formulation in resonant length for dual polarized response is also proposed. The frequency values obtained using the proposed formulations agree closely with simulated results. All these MSAs were first analyzed using the IE3D software followed by experimental verification in dual band and dual polarized HMSA.

The **Neltec NX9320** substrate (ε_r = 3.2, h = 0.76 mm, tan δ = 0.0024) is used for the simulations as well as the measurements. The HMSAs are fed using microstrip line of width 1.8246 mm.

Area of a Regular hexagon (A_h) $= \dfrac{3\sqrt{3}}{2}s^2$

Area of a Circle (A_c) $= \pi r_c{}^2$

Equating Both the Area,

$$r_c = s \times \sqrt{\dfrac{2.598}{\pi}}$$

We know that the resonance frequency of circular patch antenna,

$$f_r = \dfrac{X_{mn}\,c}{2\pi r_c \sqrt{\epsilon_r}}$$

The Resonance frequency of regular hexagon,

$$f_r = \dfrac{X_{mn}\,c}{2\pi s \sqrt{\dfrac{2.598}{\pi}}\sqrt{\epsilon_r}}$$

$$s = \dfrac{c}{3.1033 f_r \sqrt{\epsilon_r}}$$

For TM$_{11}$ Mode X$_{11}$ =1.84118
For TM$_{21}$ Mode X$_{21}$ =3.05424

The Operating Frequency (f_r) of the Hexagonal Patch is taken to be 3.8 GHz
Putting this in the above Eq we get,

Radius of the patch, $s = 14.22\ mm$
Inset Feed width, $W_l = 1.8246\ mm$
Cut Width, $2W_l = 3.6492\ mm$
Transmission Line Length $\left(\dfrac{\lambda}{4}\right) = 19.7368$

After finding the patch size the antenna feed line should be designed. The patch antenna was matched to $Z_o = 50$ Ω transmission lines where two matching methods were considered: inset feed and quarter wave transformer. Matching reduces the loss of the signal and reflected power towards the transmission line that supplies a smooth transition of energy from the antenna input impedance to the feed line. The program also provided the input impedance at the edge of the patch antenna $Z_{in} = 204.75 \ \Omega$. The quarter wave transformer was designed theoretically by first calculating its characteristic impedance as:

$$Z_1 = \sqrt{Z_0 Z_{in}} \approx 101.181 \ \Omega$$

Inserting the appropriate collected data into the transmission line calculator, the desired length and width of the quarter wave transmission line was calculated. Furthermore, utilizing the inset-feed length was found as:

$$y_0 = \frac{W}{\pi} \cos^{-1} \sqrt{\frac{Z_0}{Z_1}}$$

Putting the value of $W = 24.629 \ mm$

We get $y_0 = 6.2031 \ mm$
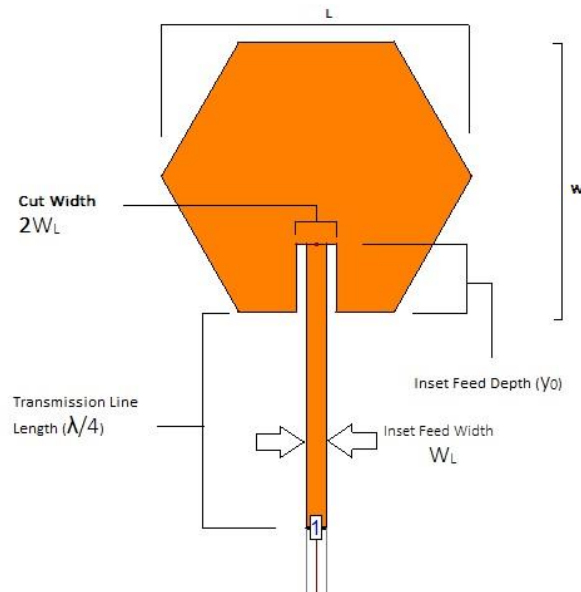
Fig:- 10

Hexagonal Microstrip Patch Antenna

III. SIMULATED RESULTS AND DISCUSSION

❖ **Hexagonal Microstrip Patch Antenna**

The Above design of Hexagonal Microstrip Patch Antenna was simulated using Zeland Ie3D 14.0.

1. HEXAGONAL MICROSTRIP PATCH ANTENNA
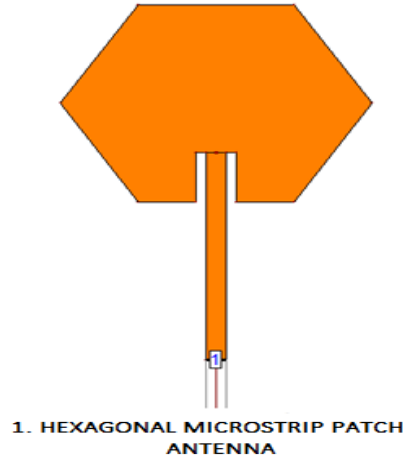
Fig:- 11
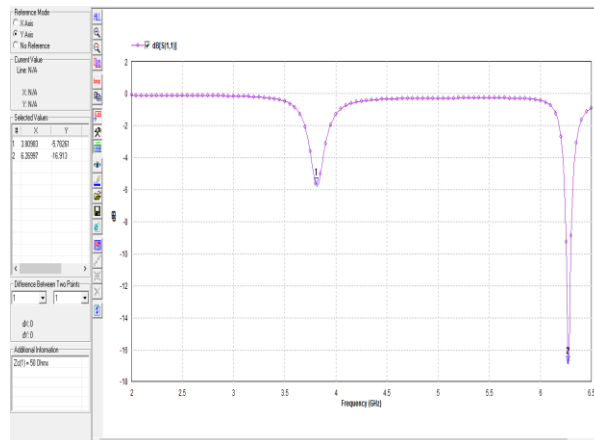
2. RETURN LOSS

Fig:- 12
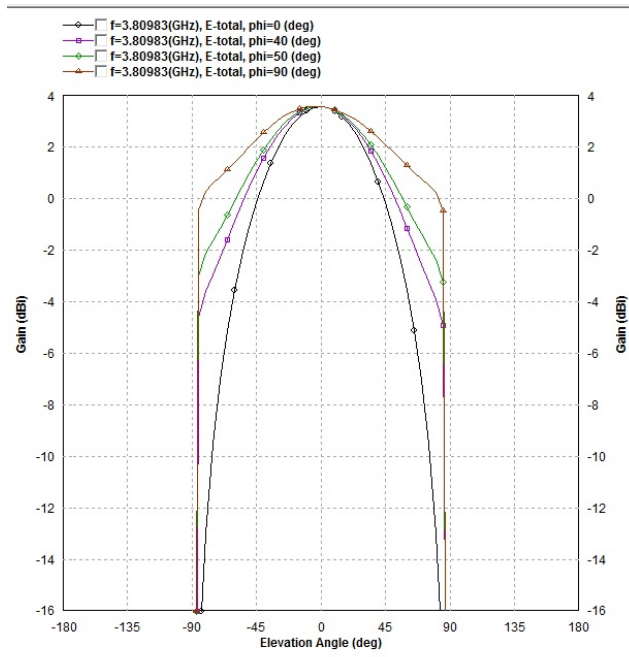
3. 2D PATTERN

Fig:- 13
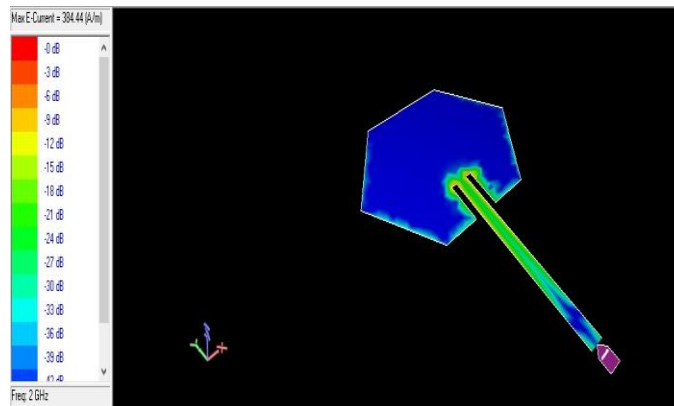
4. CURRENT DISTRIBUTION

Fig:- 14
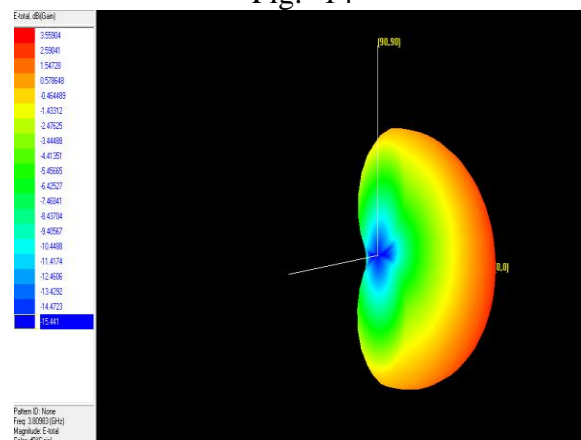
5. 3D PATTERN (SIDE VIEW)

Fig:- 15
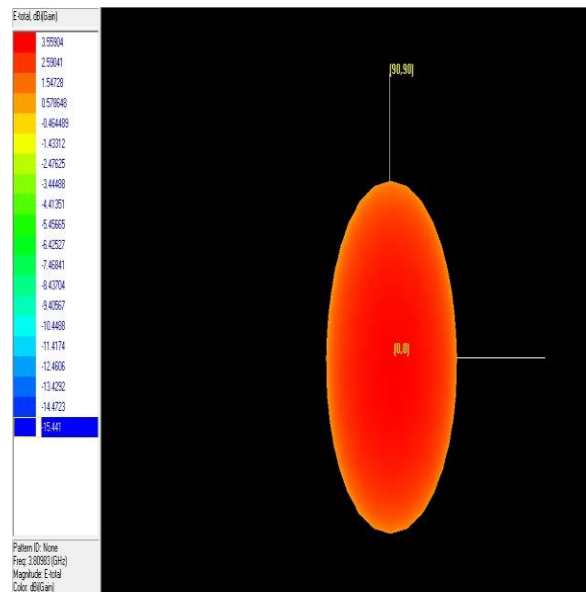
6. 3D PATTERN (TOP VIEW)

Fig:- 16

OBSERVATION:

❖ The Return Losses at 3.80983 GHz and 6.26937 GHz were -5.78261 dB and -16.913 dB respectively

❖ The Gain at 3.80983 GHz and 6.26937 GHz were 3.55904 dB and 3.20694 dB respectively

CONCLUSION:

❖ The above simulated results are not satisfactory as the antenna is working in a single band.

❖ The antenna is not working in a license free band.

And our aim is to design a dual frequency microstrip antenna working in a license free band and therefore slot is introduced.

II.2 Dual Frequency Hexagonal Microstrip Patch Antenna using Slots

The multi-band microstrip antenna (MSA) is realized by using the techniques of placing an open circuit or short circuit stub on the edges of the patch or by cutting the slot at an appropriate position inside the patch. Of these two methods, the slot method is more frequently used since it realizes dual band response without increasing the overall patch size. The dual polarized response is realized when the patch mode and the mode introduce by the slots are orthogonal to each other.

HEXAGONAL MICROSTRIP PATCH ANTENNA USING
SLOT
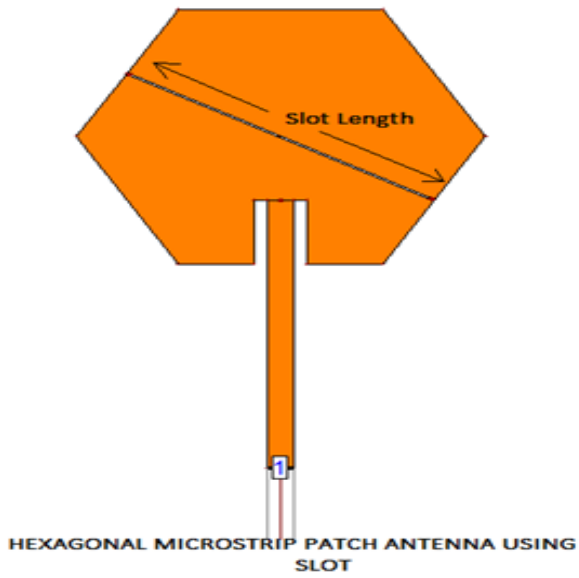
Fig:- 17

Simulated results and discussion:

❖ **Hexagonal Microstrip Patch Antenna using Slots**
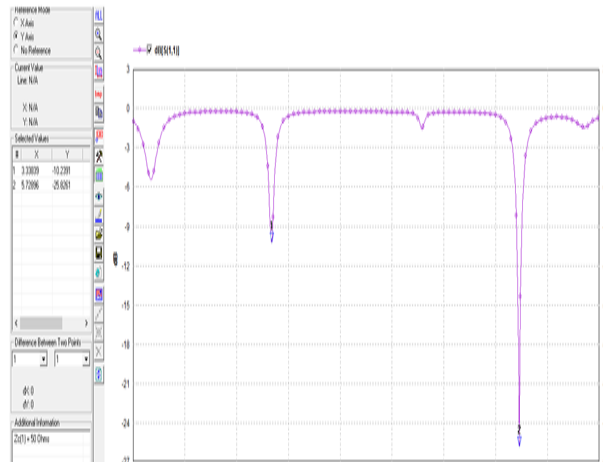
1. RETURN LOSS

Fig:- 18
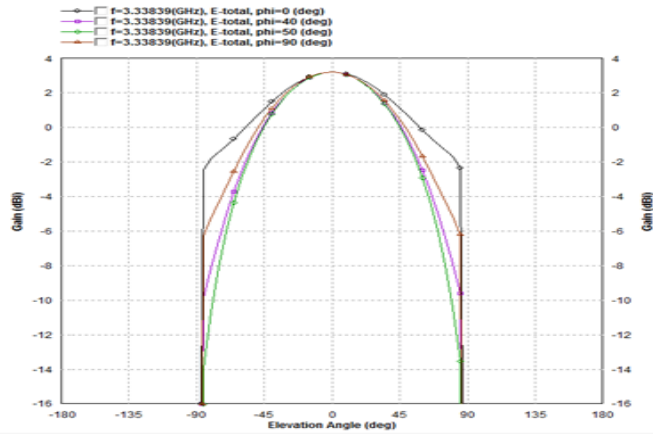
2. 2D PATTERN (Low Frequency)

Fig:-19
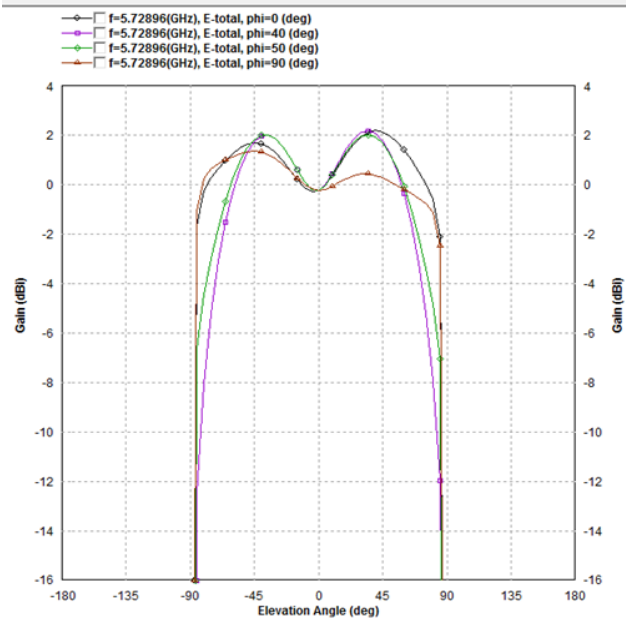
3. 2D PATTERN (High Frequency)

Fig:- 20
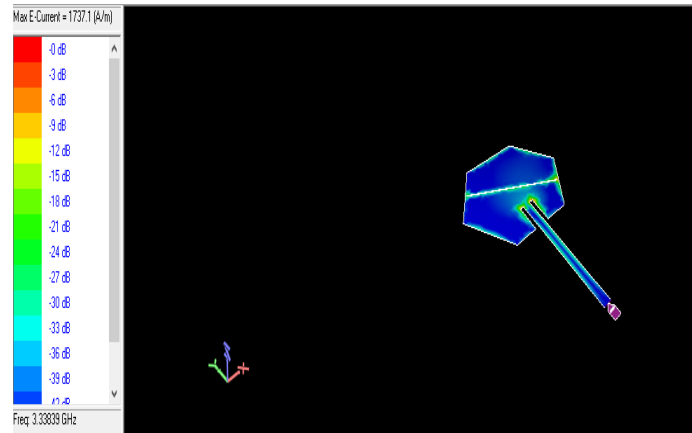
4. CURRENT DISTRIBUTION

Fig:- 21
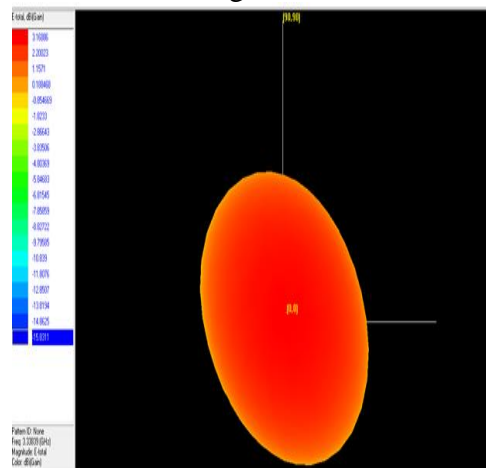
5. 3D PATTERN (Low Frequency)

Fig:- 22
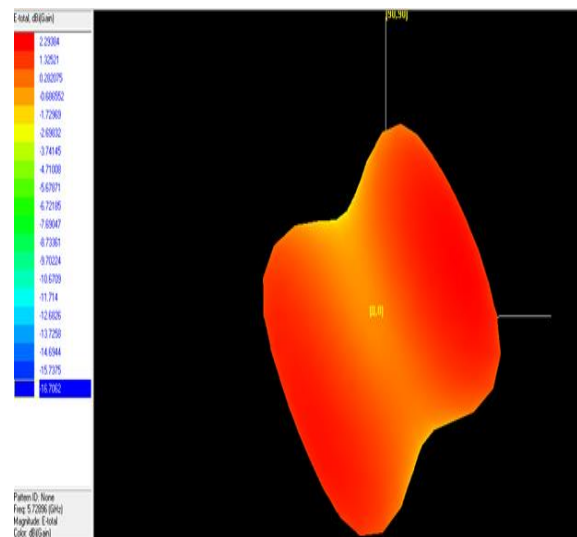
6. 3D PATTERN (High Frequency)

Fig:- 23
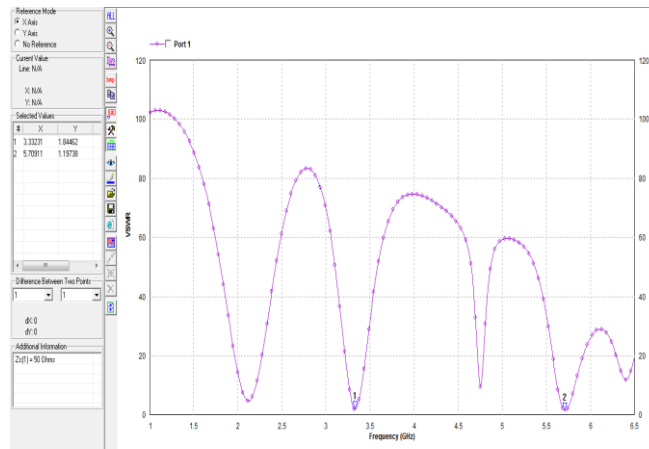
7. VSWR REPRESENTATION

Fig:- 24

OBSERVATION:

❖ The Return Losses at 3.33839 GHz and 5.72896 GHz are -10.2391 dB and   -25.8261 dB respectively.

❖ The gain at 3.33839 GHz and 5.72896 GHz are 3.16886 dB and 2.29384 dB respectively.

IV. CONCLUSION

The resonance frequency formulations for HMSA and regular HMSA using the CMSA equivalence are proposed. The frequency obtained using them closely matches with the simulated HMSA results. The dual polarized HMSA is proposed. The resonance frequency formulation in terms of slot dimension is proposed at f1. The frequency obtained using them closely matches the simulated frequency. Since these antennas are analyzed using Neltec NX 9320 substrate they have lower gain which can be increased using slots.

The impedance bandwidth of slotted patch is achieved more in comparisons to simple hexagonal patch antenna. The average gain achieved in slotted hexagonal patch more than simple hexagonal patch antenna and radiation efficiency achieved more in simple patch against slotted patch antenna.

- The Frequency Band in which the Antenna is working by using slot is 3.33839 GHz and 5.72896 GHz which are License free band.

- The most recent versions of both WiMAX standards in 802.16 cover spectrum ranges from at least the 2 GHz range through the 66 GHz range. The International standard of 3.3 GHz spectrum was the first to enjoy WiMAX products which is a license free band. Hence this Antenna can be used in the above frequency range.

- Wi-Fi is aimed at use within unlicensed spectrum. There are a number of unlicensed spectrum bands in a variety of areas of the radio spectrum. Often these are referred to as ISM bands - Industrial, Scientific and Medical, and they carry everything from microwave ovens to radio communications. This 5 GHz band or 5.8 GHz band provides additional bandwidth, and

being at a higher frequency, equipment costs are slightly higher, although usage, and hence interference is less. It can be used by IEEE 802.11a & n.

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Author's Profile:-

Sanchita Basu, currently pursuing B.Tech in Electronics & Communication Engineering at Future Institute of Engineering & Management under West Bengal University of Technology. Her research interest includes control system and radar engineering.

Ashish Srivastava, currently pursuing B.Tech in Electronics & Communication Engineering at Future Institute of Engineering & Management under West Bengal University of Technology. His research interest includes control system and wireless communication.

Modified Multilevel Inverter Topology with Reduced Switch Count and a Novel PWM Control Scheme

Dhivya Balakrishnan, Dhamodharan Shanmugam*

M.E-PED, Department OF EEE
Sri Shakthi Institute Of Engineering And Technology, Coimbatore, Tamilnadu. INDIA
Email: dhivyabalu1991@gmail.com, dharan.tec@hotmail.com*

Abstract- Multilevel converters offer high power capability, associated with lower output harmonics and lower commutation losses. Their main disadvantage is their complexity, requiring a great number of power devices and passive components, and a rather complex control circuitry. This paper proposes a single-phase seven- level inverter for grid connected PV systems, with a novel pulse width-modulated (PWM) control scheme. Three reference signals that are identical to each other with an offset that is equivalent to the amplitude of the triangular carrier signal were used to generate the PWM signals. The inverter is capable of producing seven levels of output-voltage levels from the dc supply voltage. This paper proposes a new multilevel inverter topology using an H-bridge output stage with two bidirectional auxiliary switches. The new topology produces a significant reduction in the number of power devices and capacitors required to implement a multilevel output using the Asymmetric Cascade configuration.

Index Terms- Asymmetric cascade configuration, H-Bridge, multilevel inverter, pulse width Modulation.

I. Introduction

The ever-increasing energy consumption, fossil fuels' soaring costs and exhaustible nature, and worsening global environment have created a booming interest in renewable energy generation systems, one of which is photovoltaic. Such a system generates electricity by converting the Sun's energy directly into electricity. Photovoltaic-generated energy can be delivered to power system networks through grid-connected inverters. A single-phase grid-connected inverter is usually used for residential or low-power applications of power ranges that are less than 10 kW [1]. Types of single-phase grid-connected inverters have been investigated [2]. A common topology of this inverter is full-bridge three-level. The three-level inverter can satisfy specifications through its very high switching, but it could also unfortunately increase switching losses, acoustic noise, and level of interference to other equipment. Improving its output waveform reduces its harmonic content and, hence, also the size of the filter used and the level of electromagnetic interference (EMI) generated by the inverter's switching operation [3].

Multilevel inverters are promising; they have nearly sinusoidal output-voltage waveforms, output current with better harmonic profile, less stressing of electronic components owing to decreased voltages, switching losses that are lower than those of conventional two-level inverters, a smaller filter size, and lower EMI, all of which make them cheaper, lighter, and more compact [3], [4]. Various topologies for multilevel inverters have been proposed over the years. Common ones are diode-clamped [5]–[10], flying capacitor or multicell [11]– [17], cascaded H-bridge [18]–[24], and modified H-bridge multilevel [25]–[29].

This paper recounts the development of a novel modified H-bridge single-phase multilevel inverter that has two diode embedded bidirectional switches and a novel pulse width modulated (PWM) technique. The topology was applied to a grid-connected photovoltaic system with considerations for a maximum-power-point tracker (MPPT) and a current-control algorithm.
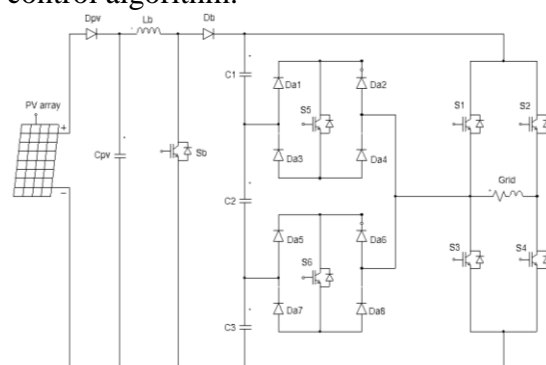
Fig 1: Proposed single-phase seven-level grid-connected inverter for photovoltaic systems.

II. PROPOSED SYSTEM

The proposed single-phase seven-level inverter was developed from the five-level inverter in [25]–[29]. It comprises a single-phase conventional H-bridge inverter, two bidirectional switches, and a capacitor voltage divider formed by C_1, C_2, and C_3, as shown in Fig. 1. The modified H-bridge topology is

significantly advantageous over other topologies, i.e., less power switch, power diodes, and less capacitor for inverters of the same number of levels. Photovoltaic (PV) arrays were connected to the inverter via a dc–dc boost converter. The power generated by the inverter is to be delivered to the power network, so the utility grid, rather than a load, was used. The dc–dc boost converter was required because the PV arrays had a voltage that was lower than the grid voltage. High dc bus voltages are necessary to ensure that power flows from the PV arrays to the grid. A filtering inductance Lf was used to filter the current injected into the grid. Proper switching of the inverter can produce seven output-voltage levels (V_{dc}, $2V_{dc}/3$, $V_{dc}/3$, $0, -V_{dc}, -2V_{dc}/3, -V_{dc}/3$) from the dc supply voltage. The proposed inverter's operation can be divided into seven switching states, as shown in Fig. 2(a)–(g). Fig. 2(a), (d), and (g) shows a conventional inverter's operational states in sequence, while Fig. 2(b), (c), (e), and (f) shows additional states in the proposed inverter synthesizing one- and two-third levels of the dc-bus voltage. The required seven levels of output voltage were generated as follows.

1) Maximum positive output (V_{dc}): S_1 is ON, connecting the load positive terminal to V_{dc}, and S_4 is ON, connecting the load negative terminal to ground. All other controlled switches are OFF; the voltage applied to the load terminals is V_{dc}. Fig. 2(a) shows the current paths that are active at this stage.

2) 2) Two-third positive output ($2V_{dc}/3$): The bidirectional switch S_5 is ON, connecting the load positive terminal, and S_4 is ON, connecting the load negative terminal to ground. All other controlled switches are OFF; the voltage applied to the load terminals is $2V_{dc}/3$. Fig. 2(b) shows the current paths that are active at this stage.

3) One-third positive output ($V_{dc}/3$): The bidirectional switch S_6 is ON, connecting the load positive terminal, and S_4 is ON, connecting the load negative terminal to ground. All other controlled switches are OFF; the voltage applied to the load terminals is $V_{dc}/3$. Fig. 2(c) shows the current paths that are active at this stage.

4) Zero output: This level can be produced by two switching combinations; switches S_3 and S_4 are ON, or S_1 and S_2 are ON, and all other controlled switches are OFF; terminal *ab* is a short circuit, and the voltage applied to the load terminals is zero. Fig. 2(d) shows the current paths that are active at this stage.

5) One-third negative output ($-V_{dc}/3$): The bidirectional switch S_5 is ON, connecting the load positive terminal, and S_2 is ON, connecting the load negative terminal to V_{dc}. All other controlled switches are OFF; the voltage applied to the load terminals is $-V_{dc}/3$. Fig. 2(e) shows the current paths that are active at this stage.

6) Two-third negative output ($-2V_{dc}/3$): The bidirectional switch S_6 is ON, connecting the load positive terminal, and S_2 is ON, connecting the load negative terminal to ground. All other controlled switches are OFF; the voltage applied to the load terminals is $-2V_{dc}/3$. Fig. 2(f) shows the current paths that are active at this stage.

7) Maximum negative output ($-V_{dc}$): S_2 is ON, connecting the load negative terminal to V_{dc}, and S_3 is ON, connecting the load positive terminal to ground. All other controlled switches are OFF; the voltage applied to the load terminals is $-V_{dc}$. Fig. 2(g) shows the current paths that are active at this stage.

(a)

(b)

(c)

(d)
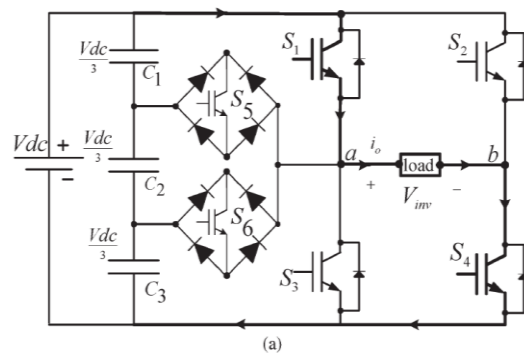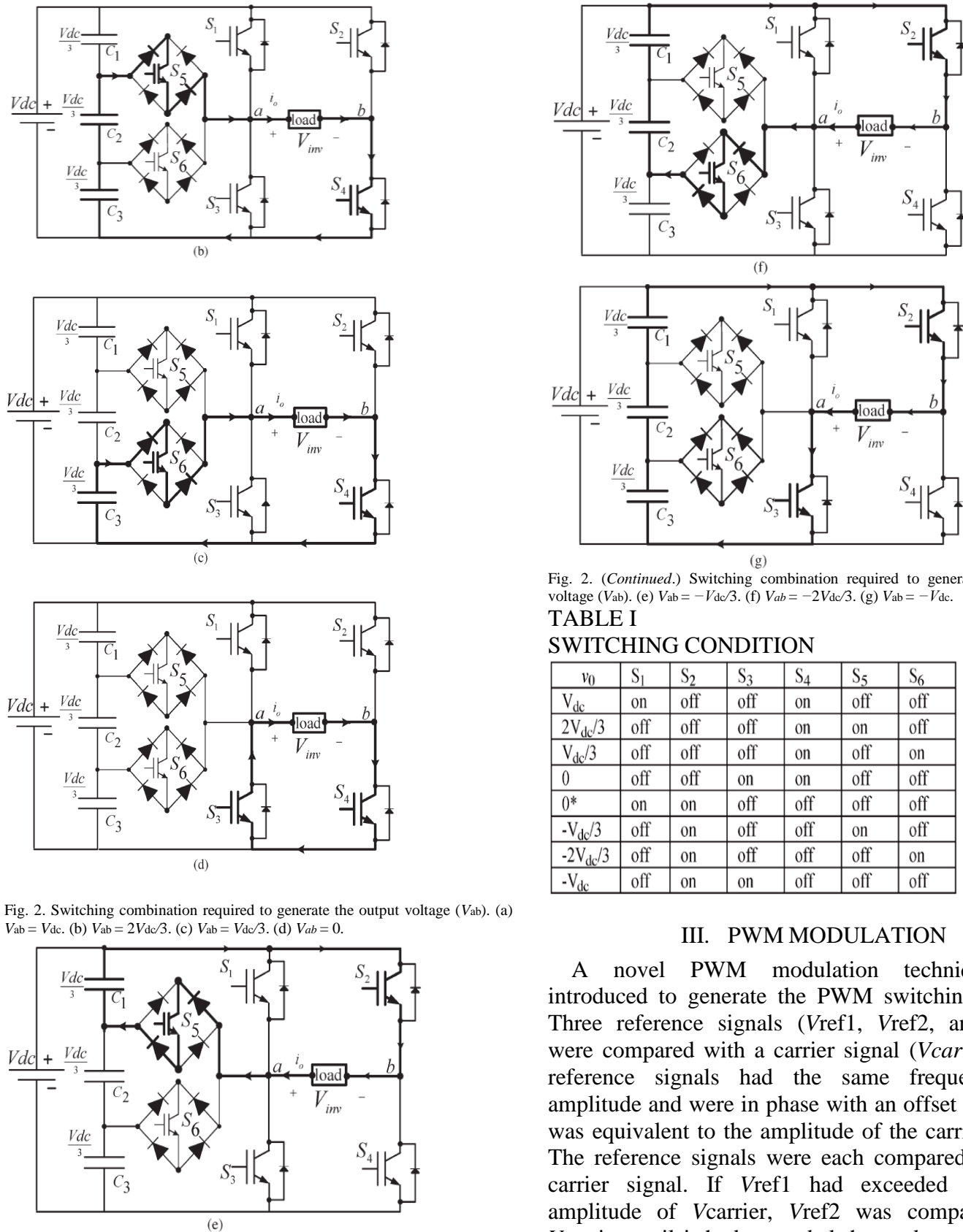
Fig. 2. Switching combination required to generate the output voltage (V_{ab}). (a) $V_{ab} = V_{dc}$. (b) $V_{ab} = 2V_{dc}/3$. (c) $V_{ab} = V_{dc}/3$. (d) $V_{ab} = 0$.

(e)

(f)

(g)
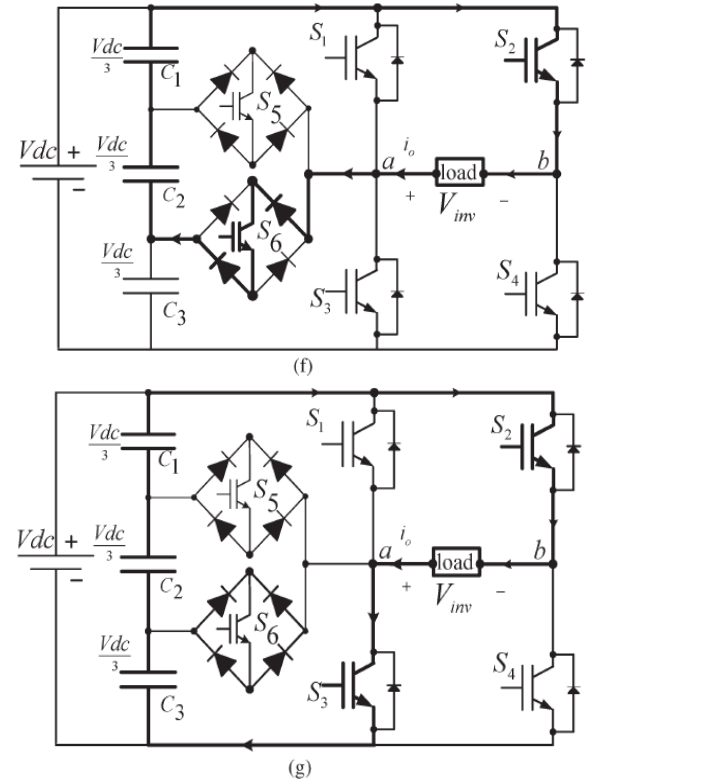
Fig. 2. (*Continued*.) Switching combination required to generate the output voltage (V_{ab}). (e) $V_{ab} = -V_{dc}/3$. (f) $V_{ab} = -2V_{dc}/3$. (g) $V_{ab} = -V_{dc}$.

TABLE I
SWITCHING CONDITION

v_0	S_1	S_2	S_3	S_4	S_5	S_6
V_{dc}	on	off	off	on	off	off
$2V_{dc}/3$	off	off	off	on	on	off
$V_{dc}/3$	off	off	off	on	off	on
0	off	off	on	on	off	off
0*	on	on	off	off	off	off
$-V_{dc}/3$	off	on	off	off	on	off
$-2V_{dc}/3$	off	on	off	off	off	on
$-V_{dc}$	off	on	on	off	off	off

III. PWM MODULATION

A novel PWM modulation technique was introduced to generate the PWM switching signals. Three reference signals (*V*ref1, *V*ref2, and *V*ref3) were compared with a carrier signal (*V*carrier). The reference signals had the same frequency and amplitude and were in phase with an offset value that was equivalent to the amplitude of the carrier signal. The reference signals were each compared with the carrier signal. If *V*ref1 had exceeded the peak amplitude of *V*carrier, *V*ref2 was compared with *V*carrier until it had exceeded the peak amplitude of *V*carrier. Then, onward, *V*ref3 would take charge and would be compared with *V*carrier until it reached

zero. Once *V*ref3 had reached zero, *V*ref2 would be compared until it reached zero. Then, onward, *V*ref1 would be compared with *V*carrier. Fig. 3 shows the resulting switching pattern. Switches *S*1, *S*3, *S*5, and *S*6 would be switching at the rate of the carrier signal frequency, whereas *S*2 and *S*4 would operate at a frequency that was equivalent to the fundamental frequency.

IV.   CONTROL SYSTEM

The control system comprises a MPPT algorithm, a dc-bus voltage controller, reference-current generation, and a current controller. The two main tasks of the control system are maximization of the energy transferred from the PV arrays to the grid, and generation of a sinusoidal current with minimum harmonic distortion, also under the presence of grid voltage harmonics.

The proposed inverter utilizes the perturb-and-observe (P&O) algorithm for its wide usage in MPPT owing to its simple structure and requirement of only a few measured parameters. It periodically perturbs (i.e., increment or decrement) the array terminal voltage and compares the PV output power with that of the previous perturbation cycle. If the power was increasing, the perturbation would continue in the same direction in the next cycle; otherwise, the direction would be reversed. This means that the array terminal voltage is perturbed every MPPT cycle; therefore, when the MPP is reached, the P&O algorithm will oscillate around it.
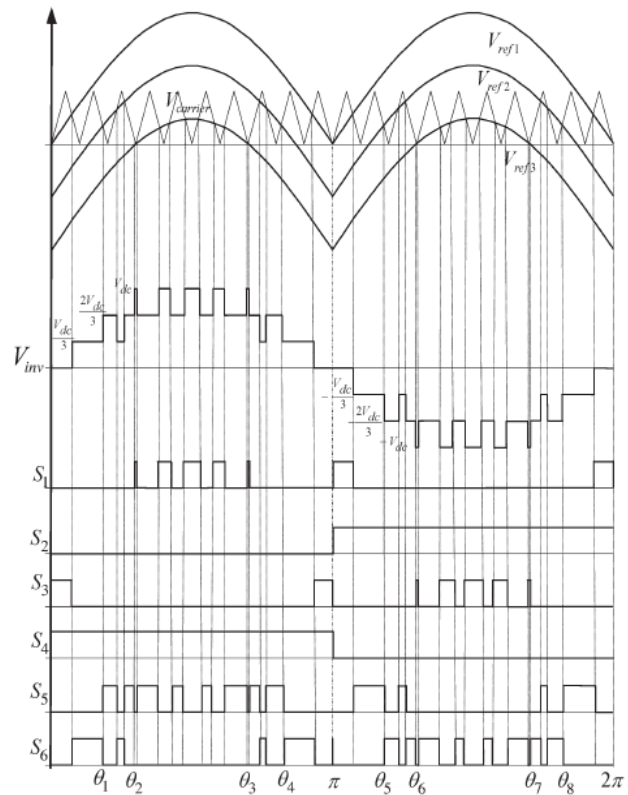
Fig. 3. Switching pattern for the single-phase seven-level inverter.
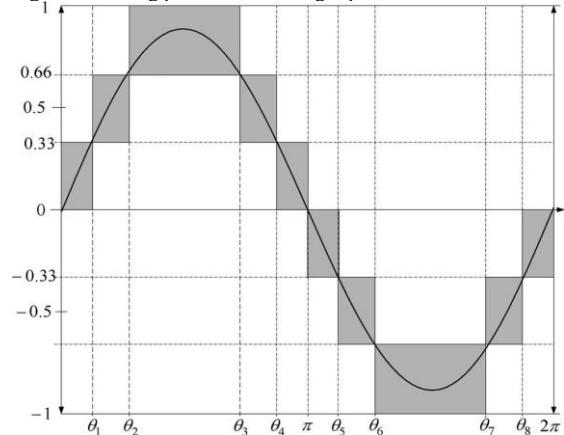
Fig. 4. Seven-level output voltage (*V*ab) and switching angles.

The P&O algorithm was implemented in the dc–dc boost converter. The output of the MPPT is the duty-cycle function. As the dc-link voltage *V*dc was controlled in the dc–ac seven level PWM inverter, the change of the duty cycle changes the voltage at the output of the PV panels. A PID controller was implemented to keep the output voltage of the dc–dc boost converter (*V*dc) constant by comparing *V*dc and *V*dc ref and feeding the error into the PID controller, which subsequently tries to reduce the error. In this way, the *V*dc can be maintained at a constant value and at more than $\sqrt{2}$ of *V*grid to inject power into the grid.

A PI algorithm was used as the feedback current controller for the application. The current injected into the grid, also known as grid current Igrid, was sensed and fed back to a comparator that compared it with the reference current Igridref . Igridref is the result of the MPPT algorithm. The error from the comparison process of Igrid and Igridref was fed into the PI controller.
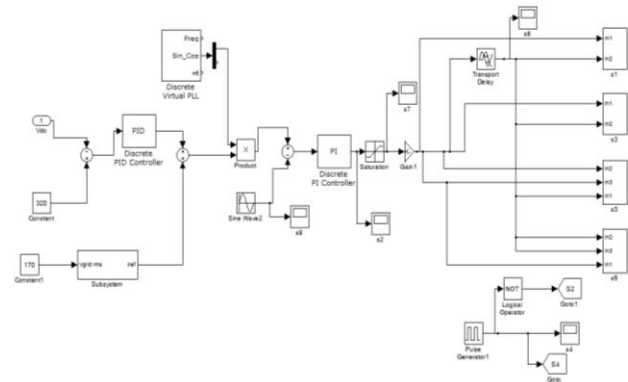
Fig.5.Control system block.

The output of the PI controller, also known as Vref , goes through an antiwindup process before being compared with the triangular wave to produce the switching signals for S1–S6. Eventually, Vref becomes Vref1; Vref2 and Vref3 can be derived from Vref1 by shifting the offset value, which was equivalent to the amplitude of the triangular wave. The mathematical formulation of the PI algorithm and its implementation in the DSP are discussed in detail in [28].Control system block is shown in figure 5.

V. SIMULATION RESULTS

MATLAB SIMULINK simulated the proposed configuration before it was physically implemented in a prototype. The PWM switching patterns were generated by comparing three reference signals (Vref1, Vref2, and Vref3) against a triangular carrier signal. Subsequently, the comparing process produced PWM switching signals for switches S1− S6.
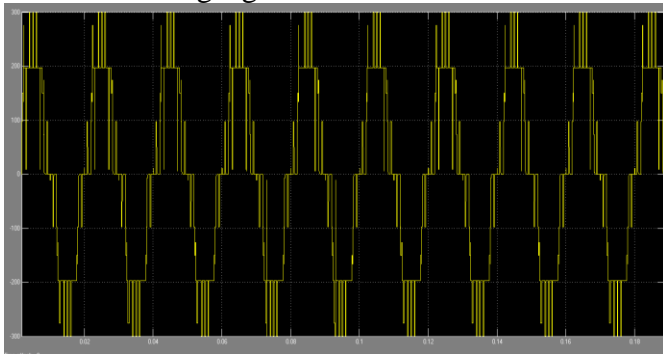
Fig. 6. Inverter output voltage (Vinv).
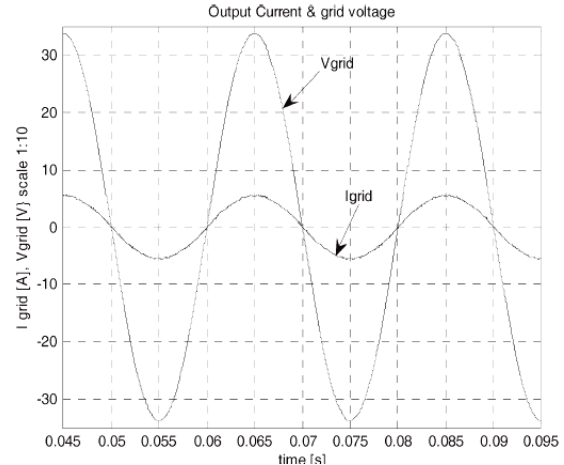
Fig. 7. Grid voltage (Vgrid) and grid current (Igrid).

One leg of the inverter operated at a high switching rate that was equivalent to the frequency of the carrier signal, while the other leg operated at the rate of the fundamental frequency (i.e., 50 Hz). Switches S5 and S6 also operated at the rate of the carrier signal. Fig. 6 shows the simulation result of inverter output voltage Vinv. The dc-bus voltage was set at 300 V ($> \sqrt{2}V$grid; in this case, Vgrid was 120 V). The dc-bus voltage must always be higher than $\sqrt{2}$ of Vgrid to inject current into the grid, or current will be injected from the grid into the inverter. Therefore, operation is recommended to be between $Ma = 0.66$ and$Ma = 1.0$. Vinv comprises seven voltage levels, namely, Vdc, $2V$dc/3, Vdc/3, 0, $−V$dc, $−2V$dc/3, and $−V$dc/3. The current flowing into the grid was filtered to resemble a pure sinewave in phase with the grid voltage (see Fig. 7). As Igrid is almost a pure sinewave at unity power factor, the total harmonic distortion (THD) can be reduced compared with the THD in [28].

VI. CONCLUSION

Multilevel inverters offer improved output waveforms and lower THD. This paper has presented a novel PWM switching scheme for the proposed multilevel inverter. It utilizes three reference signals and a triangular carrier signal to generate PWM switching signals. The behavior of the proposed multilevel inverter was analyzed in detail. By controlling the modulation index, the desired number of levels of the inverter's output voltage can be achieved. The less THD in the seven-level inverter compared with that in the five- and three-level inverters is an attractive solution for grid-connected PV inverters.

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AUTHORS

[1]**B.Dhivya,** received her B.E in Electrical and Electronics Engineering from Anna university, Chennai in 2012. At present she is pursuing M.E in Power Electronics and Drives, in sri shakthi institute of engineering and technology, coimbatore, Affiliated to Anna University, Chennai.
Her areas of interest are Power electronics, Multilevel inverter, Renewable energy system.

[2]**S.Dhamodharan,** received his B.E in Electrical and Electronics Engineering from Anna university, Coimbatore in 2011. At present he is pursuing M.E in Power Electronics and Drives, in sri shakthi institute of engineering and technology, coimbatore, Affiliated to Anna University, Chennai.
His areas of interest are Power electronics, Electric drives and control.

To Study the Role of Temperature and Sodium Hydroxide Concentration in the Synthesis of Zinc Oxide Nanoparticles

Mayekar Jyoti[a]*, Dhar Vijay[b] and Srinivasan Radha[c]

[a] Department of Physics, Bhavan's College,Mumbai-58, Maharashtra, India.
[b] Department of Physics, Jai Hind College, Mumbai-56, Maharashtra, India.
[c] Department of Physics, University of Mumbai ,Mumbai-32, Maharashtra, India.

Abstract- In this work, zinc oxide (ZnO) nanostructures were synthesized by using zinc chloride and sodium hydroxide as the precursors at different temperatures. The ZnO nanostructures obtained were characterized by X-ray diffraction (XRD), Scanning Electronic Microscopy (SEM), Energy Dispersive X ray Spectroscopy (EDAX).The ZnO powders have hexagonal wurtzite structure and nanometric-sized crystallites. The size of the particle increases as the reaction temperature is increased. An attempt has been made to find out the effect of temperature on the morphology as well as particle size and to optimize the value of temperature for stable smaller sized particles.Once the temperature is optimised effect of base concentration is studied. The base concentration is varied and different samples are synthesized for various base concentrations keeping the temperature constant. The basic idea is to design materials with the proper morphology, size, shape, and texture for desired application. The size of the particle is found to be directly related to ionic strength. Increasing the base concentration increases the surface charge density and hence reduces the interfacial tension. This paper is an attempt to optimize the base concentration for desired particle size and shape to render it suitable for Biomedical application.

Index Terms- Nanotechnology, Base concentration, Scanning Electron Microscopy Zinc oxide nanoparticles

I. INTRODUCTION

Zinc Oxide nanostructures (ZnO) are interesting to study not only because of their unique physical properties but also a wide variety of morphologies. Some of the ZnO nanostructures exhibit nanowire [1], nanorod [2], nanocomb [3], nanoflowers and nanosheet [4] like structures. The multiplicity of morphologies is the speciality of ZnO nanosystems that forms the basis of its versatile applications [5]. Several chemical methods like sol-gel, micro emulsion, hydrothermal, self assembly, homogenous, microwave assisted hydrothermal and direct precipitation have been reported for synthesis of ZnO nanostructures[6]. Zinc oxide (ZnO) is an n-type semiconductor displays a hexagonal crystalline wurtzite type structure, with space group P63mc and lattice parameters of a = b = 0.3250 nm and c = 0.5207 nm. ZnO has long been recognized as having inhibitory effect on the microbes present in the Medical and Industrial process. They were found to be highly toxic against different multidrug resistant human pathogens. In our earlier work we have studied the antibacterial property of these ZnO nanoparticles against Escherichia coli and Staphylococcus aureus[7]. ZnO nanoparticles have good biocompatibility to human cell [8]. ZnO has long been recognized as having inhibitory effect on the microbes present in the Medical and Industrial process. They were found to be highly toxic against different multidrug resistant human pathogens. ZnO nanoparticles have good biocompatibility to human cell.

Currently ZnO is documented as safe material by FDA (Food and Drug Administration, USA)[9]. In this paper an attempt has been made to standardize the method for suitable temperature and base concentration so that smaller particle size can be obtained as smaller particle sized nanoparticles show enhanced antibacterial activity. Although antibacterial activity of ZnO nanoparticles is investigated, the mechanism of the antibacterial activity of ZnO nanoparticles is not well understood. There are several methods which have been proposed to explain the antibacterial activity of ZnO nanoparticles. The generation of hydrogen peroxide from the surface of ZnO nanoparticles is considered as an effective mean for the inhibition of bacterial growth. It is presumed that with decreasing particle size the number of ZnO powder particles per unit volume of the powder slurry increases resulting in increased surface area and increased generation of hydrogen peroxide. Another possible mechanism for ZnO antibacterial activity is the release of Zn^{+2} ions which can damage the cell membrane and interact with intracellular contents[10].

In our earlier work we have studied the antibacterial property of zinc oxide nanoparticles synthesized using zinc acetate precursor and its application in bandages has been studied [11]. This paper is an attempt to optimize the value of base concentration for suitable particle size and morphology.

II. EXPERIMENTAL

Zinc chloride is dissolved in 100 ml of distilled water. It is stirred continuously with magnetic stirrer and its temperature is raised to 80^0 C. Once the temperature of zinc chloride solution is reached to 80^0 C, add 5M NaOH solution drop by drop touching the walls of container. The aqueous solution turned into a milky white colloid without any precipitation. The reaction was allowed to proceed for two hours after complete addition of sodium hydroxide. After the complete reaction, solution was allowed to settle and the supernatant solution was removed by washing with distilled water five times. After washing, the precipitate is allowed to dry in oven at 100^0 C for 2 hours [12]. Five samples sample 1,2,3,4 and 5 are synthesized using the above method by changing the temperature as 80^0C, 85^0C, 90^0C, 95^0C and 100^0C. For lowest

temperature particle size is lowest so the temperature is optimized and it is 80^0C. In the next part the temperature is kept constant at 80^0C while the concentration of sodium hydroxide is varied as 2M, 4M, 6M, 8M, 10M and again five samples, sample 6, 7, 8, 9 and 10 are synthesized.

III. RESULTS AND DISCUSSION

A. X ray Diffraction Spectroscopy

X-ray diffraction (XRD) was carried out on a XPERT-PRO X-ray diffractometer with Cu Kα radiation (λ =1.54060 nm) (applied voltage 45 kV, current 40 mA) at a scanning rate of $0.05^0 s^{-1}$ in the 2θ range from 20^0 to 80^0. About 0.5 g of the dried particles was deposited as a randomly oriented powder onto a plexi glass sample container. The crystal structure and orientation of ZnO nanoparticles have been investigated by x-ray diffraction method using Panalytical Xpert Pro MPD using the software Panalytical Xpert High Score Plus.

The crystallite size of the prepared nanopowder can be calculated using Debye Scherer formula,

$$d_{avg} = \frac{0.9\lambda}{\beta \cos\theta}$$

Where;

d_{avg} = Average crystal size,

λ= Wavelength of incident beam (1.5406Å),

β= FWHM in radians,

θ= Scattering angle in degree.

The lattice parameters a and c are determined using the formula

$1/d^2 = (4a^2/3(h^2 + hk + k^2)) + l^2/c^2$

As a=3.2508 A^0 and c=5.2108 A^0. The values obtained matches with the standard values (JCPDS Card No. 36-1451, a = 3.249 A °, c = 5.206 A °, space group:P63mc, No.186).

B. Scanning Electron Microscopy

The particle size using SEM data is approximately found to be 20nm, 30nm, 40nm, 50nm, 350nm for the samples 1,2,3,4,5 and 20nm,40nm,60nm,70nm and 350 nm for the samples 6,7,8,9 and 10.

Sample 1 consist of monodispersed and spherical shaped nanoparticles. As the temperature is increased further the shape of the particles is changed and size of the particles also increases. The particles take rod like morphology As the temperature is increased further the micron sized particles are formed having polygonal shape.

C. Effect of temperature on the particle size and morphology

Reaction temperature is an important parameter which influences the structural morphology of the particles as well as the particle size. As the reaction temperature is increased there is increase in the particle size. In heating process when the particles are formed, they collide and either coalesce with one another to form a larger particle or coagulate. The process which occurs depends upon the temperature and available energy, that's why particle size increases with increasing temperature.

D.Effect of base concentration on the particle size and morphology

Herein as we increase the concentration from 2M to 10M the particle size increases. The reduction of Gibb's free energy is the driving force for both nucleation and growth.

$$\Delta G = (-KT/\Omega)\ln(C/C_0)$$

Where C is the concentration of the solute C_0 is the equilibrium concentration or solubility, Ω is the atomic volume. From above equation we can see that as the concentration increases Gibb's free energy increases. To lower this energy the particles continues to grow unless the minimum energy required for stability is achieved. The hydroxyl ion concentration plays an important role for the morphology and size. After nucleation the hydroxyl ions excess in solution is adsorbed on the polar faces of growing particle i.e. it takes nano rod shape. For even higher concentration hydrolysis/condensation is uncontrolled then no
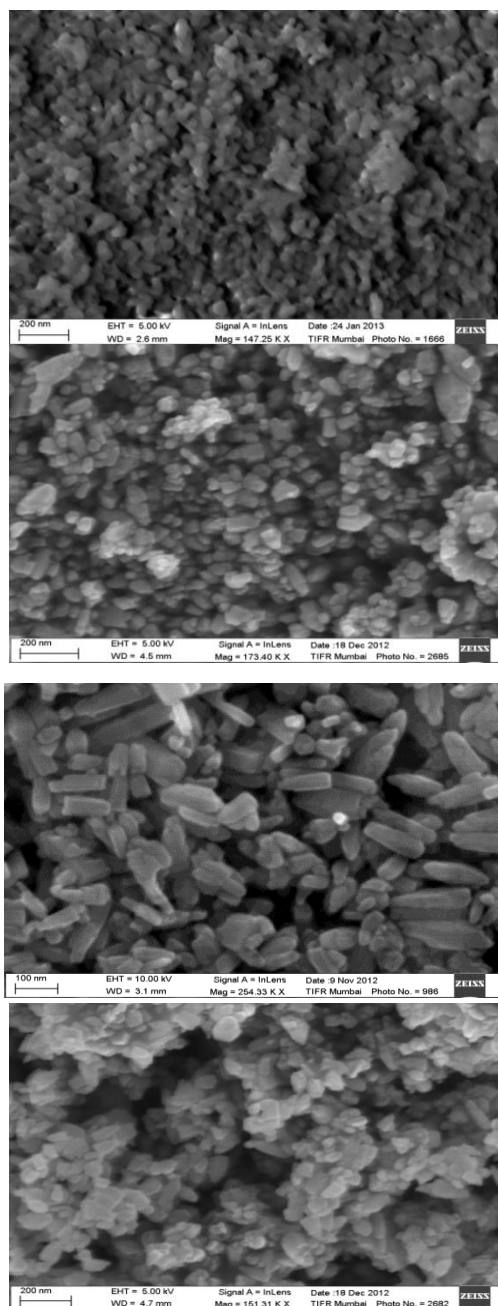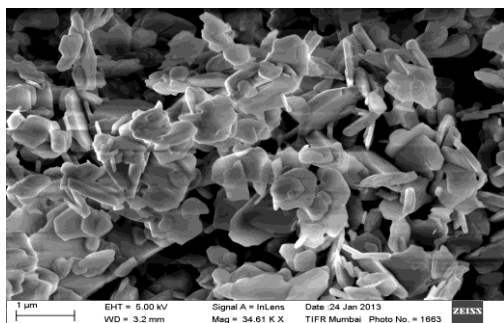
Fig 1: SEM Images of the synthesized ZnO nanoparticles at different temperatures 80^0C, 85^0C, 90^0C, 95^0C, 100^0C
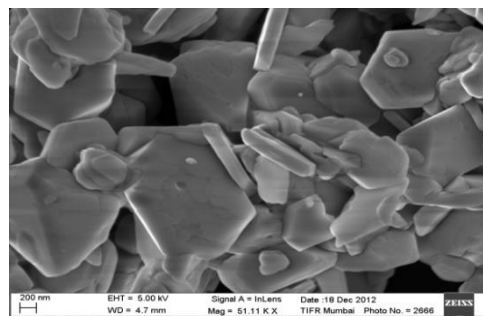
Fig. 2: SEM images of the synthesized ZnO nanoparticles at different molar concentrations of base 2M,4M,6M,8M,10M
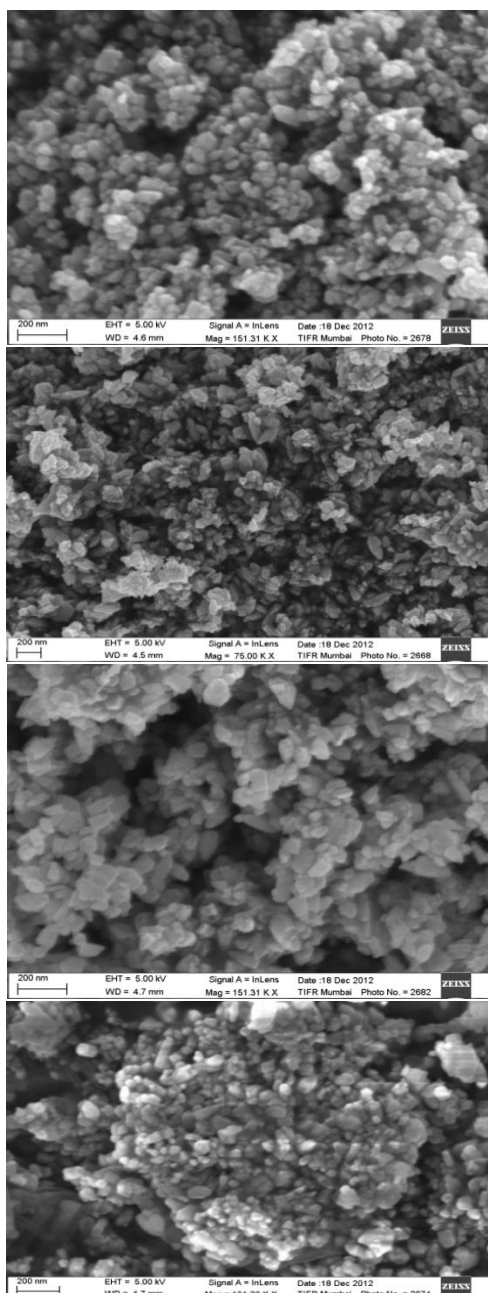
preferential growth is observed   along c axis and so the particles appear in quasi spherical shape. The critical size represents the limit how small nanoparticles can be synthesized. Critical size and critical energy is given by

$$r* = -2\gamma/\Delta Gv$$

and

$$\Delta G* = 16\pi\gamma/3(\Delta Gv)^2$$

where γ is the surface energy per unit area and ΔGv change of Gibb's free energy or volume energy.

To reduce the critical size and free energy one need to increase the change of Gibb's free energy, ΔGv and reduce the surface energy of the new phase.

IV.CONCLUSION

In this paper wet chemical method for synthesis of zinc oxide nanoparticles is optimized for suitable temperature and base concentration. The temperature and base concentration is having profound effect on the size and shape of the nanoparticles. The particle size increases with increase in temperature and with increase in base concentration. The possible reason for both the observation is explained in terms of Gibb's free energy associated with the nanoparticles. The particles acquire the shape and size in such a way so as to minimize the Gibb's free energy.

ACKNOWLEDGMENT

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AUTHORS

First Author – Jyoti Mayekar, M.Sc, Bhavan's College, Mumbai.
Jyot.nano@gmail.com
Second Author –Vijay Dhar, Ph.D, Jai Hind College, Mumbai.
Vsdhar@gmail.com
Third Author – Radha Srinivasan, Ph.D, University of Mumbai.
Radhasri12@gmail.com
Correspondence Author – Jyoti Mayekar,
jyot.nano@gmail.com,
Contact no. 9702253408

Need of Expert Determination before A.D.R.(Lok Adalat) in Land Encroachment Civil Suits (Suggested Method)

Sanjay Rambhau Salkute

Labour Court Aurangabad Maharashtra (India) Pin Code:- 431001

Abstract- In India, prior to implementation of scheme for Lok Adalat, parties used to compromise their matter as per provisions contemplated under Order 23 Rule 3 of the Civil Procedure Code, 1908 or by any other available Traditional ways. Then ,the Lok Adalat mechanisms was introduced, consequently, amended provisions of Civil Procedure Code, 1908, and Legal Services Authority Act,1987, provided more provisions.

Lok Adalat is an improved mechanism for Indian Citizens because it is based on the principles of Father of Nation Mahatma Gandhi. The entire process of Lok Adalat reflects that India is a democratic Country. The credit of originating this system for speedy justice to common man goes to Hon'ble Mr. Justice P. N. Bhagwati, the former Chief Justice of the Supreme Court of India who started Lok Adalats . Then , after the passing of Legal Service Authority Act in 1987, the decisions of Lok Adalats got statutory validity and now the concept of Lok Adalats have became a powerful legal instrument. Thus Lok Adalat system is to solve the problems, it is not for declaration of winner or loser.

Hon'ble *Shri. Justice Mohit S.Shah*, Chief Justice of the Bombay High Court at the inauguration of the conference of the Judicial officer on *"Enhancing Quality of Adjudication"* at Judicial Academy Uttan, Thane, address that, New Methods and New Roles are necessary in the Justice Delivery System.

During my study for M.B.A.(H.R.) from Sikkim Manipal University, I prepared Live Pilot Project on "Mentor Judge, To Decrease Old Pendency And Increase Rate Of Disposal In Civil Judge Junior Division And Judicial Magistrate First Class Bhiwandi " . I also studied on ADR mechanism. I compared Traditional Method, Provisions for Compromise cases as per Civil Procedure Code, 1908 and Present Lok Adalat System. I feel it necessary that there is need of effective mechanism to have expert determination in land encroachment certain cases which are to be referred before Lok Adalat. The main objective of my research was to find out new method, New roles in the Justice Delivery System. This suggested method for Lok Adalat was not included in Pilot Project.

This is a study paper for the need of expert determination, before referring the case for land encroachment to the Lok Adalat wherein I suggested new method. It is a method wherein in I made combination of process of Expert determination and Conciliation for Lok Adalat , and its management.

In this paper , I expressed my personal views that there is a need of expert determination in Lok Adalat system in Maharashtra. The cases studies as discussed below are literature study only. Case study shows that , Lok adalat system from ADR mechanisms is a very important system for Indian Citizens. The process of settlement by the parties , shows that, it is nothing but a settlement by number of person and that, it is so probable that

a prudent man ought, under the circumstances of the particular case, to act , upon the supposition that it exists. The advantages for Lok Adalat /ADR Systems are discussed in various papers , hence such literature portion is avoided.

The effect of suggested method shows that, after expert determination, the panel members of Lok Adalat and parties get ample opportunity to find out ways to settle the dispute. In my view, in certain cases , suggested method in Lok Adalat would be more inexpensive, efficacious and speedy justice accessible to the public.

Index Terms- Lok Adalat, encroachment map, land surveying, expert determination, ADR mechanisms

I. Background Study

Agriculture is a main profession of most of the Indian. Now a days , due to increase in population & Industrial Development , residential areas are increasing by converting agricultural land into Non-agricultural purpose therefore, the transaction to sale /purchase of land/ plot, is also inevitably increasing. In a sale-purchase transactions the title of land should be clear. If such title is defective then it gives cause to the law suits.

These civil suits are based on land survey map wherein it is observed that the defendant merely denies title of the plaintiff without specific pleading.

Such dispute are under following title :

- *Suit for removal of an encroachment,*
- *Suit for Injunction,*
- *Suit for possession*.

In most of certain cases, it is noticed that, the parties were ready to satisfy their claims, if the land is measured / located properly. This is one of the probability to overcome from the allegations of making an encroachment over the land. Then in such circumstances only question remains ,

Whether an encroachment is committed or not?.

While proving land encroachment , the map drawn for cause of action plays major role. In old days there was traditional system to settle dispute by Mukhiya (Head of Village). Following is a short story may explains background for my studies :

In a village a dispute arose due to use of improper ball pen while writing/ taking subsequent entries in Revenue crop statement in a Marathi Language digit   seven (Sat) (**7**) and

eight (Aath) (**8**) , where only half circle and if drawn long line then it will look like a digit eight (Aath).

An old man aged about 79 years from a remote village, by applying common sense used to solve disputes in a legal form. He was well known as "**Aaba**." He was also an agriculturist.

In the village , since last 10 years, two brothers were cultivating their field. Their father in his life time effected partition of a field by erecting/constructing small boundary (Dhura) in the middle portion of the field. After the death of father, both brothers effected oral family arrangement .

Tukaram made complaint oral complaint at Aaba that the brother Ramesh committed an encroachment over half acre of land. **Aaba** made inquiries, Ramesh denied committing any encroachment. Then brother Tukaram disclosed that, before two days, his son Namdeo brought private land measurer/surveyor. Said measurer measured the field, accordingly, an encroachment found. Then he had been to Lawyer to take legal action who advice him to issue notice and then to file suit for removal of an encroachment.

Aaba asked both brothers to show crop-statement and record-of-right and map drawn by private surveyor. Then he asked both brother to come on spot with all documents. They were also asked to call their family member, relatives and private measurer who drawn map.

Aaba called Surpanch (village Head) and village members, Police-Patil, Patwari (Talathi-Revenue officer- with relevant all record about the field in dispute), adjoining landholders of the said area and other respectable persons from village.

They went at the disputed field. They saw boundaries of entire field were not damaged. A small dhura (boundary) between the fields was maintained with more precautions. Then **Aaba** asked to the private measurer to measure both portions. Each portion found with area three acres and about twenty gunthas. It means both brothers were in possession of equal share**. Aaba** asked the Talathi (Revenue Officer) to show the survey map of the field. As per Government Survey map the area of the field was only Seven acres.

In the old revenue record, the area of the field was also shown seven acres but in meantime due to the use of ball pen or might be by mistake, the length of digit seven (Marathi language digit) was longer than ordinary course and half circle was not clearly impressed/drawn. So that, the digit (seven) Sat in Marathi Language was really appearing like Aath (eight), and said entry was continued in the subsequent record.

Thus, the Dispute between brothers was settled .

In Maharashtra State, there are two departments for Land Records. They covers under Maharashtra Land Revenue Code ,1966 , its rules and Manual . There is separate Department for the land measurement. Both departments have separate powers, duties but they are correlated to each other. In Maharashtra Land Revenue Code, 1966 , there are provisions are for removal of an encroachment over Government Land or Local Authority. There is no provision to settle the dispute for private land holders. Civil Court is the only forum for such causes.

Such civil suits are individuals disputes . I studied to determine the causes of land disputes and mechanisms for settling those dispute through Alternate Resolution Dispute mechanisms. I noticed that a new method is necessary to settle such conflicts.

I found frequent causes for such dispute as :-

- *Dispute for boundary conflicts.*
- *Dispute due to incorrect description of land.*
- *Dispute due to holding incorrect portion of land.*

Under section 110 of the Indian Evidence Act,1872 , Burden of Proof as to ownership. Such possession should be over the exact position of the land , that was drawn from the title. Therefore I also studied Land surveying to find out position of land.

To prove encroachment over land, the map is material document. *Under Order VII Rule 3 of Code of Civil Procedure 1908*, in case of a boundary dispute or where there is any possible doubt about the identity of the land in dispute, it is essential that a good plan of the land should be put in. As per Bombay amendment dated 1 November 1966, in cases of encroachment an accurate plan shall also filed along with the plaint. As per Bombay amendment dated 1-10-1983, In case of encroachment, sketch showing as approximately as possible the location and extent of the encroachment shall also be filed along with the plaint. Section 83 of the Evidence Act,1872, lays down that the court shall presume that maps or plans purporting to be made by the authority of the Central Government or any State Government were so made and are accurate. However, maps or plans made for the purpose of any cause must be proved accurate. Thus the onus proving that such a map in accurate lies on the party who produces it.

To ascertain the description of the title deed or relevant documents, I studied Maharashtra Land Revenue Code, 1966 and related laws for Registration of sale transaction . In fact, basic concept of such Lok Adalats is not new for Indian Citizens. In India there was traditional well known Panch Committee system. However, in such Panch committee there was less probability to compromise the matter in the legal form. Then the Lok Adalat mechanisms was introduced . In amended civil Procedure Code, 1908 and Legal Services Authority Act, 1987 , material provisions are provided.

The name " Lok Adalat" , means, People's Court. "Lok" stands for "people" and the vernacular meaning of the term "Adalat" is the court. It is a system that comes under ADR mechanism. The purpose of the Legal Services Authorities Act, 1987 is to promote justice on the basis of equal opportunity. Lok Adalats are playing very important role to advance and strengthen "equal access to justice", the heart of the Constitution of India. Disputes can be settled in a simpler, quicker and cost-effective way at all the three stages i.e. pre-litigation, pending-litigation and post-litigation. Thus, disputes can be brought before the Lok Adalat directly instead of going to a regular court first and then to the Lok Adalat. There is no court fee and even if the case is already filed in the regular court, the fee paid will be refunded if the dispute is settled at the Lok Adalat.

Lok Adalat may take cognizance of cases, as per Section 20 of the Legal Services Authority Act where:(I) (a) the parties thereof agree; or (b) one of the parties thereof makes an application to the court for referring the case to the Lok Adalat for settlement and if such court is prima facie satisfied that there are chances of such settlement; or (II) the court is satisfied that the matter is an appropriate one to be taken cognizance of by the

Lok Adalat, the court shall refer the case to the Lok Adalat : Provided that no case shall be referred to the Lok Adalat by such court except after giving a reasonable opportunity of being heard to the parties.

The Lok Adalat is presided over by a sitting or retired judicial officer as the chairman/ Panel Judge, two other members/ Panel Members, usually a lawyer and a social worker.It involves people who are directly or indirectly affected by dispute resolution. The parties to the disputes though represented by their advocate , parties can interact with the Lok Adalat Panel, directly and explain their stand in the dispute and the reasons therefore, which is not possible in a regular court of law. Thus, the salient features of this form of dispute resolution are participation, accommodation, fairness, expectation, voluntariness, neighbourliness, transparency, efficiency and lack of animosity.

The section 22 speaks that, the procedure to be followed at a Lok Adalat is very simple. Section 20 (4) shows that, Every Lok Adalat shall, while determining any reference before it under this Act, act with utmost expedition to arrive at a compromise or settlement between the parties and shall be guided by the principles of justice, equity, fair play and other legal principles. The Lok Adalat does not strictly follow the procedural laws, and the Evidence Act , 1872 ,while assessing the merits of the claim. Parties compromise their matter which is always a bilateral and means mutual adjustment. If no compromise or settlement is or could be arrived at, no order/Award can be passed by the Lok Adalat. If both parties agree for settlement then Award has to be pass. Such Award shall be deemed to be a decree of a civil court and shall be final and binding on the parties to the dispute. No appeal lies against the order of the Lok Adalat. As per Section 22 of the Legal Services Authority Act the Powers of Lok Adalats are same powers as vested to Civil Court under Civil Procedure Code, 1908 as ,(a) The summoning and enforcing the attendance of any witness and examining him on oath; (b) The discovery and production of any document; c)The reception of evidence on affidavits; (d) The requisitioning of any public record or document or copy of such record or document from any court or office; and (e) Such other matters as may be prescribed. (2) Without prejudice to the generality of the powers contained in sub-section (1), every Lok Adalat shall have the requisite powers to specify its own procedure for the determination of any dispute coming before it. Thus, it is a dispute resolution mechanism that focuses on the root cause of the dispute .

Material Case law : *State of Punjab and Anr.--Vs. Jalour Singh and Ors. Reported in AIR 2008 SC 1209*

The Hon'ble Apex court pleased to discuss , "*8. It is evident from the said provisions that Lok Adalats have no adjudicatory or judicial functions. Their functions relate purely to conciliation. A Lok Adalat determines a reference on the basis of a compromise or settlement between the parties at its instance, and put its seal of confirmation by making an award in terms of the compromise or settlement. When the Lok Adalat is not able to arrive at a settlement or compromise, no award is made and the case record is returned to the court from which the reference was received, for disposal in accordance with law. No Lok Adalat has the power to "hear" parties to adjudicate cases as a court does. It discusses the subject matter with the parties and persuades*

them to arrive at a just settlement. In their conciliatory role, the Lok Adalats are guided by principles of justice, equity, fair play. When the LSA Act refers to 'determination' by the Lok Adalat and 'award' by the Lok Adalat, the said Act does not contemplate nor require an adjudicatory judicial determination, but a non-adjudicatory determination based on a compromise or settlement, arrived at by the parties, with guidance and assistance from the Lok Adalat. The 'award' of the Lok Adalat does not mean any independent verdict or opinion arrived at by any decision making process. The making of the award is merely an administrative act of incorporating the terms of settlement or compromise agreed by parties in the presence of the Lok Adalat, in the form of an executable order under the signature and seal of the Lok Adalat.

9. But we find that many sitting or retired Judges, while participating in Lok Adalats as members, tend to conduct Lok Adalats like courts, by hearing parties, and imposing their views as to what is just and equitable, on the parties. Sometimes they get carried away and proceed to pass orders on merits, as in this case, even though there is no consensus or settlement. Such acts, instead of fostering alternative dispute resolution through Lok Adalats, will drive the litigants away from Lok Adalats. Lok Adalats should resist their temptation to play the part of Judges and constantly strive to function as conciliators. The endeavour and effort of the Lok Adalats should be to guide and persuade the parties, with reference to principles of justice, equity and fair play to compromise and settle the dispute by explaining the pros and cons, strength and weaknesses, advantages and disadvantages of their respective claims."

II. RESEARCH STUDY

During the pilot project '*Mentor Judge, To Decrease Old Pendency And Increase Rate Of Disposal In Civil Judge Junior Division And Judicial Magistrate First Class Bhiwandi* ' .The aim of the project was to find out to new method to reduce backlog of cases.

On the basis of literature studies, I suggested new method for certain cases. It is useful literature study to identify opportunities to improve future process and enhance the dispute resolution capability. It ensures transparency and build confidence. To identify opportunities to enhance present Lok Adalat (ADR) mechanism.

Section 22 of the Legal Services Authority Act , 1987, provided Powers requisitioning of any public record or document or copy of such record or document from any court or office. Due such provision , Revenue Records or land survey map can be called but in my study I found that, mere calling such record is not sufficient to settle the matter before Lok Adalat. The section 22 of the Legal Services Authority Act, 1987 , further speaks that, such other matters may be prescribed in the Civil Procedure Code, 1908. Provisions under Section 75 of Code Of Civil Procedure,1908 speaks Power of Court to issue commissions. Rule 9 of Order 26 of Code of Civil Procedure,1908 is a provision for commission to make local investigations . To prove the fact for encroachment over land . The court may appoint commissioner to locate the boundaries but commissioner can not appointed to collect the evidence. Thus due to said provisions, the lands of both parties can be measured

by appointing commissioner . By the Joint measurement of both / disputed land before the parties, the actual position of land comes through measurement map. If the joint measurement map is not disputed by the parties , then for the remaining claim, the matter can be referred before Lok Adalat.

During the Lok Adalat actual process, such Joint measurement of land activity can not be carried out. It means, prior to referring the matter before the Lok Adalat some material activities has to be carried out by the Court , it may be called as pre-lok adalat activity or Expert Determination. I studied that, if required, Expert Determination is called prior to referring certain cases before Lok Adalat ,then rest of claim of the parties can be settled before the Lok Adalat.

The object of Legal Services Authority Act is that, the compromise / settlement should be legal. It should not be imposed compromise or consent given/taken should not be due to lack of knowledge or other factors. As per Indian Evidence Act,1872, before the regular trial , for some technical or scientific points, the court may call opinion from expert person. Then , if the fact before Lok Adalat is based on scientific or technical aspects then question arose , whether the Lok Adalat Panel member or members have experience or qualifications in that field to settle the matter without taking aid of Expert Determination . I studied the Lok Adalat Panel can promote settlement such matters that are not mainly based on scientific or technical aspects.

(i) Statement of the problem

I noticed that , major cause of the dispute was for land encroachment, boundary disputes . Some disputes were not really for land encroachment , but those disputes were filed in that fashion. In such suits there was defects in the description of title or at private map/ agreed map. In certain cases , opposite party pleads various defences. But they did not seriously contest it. Both parties desires to know exact position of their lands. In such circumstances, only question remains:

[1] *Whether encroachment is really committed ?*

[2] *Whether the Land encroachment suit can be referred before Lok Adalat, without Expert determination ? .*

(ii) Data collection

Land Revenue Records, Survey Records, map filed for cause of action. Pleadings by the parties, documents and survey map .

(iii) Lok Adalat Pre-Process / Expert determination

Ordinarily, the Land measurer, measures lands as per the portion in the possession of the parties. Party shows his possession and measurer measures it.

It would be appropriate place to share my observation in respect of mentality of Indian Citizen. I often found that he only believed and blindly trust upon the land measurer who draws map in his favour. He does not accept that, there might be any other position on the land. Even , he does not trust to joint measurement map of lands, if it goes against him.

Alternative Dispute Resolution is a process of resolving disputes by arbitration, mediation, conciliation, expert determination and early neutral evaluation by a third person. Mediation and Conciliation require an independent third party . If the subject is technical then, the expert determination requires independent experts in the subject of disagreement of the parties to decide the case. Such expert is chosen jointly by the parties and the decision is binding. It may be called as fact finding process .

Expert determination is a process in which the parties to a dispute appoint a neutral and independent expert in Land Measurement/surveying, to make a final and binding determination on a dispute . In such determination , the parties must be agree in advance that they are bound by the opinion of the expert measurer ,if he really carried out measurement as per the Law and Rules.

Therefore, in the Expert determination process before Lok Adalat, the Joint measurement of Land is required to be carried out with the consent of parties . It should be carried out , from the suggested expert land measurer or expert from Government Survey department . During joint measurement of land, Both parties should give an opportunity to bring their own measurer to watch measurement method I.e. whether the expert measurer is measuring lands correctly or not. The counsels for parties are also required to remain present at the time of such measurement . An expert measurer should explain each stage , its distance as per survey map and measured distance and then record such entries in his map, in presence of both parties, watching measurer,and counsel. Expert measurer has to apply more advance method so that the joint land measurement map should be drawn at the spot. Then to send said drawn map along with its report to the referring court.

The quality of assessment of disputes to refer before Lok Adalat is important factor. It is necessary to make proper assessment of case, location of land, litigants position to avoid the cultural barriers. A lack of access to information may also create a barrier to use of Lok Adalat. It is necessary to know litigants the type of process, how it differs from the regular court process .

As per my study, the following steps are necessary:-

Steps for suggested method (In brief):

Step 1: At Quarterly period , **Court owe a duty to examine all cases to find out whether they are fit cases for reference to Lok Adalat and there is a need for constant efforts on the part of the Bar.**

Step2: The referring court has to refer the matter to expert determination by the consent of the parties . The parties may suggest name of land measurer or may intimate to appoint surveyor from the Government Department. Then court has to call consent from appointed/intimated measurer. In said consent, the measurer to mention fees for land measurement and what will the procedure or instrument to measure the land. Then both parties has to deposit equal amount for fees in the court. Parties to file xerox copies of documents for their claim/defence in order to send to measurer. Then send writ to measurer wherein it is necessary to mention next date to file map & report.

Step 3: On receipt of Writ , the measurer to fix its schedule for measurement of the land . He should sent notices to parties by speed post or by hand . In the said notice it is necessary to mention that, the parties may come at fixed date with their counsel , family members, relatives , friends and own measurer(to watch process of expert determination). It is also necessary to

inform to parties to come with their documents, record for the land in dispute. Measurer to issue notices to adjoining land holders, village head, revenue officer of said area. In all these notices, the measurer has to mention as to what method,instrument will be used in land measurement.

Step 4 : Measurer has to take signature of persons to whom notices were given. Then he has to carry out measurement of land.

Step 5: The land should be measure as per the Survey map carried out by the Government Department and as per the provisions of Land Measurement Manuals and Maharashtra Land Revenue Code, 1966 . Measurer to find / trace out the original survey mark , that may be at any distance. By applying two points theory or any other method , then to find out / confirm another survey mark. From the confirmed two survey mark, then reach upto the disputed lands . By this way to find out / restore , lost survey mark of the lands in dispute. May apply different tests , methods to measure land and correct mathematical formula, calculations for coming opinion.

Step 6 : Draw map at the spot . Take signature of all person to whom notice was given and signed by both sides, counsels, revenue officer , etc all related persons over the drawn map.(Video recording for the stages from 3 to 5 , that may help, if any controversy arises at any stage)

Step 7 : Prepare report of entire process and map and send to the court.

Step 8: Then referring court to refer the matter to Lok Adalat as per the provisions of the Civil Procedure Code, 1908.

Step 9:- Make provision for Video Conference, if the parties desire to participate its any relative , friend at the actual process before Lok Adalat Panel.

Step 10: At Lok Adalat, if the matter is settled, send report to referring court. Lok Adalat panel to send short report to District Legal Aid office, stating success , its mode and feedback any given by parties.

Step 11: District Legal Aid to carry study for adopted new logic by Lok Adalat panel to settle the dispute. Such new logic may be helpful for future Lok Adalat.

It is suggested method on the basis of Laws applicable in Maharashtra State (India) .It is important to remember that geographical condition of land and interest of the parties are different. Therefore it is expected that , if such suggested method is adopted by applying relevant laws then it should meet specific needs of the said area. Such method can be expand upon some ideas. In my study, I found that, there is no " right way" to design a fixed program.

Case Studies(for suggested method): *(Note :It is a brief discussion for logic applied to each cause)*

*1 . **Case for non-sanctioned layout that affected to the sanctioned layout***

Facts of case :- In a big lay out wherein near about 90% plot holders constructed their houses. When complainant measured his own plot, he found that, towards Eastern side, the an encroachment was committed by the opposite side party.

Expert Determination :- When the entire layout was measured it revealed that, there was another layout towards Eastern Side . It was non sanctioned layout. The holders of non sanctioned layout moved towards their Western Side for 10 feet and constructed

their houses as per their non sanction layout map. Therefore holders of non sanctioned layout moved towards Western Side portion of the layout of the plaintiff. Said cause may create many civil suits .

Settlement : - In this case , there was no role of defendant to make an encroachment but due to the above mistake the litigation was filed. The opposite side (Western Side) holder shown his willingness to purchased the remaining plot of the complainant and the dispute was settled. (Like this ,by way of pre-litigation the other holders have also settled their claims)

*2 . **Case for purchasing land without verifying own title***

Facts of case : - One cultivator/ owner was in need of money so after converting land into non-agricultural purpose , he sold plots without the sanctioned map. The complainant purchased one of the plots. After 5 years ,when the complainant had been to the spot and found that there was a house constructed by the defendant. On making inquiry the defendant produced his sale deed. The complainant measured his plot through private surveyor and in that measurement it was shown that, the defendant committed encroachment over the entire plot. The defendant also brought his own map in which his private measurer shown that the defendant did not commit any encroachment.

Expert determination :- In the sale deeds of both parties only plot numbers were mentioned. Three sides of plots were with descriptions of plot numbers only. Road was shown towards Southern side. Both sale deed were without map to show its correct position. The measurer of the complainant measured the plot as per Survey map of the field. In fact there was no sanctioned layout so on basis of the boundaries shown in the sale deed of the complainant, without layout map, it was difficult for him to ascertain the location . Thereafter , the defendant brought copy of the alleged non-sanctioned layout, then on superimposition it revealed that, the entire plot of the complainant was shown in the land owned by adjoining holder.

Settlement :- At the pre-assessment stage, shows that, Such dispute can not be settled in Lok Adalat because , While purchasing any field or plot the purchaser has to make some inquiries to avoid such disputes as:-1.See mutation entries to verify Tenancy rights, any other right or interest, like road for other cultivators, any debt from Bank. Whether there is need of permission from any authority.2.While ascertaining the title, see whether it is an ancestral property or self acquired property, any share from other person and objection from other person ,interest of minor etc.3.Take search report from the Sub Registrar office. 4.For precautions, give public notice, if doubt about title or right or interest .5.Verify the Survey Map and confirm about the area shown in the record of right and whether there is a separate map for the alleged portion or recorded map. 6.Make inquiry about any dispute pending for encroachment.7. As far as possible, before executing the sale deed, measure the land from authorized agency to confirm the location and extent. After purchasing the property, if the share purchased is not recorded in the whole map of the said field or plot, then follow the provisions of Maharashtra Land Revenue Code and its rules to make partitions and to record entry in the survey map.8.See about compliance of provisions of Fragmentation Act, Land Acquisition Act, Tenancy

Laws, and Ceiling Act etc. While purchasing the plot from City then see:-(In addition to above relevant points)1.Go through the title deed .2.Verify the town planning map ,city survey map.3.Verify debt from Bank 4.Verify about Slums Act 5.Take search of the property from the Sub registrar office.6.Whether the lay out is sanctioned layout or not.7.Whether it is duly converted land.8.Whether it comes under any prohibited zone.9.Whether permission from any authority is necessary.

3 . Case of purchasing land without making enquirers:

Facts of the case: A businessman/complainant purchased a field 2 Acres 2 Gunthas from his debtor (VENDER/SELLER) on the basis of 7/12 (revenue record) extract. The seller mentioned the boundaries of field. Actually, since long seller never cultivated his land. So he was not aware for actual boundaries. Complainant filed suit against defendant for encroachment of land area 1 Acre 2 Gunthas and also made party to his vendor.

Expert Determination :- Measurer visited to spot. He collected information from Sub-Registrar of sale deed. The seller/vendor had already sold most of area from his land to adjoining land holders. Measurer measured entire land as per sale deeds. It revealed that, at the time of sale deed in favour of plaintiff, only one acre land was owned by the seller /vendor. In fact before three months ago from the sale deed of complainant, the vendor sold 5 acre land but said entry was not recorded in the revenue record . Therefore the Sub-Registrar office might have registered the sale deed of the businessman/complainant , otherwise due to fragment, the sale deed could not register. Only one acre area land was owned by the seller. He sold it to complainant. Said one acre land being fellow land was in use of adjoining landholder/defendant for keeping cattle's , bullock cart, Tractor etc. as a temporary use.

Settlement :- In the settlement it was decided to purchase 01 acre land by the defendant as per market rate.(The complainant could take action against the /vendor seller for cheating him, but he counted his own time, required money for the said action.).

4 . Case for small layout in a city

Facts of case : In a city, a complainant purchased a plot from newly sanctioned layout. After one year, he desired to construct his house. When he measured his plot, he found that, towards Northern Side, the defendant encroached over 1 foot by 40 feet land strip. Before constructing house the defendant also measured his own plot.

Determination :- When all plots in the said row were measured then it revealed that, the survey stone fixed at the Northern side was moved or disturbed by one feet towards Southern side and therefore all plot holders measured their plots from the said Northern side stone thereby all of them committed an encroachment over the plot of each others.

Settlement : -In settlement, both parties realized the actual fact. The complainant had given up his rights over encroached portion 1 foot by 40 feet to the defendant . The defendant agreed to construct the common compound wall at the Northern side and bear the expenses for it.

5 . Case for Partition of an Ancestral / Joint Family Land

Facts of case :- An ancestral/ joint family irrigation land ad-measuring area 5 Hectors was divided between family members. Dispute arose when five cousin were in possession of their shares . Each should be in possession of 1 Hectare land. The complainant was in possession of 2 acres and 10 Gunthas land. It means 10 gunthas land was less in his possession. Complainant started to claim against the adjoining brother because the adjoining brother was in possession of more land.

Expert Determination : -There was no boundary mark to show an encroachment. The grandfather of the parties had five sons. When the grandfather was cultivating the field at that time only 2 acres 10 Gunthas was under irrigation. While making partition, the irrigated portion was given to the share of father of the complainant. Rest of land 10 Gunthas was left for the purpose of road . The grandfather had effected partition privately and it was not recorded in the Revenue Department or Survey Department.

After the partition, sons (Fathers of parties) started to cultivate their shares separately. After some years they purchased land touching to their shares and started to cultivate through other convenient road from the subsequent purchased lands. They stopped to use the previous undeveloped road of 10 guntha land.

Now ,really the adjoining brother was cultivating the portion 10 Gunthas land of common road. Previously common road was owned by all five brothers. But it was useless for other three brothers because of fencing to their lands. To divide previous road land 10 guntha area means to give 2 gunthas area to each brother .

It was expected by the complainant that, the T.I.L.R / measurer should show four boundaries and alleged road land. The T.I.L.R / Taluqa Inspector of Land Measurer , can show only recorded boundaries in its register/survey map . The partition in dispute was not recorded in the survey map.

Settlement :- While compromising the matter ,the adjoining brother who was in possession of more land he paid market value of two gunthas land each to his four cousin.

6 . Case for proved encroachment but geographical position was different

Facts of the case : - Complainant was that, the defendant committed encroachment. The defendant contended that, since long years he is cultivating the alleged portion of land and did not commit an encroachment.

Expert Determination :- The actual location of the land was as: Previously the both portions of land was a Whole Survey number. The land in the possession of complainant was at lower level about 5 feet than the land of defendant.
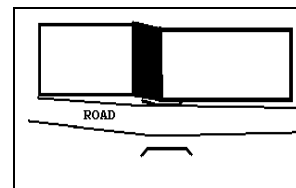
After the measuring the entire survey number. Area one guntha land was found in possession of the defendant.

*Settlement : -*Due to the above location, understanding was given to the defendant that, his plea mere to claim adverse possession is not sufficient. The one acre land in dispute was not useful for the complainant because it was at 5 feet in height. The defendant could use it in a better way. Then the matter settled wherein in the defendant agreed to purchase one acre of disputed land. Thus while considering terms of compromise and to give end to dispute , following points were considered :The actual geographical situation. Utility of the land in dispute.

7 . Case wherein the complainant was a new purchaser of part of land from whole land

Facts of case :- One of the share holder of the land, sold his share to complainant. The complainant alleged that, defendant committed encroachment over the purchased land.

Expert Determination :- Name of Ten shares of cultivators were shown in the 7/12 (Revenue Document) extract. There was no recorded map for their share. When the entire land was measured then it revealed that, all share holders were not in possession of their actual share. The share in the name of cultivator was actually in the possession of another share holder ,but the crops entry was taken in the name of the actual share holder. The land measurer shown the portion of land of complainant but it was in the possession of another share holder/defendant. It means all holders were in fault but it was not their intention to commit trespass.

Settlement :- In the settlement, Lok Adalat Panchas" gave understanding about actual situation as it was also not known to the vendor. Complainant and defendant executed exchange registered deed. The matter was settled.

8 . Case due to wrong mathematical formula for calculation

Facts of case : - The complainant measured the land from land measurer and filed civil suits against all four adjoining land holders/defendants.

Expert Determination: The land measurer of the complainant had only measured length and width. He applied mathematical formula to find out area of Square. When the expert measures measured land and it was cleared that the shape of the land was like a Kite(Quadrilateral).

Settlement: - By applying formula for Square and Formula for area to be drawn shape like Kite (Quadrilateral) were compared. Geographical position was brought through map drawn by expert. Without any terms the matter was settled .

9. Case of Partition map :

Facts of case :- Three brothers orally partitioned their plot. Then after one year, they measured the plot from private surveyor. Then as per the share shown in the private map they constructed their houses over it. After constructions of houses, One of the brother /Complainant measured the entire plot through government surveyor. In the said measurement it was found that the opponent brother encroached over 2 feet by 40 feet area towards Eastern side, i.e. over the plot of the complainant.

Expert Determination : The Land measurer measured the entire plot as per the city survey map. All boundaries for entire plot were correct. Then he measured , internal portion as per the

partition map of the parties. The partition map of the parties was not recorded map. It was agreed map between the parties and they acted upon said agreed map.

Settlement:- It was fault by all brothers to partition the land without help of city survey map and to record map at government department. They agreed and acted as per private map drawn for their partition. Partition map was their agreed map. In settlement, they agreed to continue to act as per private map in future and to record partition map at the concern department.

10 .Case for Reserve Forest Land:

Facts : Plaintiffs filed suit against Forest department and prayed that the forest department be restrained from demolishing construction over suit land. The builder purchased land from original owner and constructed building. All members purchased their flats from builder by availing loan from Banks or State Government. It was alleged that, the plaintiffs are members of co-operative society. The defendant Forest department filed say that, it is reserve forest. It was declared as reserve forest long before. It is contended that the plaintiffs made encroachment over reserve forest land. The plaintiffs moved application to refer matter before Lok Adalat.

Lok Adalat process: The Revenue record (7/12 extract) shows the name of original owner. The builder purchased it from original owner by registered sale-deed . The builder applied to authority for non-agriculture purpose, then permission to construct . All authorities sanctioned the plan of the builder. The plaintiffs purchased by availing home loan from Government or Banks. Then they formed co-operative society.

The document filed by Forest department shows that, the land in dispute was private land. It was declared as reserve forest long before the sale deed of the builder. The Reserve Forest land was published long before in the Government Gazette.

Settlement:- The Government published Gazette for Reserve Forest. The revenue department might not have recorded entry for reserve forest. All the Public authorities or Government department who sanctioned construction, home loan might not have make inquiries for the status of land. In all probabilities, it is for the Government to take decision for such disputed land and construction . Such matter can not settle in Lok Adalat. Even such matter is not suitable for expert determination or can not be refer before Lok Adalat.

11 .Case for Wrongly Identified Location / Plot

Facts : The plaintiff was a clerk in government department. In the year 1970 plaintiff purchased plot no.17 (sanctioned layout). It was not developed area. Plaintiff was residing in Tenanted premises. His job was transferable job. He did not visited to the spot for a long period. After his retirement, when he visited to the plot , he found that the defendant constructed house and was residing in it. He filed suit for removal of an encroachment and possession of the plot no.17 .The defendant was a Bank Manager. The defendant contended that, in the year 1981 he purchased plot no.70 through the estate broker. He availed loan from Bank and after taking permission from the local authority & constructed house.

Settlement:- The sale deeds of both parties shows that, the plaintiff purchased plot no.17 that was near to the road. The plot

no.70 was at far from the road . In fact it was a last portion of the entire layout. The bank loan documents, local authority permission shows that, said loan and permission was granted for plot no.70. The defendant disclose that the estate broker shown plot no.17 as plot no.70 so he constructed house and being near to the road , he purchased it .

During settlement it was decided to execute exchange deed between parties. The plaintiff got plot no.70 and difference of market value amount for plot no.17. So that he could construct most of portion of his home. Mere on the basis of sanctioned map and other documents the matter settled. Matter was not sent for expert determination.(Dispute might have been caused due to wrong pronunciation in English language as Seventy or Seventeen).

III.   EVALUATION FOR SUGGESTED METHOD

Indian citizen has habit to live and accept opinion of his own society . He do not dare to take some decisions independently , when the matter is concern with his business or family occupation. Lok Adalat Panel (three persons) applied their mind to find out solution. The expert determination also played role to bring actual situation of land . Two parties applied their mind. The parties were free take opinion of their counsel, relative, friends who were called by them.

The case studies as discuss shows that, no two disputes are alike and no same formula /logic to settle such matter can be applied. The Revenue Record , survey map and map for cause of action should be understood. In my study I found that, such expert determination depends upon the facts and circumstances of the each case. It is limited procedure. It helps to the Lok Adalat panel to identify the goals and interest of each parties before they become deeply entrenched in their positions and litigation commences. Such joint measurement map helps the parties to evaluate the soundness of their position. It gives confidence to them to find out reasonable settlement offer. Thus, the Expert determination process provides information that due to correct measurement of land, the most of conflict can be settled. In such process neither party has a burden of proof to establish technical fact. The Lok Adalat Panel members did not determine any fault. They always tried to identify the issues, explore settlement solutions. They focus on the issues and interests and not the personalities of parties in dispute. They tries to find out possible solutions. The parties had power and authority to explore options to resolve an issue in dispute. The parties   will have to implement and live with any agreement reached.

Expert determination may help for non giving birth to any such cause of action from the basis of incorrect revenue record or incorrect map, if matters are referred at Pre-litigation stage. Thus that Pre-litigation would be nothing but, "*Prevention   is better than a cure*".

IV.   ODR (ONLINE DISPUTE RESOLUTION)

e-courts and ODR are the two most important uses of technology for dispute resolution and reducing backlog. The ODR is complementary system so I studied cultural factors including customary roots, data collection, data analysis. More participation is possible so that more interest of concerns can be settled. In this system, it is possible to take opinion of third person who may be expert in that field. Parties may also consult to   others.   Suggested   Videoconferencing   and   Video shutting/recording is a combination of A.D.R. and O.D.R. Electronic communication is no substitute for face-to-face conversations but it is useful for oral communication where consent of parties is needed. It is useful for limited purpose only because of the discussion before Lok Adalat panel is not confidential and it is open to all participants. The conflicts in explained examples , after expert determination, does not remain complex point , hence , there would be no chance to misunderstanding and therefore each individual party could focus purely on the relevant facts and issues - devoid of any irrelevant debate, emotions or personality clashes etc.

The parties may use telephonic call, video call till the development of efficient ODR system. In India the mobile phones and new technology is more popular and the Indians are well aware for the use of   *' Phone a Friend '* facilities in Television programs.

In case of pre-litigation or fully O.D.R. System, where relevant documents could be   supplied to both sides prior to seating before Lok Adalat , will require good software.

V.   CONCLUSION

To give more effect to this new system , it is necessary to set team to measure land. The Revenue Authority to decide the disputes for incorrect area shown in Revenue Records and survey record maintained by the survey department . It is necessary to make this new system more effective so that it , diagnosis, designs and implements the program, evaluates program, monitor and and suggest improvement.   It is necessary to develop software for effective implementation of system.

In the Lok Adalat process many person involves .They acts, observes the fact and laws. All those minds worked to comes to the conclusion for settlement. It clearly shows that they are of one mind means they agreed . Their act to agree shows that, such settlement is nothing but , so probable that a prudent man ought, under the circumstances of the particular case, to act , upon the supposition that it exists. In the language of management it can be called as bottom-up system. Such a mechanism of Lok Adalat is beneficial for public at large. It is a dream of Father of Nation and main object of the system by Hon'ble Mr. Justice P. N. Bhagwati, the former Chief Justice of the Supreme Court of India.

Judiciary is the most trusted government body in the country. But it appears that, for the cause of land encorachment , people are reluctant to adopt Lok Adalat. In my view, it is necessary to focus on opening and maintaining clear channels of communication with them so they understand what is coming and what it means to them. For that purpose effective change management is necessary.

I appeal to litigants to take active participation in   Lok Adalat . Lok Adalat is enable the people to get rid of their disputes and to reduce pendency .

I would like to quote :

"There are moments when troubles enter our lives and we can do nothing to avoid them. But they are there for a reason. Only when we have overcome them will we understand why they were there."

― Paulo Coelho, The Fifth Mountain

ABBREVIATION

Acre = unit for land measurement
Guntha = unit for land measurement (40 Gunthas is equal to one acre)
Dhura = boundary between two land portion.
T.I.L.R = Government land survey department at Taluqa place

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AUTHORS

First Author – Sanjay Rambhau Salkute, Labour Court Aurangabad Maharashtra (India) Pin Code:- 431001, sanjaysalkute@gmail.com

Foreign Labour Employment in Construction Project

Abdul Rahim Abdul Hamid, Bachan Singh and Muhammad Ammar Jamadi

Department of Structures and Materials, Faculty of Civil Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai Johor, Malaysia

Abstract- Demands on labour force nowadays increased rapidly each year as the globalization become a national core business, especially in construction sector. Construction sector provides all kind of national needs and Malaysia become a well-developed country in the world. But there is an issue where the citizens have their own demand on choosing work which they refused to work as a construction labour. However, work in the construction sector is often stigmatized with 4D (dirty, dangerous, difficult, and demeaning). Besides that, labour resources are important in ensuring the successful completion of a project. Therefore, Malaysia construction sector had been pulling factor for foreign labour migration in this country. Nowadays, the foreign labour holds the major composition of labour on construction project. This study aim was to investigated the advantages and disadvantaged of foreign labour in construction project. Parallel to this aim, this study set four (4) objectives; to ascertain labour composition in local construction project, to identify common criteria of labour recruitment and selecting among employer, to identify the advantages of hiring foreign labours among employer, and to identify the negative impact of foreign labour to our country, Malaysia. The method that been used to get the data for the objectives was questionnaires distribution method. The questionnaire consisted four (4) sections; details of the construction project, category of respondent, details of construction labours and Likert Scale questions. Then, the data been analysed using percentage and mean index method to reflected it with the objectives. From the analysis, there were more foreign labours rather that local labour that work in local construction project. The most strongly agreed criteria that made foreign labours as the majority in construction project was working experience in construction sector. Most of the employers strongly agreed that foreign labour were cost them lower compared to local labour. However, the employers also strongly agreed that the foreign labour brought negative impacts such as contamination to local culture, increased social problems and increased job competitions to local people. As a conclusion, government should monitor and limits foreign labours migration toward our country, Malaysia to ensure stability and security among Malaysian.

Index Terms- Construction, Employment, Foreign, Labour, Project.

I. Introduction

Malaysian economic sector development had derived direct impact in Malaysian construction sector development. The construction sector had developed with the demand of residential, commercials, industrials and infrastructures by economic sector. Other than that, foreign markets also increased the demand of construction in Malaysia (Gerald Sundaraj, 2007). Because of this successful development, the labour demand for construction sector had increased. This increment had attracts local citizens also foreign to works in construction sector. In 2010, Malaysian labour force showed very drastic increment from 11.57 million to 12.06 million workers (Department of Statistic Malaysia, 2010). The phenomenon, also contributed by foreign migrants from various neighbour country such as Indonesia, Bangladesh, India, Myanmar, Nepal, Thailand, Vietnam, Philippine and others (Navamukundan and Subramaniam, 2003).

Because of that, this study was conducted to ensure the eligibility of information about today construction labour composition, criteria of construction labour recruitment and selection, advantages of foreign labour toward employers and negatives impacts from the foreign labour toward our country, Malaysia. This study will provide useful information for making policies bodies such as Malaysian Government, Human Resource Deputy and others in taking measure on reducing foreign labour dependency in Malaysia.

II. Problem Statement

Construction industry is a very important in developing Malaysia as it generates further economic growth in this country. Malaysia has about 2.2 million legal foreign workers, almost 20 percent of the present Malaysian workforce. The illegal foreign workers were also having the same amount with the legal foreign workers. Malaysia will continue to be flooded with the foreign workers up to 1600 people a day as long as immigration and employment policies are deemed to be very loose and not tightened. General Secretary of the Malaysian Trades Union Congress (MTUC), G. Rajasekaran said the record of foreign workers immigration is very high and become not reasonable. This fact is worrying because it could threaten Malaysian labour market (Malaysian Trades Union Congress, 2007).

According to Apong Herlina (Indonesian labour activists), many Indonesian workers return to Malaysia as urged by the lack of survival options in their own country. Because of that, all the hurdles by the Malaysian government do not break the desire to return to Malaysia (Reuters, August 30, 2002). Country's economic dependence on foreign labours, mainly in construction and agriculture sectors is inevitable. These sectors are still labour-intensive sectors. Foreign workers are needed for the labour-intensive sectors, but employers also need to find a new approach to reduce dependency on foreign workers. Deputy of Human Resources Minister, Datuk Abdul Rahman Bakar, said the increase in foreign workers is inevitable, especially in the 9th Malaysia Plan (RMK-9), which requires more than 1.2 million

new workers to ensure that all sectors can be developed smoothly (Star, July 19, 2007).

Other than that, the country also increased the intake of these foreign workers in 2007, "With the findings, the cabinet committee on foreign workers will be able to decide on the policy for the intake of foreign workers in the future," said Najib. The study would also consider the need for foreign workers in five regional development corridors, three in Peninsular Malaysia and two in Sabah and Sarawak. Demand for foreign workers to work in these areas is expected to increase (NST, 2007). Department of Statistic, Malaysia estimate that there are now 12 thousand foreign nationals (0.2%) in the country. In year 2011, of a total labour force of around 11.62 million people, 12.0% is employed in agriculture, 0.4 % in mining, 27.6% in manufacturing, 6.6 % in construction and 53.5% in services. However, in 2010 total labour employed in agriculture is 11.8%, 0.4% in mining, 27.8% in manufacturing, 6.5% in construction and 53.6% in services (Economic Planning Unit and Department of Statistics).

Meanwhile, the increment of foreign labour had made the domestic labour force view migrant labour as competitors for scarce jobs, whereas they once saw migrant labour as inexpensive sources of labour to fuel the country's high economic growth (Syarisa, 2002). Foreign migrants in Malaysia also involved crime violence's such as robbery and murder (Malaysian Crime Index, 2004). Furthermore, a couple of assemblymen brought up the same issues during the debate, saying that many of their constituents had complained of problems concerning foreign workers. The complained issues consisted unpleasant behavior that showed by the foreign labour that lack of awareness to local sensitivity and caused culture shock to locals. From the wide opinion, it can be concluded that foreign labours were not accustomed to local norms and culture. On the positive side, the foreign labours were hardworking and cheaper in cost compared to local labour. The foreign also, gave positive impacts to Malaysian productivity especially in industrial sector (Zaleha, 2011). They can work for long period with low salary and also can work in high risk and uncomfortable work condition (Zaleha, 2011). Because of those issues, this study focused on advantages and disadvantages of foreign labour in local construction projects.

III.   AIM AND OBJECTIVES OF STUDY

The aim of this project to investigate the advantages and disadvantages of foreign labour employment towards local construction projects. This aim is supported by the following objectives:

i.   To identify labour composition in local construction project,
ii. To determine common criteria of labour recruitment and selection among employer,
iii. To investigate the advantages of hiring foreign labours among employer, and
iv. To examine the negative impact of foreign labour to our country, Malaysia.

IV.   SCOPE OF STUDY

In order to achieve the objectives of this study, the scope of study only focusing on the development of construction. The scopes of data collection in this study focus on the following aspects:

i.   The labour working on-site for construction company such as contractors and sub-contractors who involved in any construction.
ii. The selected construction project for thoose companies are located around Johor Bahru due to availability of good number of projects.

V.   METHODOLOGY OF THE STUDY

In this study, the following methodology has been adopted in order to achieve the objective of the study and the methodology of study. The objective of the study achieved using two methods. The first method was through literature review to gather some sound knowledge of the study topic where a clearer framework of the study was established. The sources of the literature were obtained from books, previous thesis, journal, articles, websites and previous researches. The second method was achieved through distribution of questionnaire survey to selected construction project in Johor Bahru. Initially the leading questions for the questionnaire were developed based on objective of the study. The questionnaire was structured into six (4) parts:

i.   Questionnaire cover and general information and instructions to the participants.
ii. Section A: General information of construction project (Project Title, Type of Project and Project Cost)
iii. Section B: A quantitative research method was chosen a questionnaire survey was used to collect information of construction labour for each construction project to fulfill the first objective of this study (Total Number of Labour, Number of Local Labour, Number of Foreign Labour, Dividation of Local Labour and Dividation of Foreign Labour by Country).
iv. Section C: Also a quantitative research method in form of Likert Scale questions to fulfill the second, third and fourth objective of this study (Common Criteria of Labour Recruitment and Selection among Employer, The Advantages of Hiring Foreign Labours among Employer and The Negative Impact of Foreign Labour to Our Country, Malaysia).

The total amount of questionnaire forms been distributed were 50 set of questionnaire forms starting on early of august. This questionnaire forms were answered by 50 respondents, each respondent that represented by each construction project were consisted expert such as Human Resource Officer, Project Manager, Project Executive and Site Supervisor. On the end of October, 35 set of questionnaires had been completely returned.

The data analysis had been done using data that been exported from the returned questionnaire forms. Method of data analysis that been used was Percentage and Comparison Method for section A and section B data and Mean Index Method for section C data.

The percentage and comparison method that been used for section A and B data were used to find percentage for total of local labour, foreign labour, dividation by ethnic for local labour and dividation by country for foreign labour. These analysis methods were applied to each construction project. The mean index method that been used for section C data were using this formula that used by previous researcher such as McCaffer and Zaimi Abd Majid (1997), See Shiau Ling (2006), Shiadri Saleh (2008) and Noor Ainy Burhanudin (2011) as below.
Mean Index (MI) formula:

$$\frac{\sum a_i x_i}{\sum x_i}$$

Where,
a_i : Index of a class
x_i : Frequency of response
i : 1, 2, 3, 4 and 5 as explained below

The mean index (MI) of the variables was later analyzed and categorized according to the following classification:
1 = Strongly Disagree ($1.0 \leq MI \leq 1.5$)
2 = Disagree ($1.5 < MI \leq 2.5$)
3 = Slightly Agree ($2.5 < MI \leq 3.5$)
4 = Agree ($3.5 < MI \leq 4.5$)
5 = Strongly Agree ($4.5 < MI \leq 5.0$)

This MI method was used to analyzed the question with the rating or Likert Scale format according to 5 rating as shown above. The rating had been analyzed in order to get the MI (1.0 until 5.0) showing the tendency of results (See Shiau Ling, 2006).

VI. FINDINGS AND DISCUSSION

This section explain the findings and discussion based on analyzed data that achieved the objectives of the study. The objectives had been achieved through out literature review and questionnaire's data analysis phase.

A. Literature Review

Construction industry plays an important role in archiving the elements and the main strategy of the country today. In the 10th Malaysia Plan (RMK10) and the Economic Transformation Program (ETP), the value of projects have been identified were worth almost RM90 billion. Construction industry contribute significantly to the country's economic growth because it has a "multiplier deserve" to give movement to the other economic sectors. In 2010, construction sector recorded a growth of 5.2% versus 5.8% in 2009 (Ministry of Public Works Department, 2011). The demand for construction is a derived demand i.e. demand is derived from every other economic sector, and from both the public as well as the private sectors. The demand can generally be classified as wealth creation demand from economic needs for infrastructure and commercial buildings, and quality of life demand such as needs for housing. Demand can also come from foreign markets for the same reasons as domestic demand (Gerald Sundaraj, 2007).

Towards Malaysian economic development that had also drived construction industry developed rapidly, the labour demand also had increased. This statement proved by Main Statistic of Work Power in Malaysia, April 2011, labours force numbers slightly increase (0.6%) than 12.63 million on March 2011 to 12.71 million people. Likewise the other people outside the labour force also increased 12,000 persons (0.2%). The cause of the situation is the Levels of Labour Force Participation (KPTB) records slight increase by 0.1 KPTB point to 64.8 percent. When compared with the same month in 2010, it rising 1.1 KPTB point than 63.7 percent (Statistics of Labour Force in Malaysia, 2011). One recent study (Narayanan and Lai, 2007) found that while in 1985 immigrant labour was concentrated in agriculture (50%), construction (15%), the services sector (16%) and the domestic service sector (8%). The number of labour force showed a significant increase of 490,300 persons to 12.06 million persons compared to 11.57 million in the previous month. Meanwhile, the number of persons outside the labour force recorded a sharp decline of 541,300 persons (7.6%) to 6.63 million compared with 7.17 million. This has contributed to the increase in the LFPR by 2.8 percentage points from 61.7 to 64.5 per cent in December 2010 as showed in figure 2.3.1 (Department of Statistics Malaysia, 2010).

The proportion in the local labour force between 1970 and 2000 for professional, administrative and technical workers increased from 6 per cent to 19 per cent, for service workers increased from 21 per cent to 34 per cent and for agricultural and production workers declined from 73 per cent to 51 per cent. The changing face of the Malaysian labour force has been made possible by access to educational opportunities. Foreign workers have been brought in legally as well as illegally through contractors from Indonesia, Thailand, Burma, Philippines, Cambodia, Sri Lanka, India, Nepal and Bangladesh (Navamukundan and Subramaniam, 2003:343). Of the 2,044,805 foreign workers in 2007, the top five countries origin of unskilled and semi-skilled migrant workers (216,416), India (142,031) and Myanmar (125,577). Most of them worked in the manufacturing sector. In 2006, there were 1,869,209 unskilled and semi-skilled workers from 23 countries. The top five sending countries included Indonesia (62.8 per cent), Nepal (11.4 per cent), India (7.4 per cent), Myanmar (5.8 per cent) and Vietnam (5.7 per cent) (Department of Immigration, 2008).

B. Data Analysis

There were 35 set of questionnaire forms that been return completely to contribute with this analysis. This complete questionnaire forms had been return by 35 projects around Johor Bahru region.

i. *Categories of Respondent*
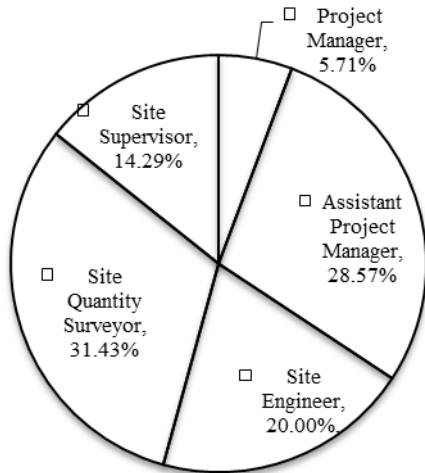
Figure 1: Categories of respondent

Figure 1 shows the categories of respondent from 35 construction projects the were Site Quantity Surveyor (31.43%), Assistant Project Manager (28.57%), Site Engineer (20.00%), Site Supervisor (14.29%) and Project Manager (5.71%). All of those respondents were professional and had knowledge about construction project labours.

ii. *Objective 1: Labour Composition in Local Construction Project*

This objective was focused on labour composition in employer's construction project. There were 35 construction projects that contributed to this survey. Result from the data analysis phase as shown in Figure 2, 3, 4 and 5.

Figure 2: Overall Labour Composition in Domestic Construction Project

Figure 2 shows, the chart for overall labour composition in selected domestic construction project. The chart shows the foreign labour (82.77%) was exceeding half of local labour (17.23%) porpotion in selected domestic construction project. This shocking situation occurred because of most of the construction company today, were more intrested in hiring foreign labour for their construction project compared to local labour.

Figure 3: Local Labour in Domestic Construction Project

Figure 3 shows, local labour composition in selected domestic construction project. The most highest percentage was the Malay labour (62.11%) with the second and third highest were Chinese (25.59%) and others (6.45%). The lowest percentage of local labour in selected construction project was Indian (5.86%). This situation occurred because many construction company in Malaysia were owned by Malay and Chinese. Because of that there were large amount of Malay and Chinese labour on their construction project. Indian was the lowest because there was a little amount of Indian construction company in Malaysia.
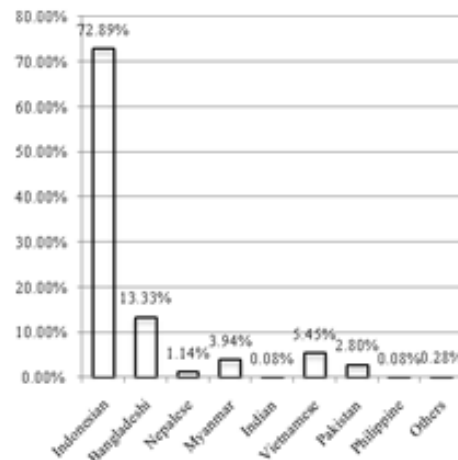
Fig. 4: Foreign Labour in Domestic Construction Project

Figure 4 shows, foreign labour composition in selected domestic construction project. The most highest percentage was the Indonesian labour (72.89%) with the second and third highest were Bangladeshi (13.33%) and Vietnamese (5.45%). Then, followed by Myanmar (3.94%), Pakistan (2.80%) and Nepalese (1.14%) The three lowest percentage of foreign labour in selected construction project was others (0.28%), Indian and Philippine (0.08%). This situation explained, the three highest migrant to Malaysia was from Indonesia, Bangladesh and Vietnam. Its because there were easily adapted with Malaysian culture, climate and environment and Malaysia also offered various of work opportunities with higher currency rate. The other foreign

labours from Myanmar, Pakistan and Nepal also attracted to Malaysia of their work opportunities with currency rate compared to their own country. The lowest foreign labours that work in domestic construction project were others, Indian and Philippine because of there were lack information about Malaysia construction sector work opportunities in their country.

Johor Bahru construction project were 17.23% local labours and 82.77% foreign labour mostly from Indonesia.

iii. Objective 2: Criteria of Labour Recruitment and Selection

Figure 6: Criteria in Labour Recruitment and Selection among Employers

Table 1: Classification of Criteria by

ID	Criteria	MI	Class
C1	Education Level	3.94	Agreed
C2	Working Experience	4.71	Strongly Agreed
C3	Nationality	4.03	Agreed
C4	Salary Demand	4.20	Agreed
C5	Work Capability	4.51	Strongly Agreed

Figure 6 and Table 1 show the criteria for recruitment and selection of labour that been stressed by the employer in domestic construction project. The highest selection criteria that been strongly agreed by most of the employers was working experience of the labour (C2) with 4.71 Mean Index (MI). Then, followed by work capability of the labour (C5) with 4.51 MI, salary demand by the labour (C4) with 4.20 MI, nationality of the labour (C3) with 4.03 MI and the education level of the labour (C1) with 3.94 MI. In this figure, there were two (2) criteria that strongly agreed by the employers, it was C2 and C5. Other than that, the employers also agreed on C4, C3 and C1. Therefore, the most important criteria that were stressed by the employers were working experience. Today, not many local people had experience working as a construction labour. Because of that, all of this position sited by foreign labour that gained experience from working as labour at their own country.

Figure 5: Overall Labour Composition for each Domestic Construction Project

Figure 5 shows the overall labour composition for each domestic construction project in Johor Bahru. The L label is referring local labour and the F label refers to foreign labour. There were 35 construction project labels as P1 until P35 at the left side of the chart. The top three construction projects consisting highest percentages of local labour was P31 (81.25%), P14 (66.67%) and P11 (56.00%). On the other view, the top three construction projects consisting highest percentages of foreign labour was P16 (100.00%), P18 (100.00%) and P19 (100.00%). According to figure also, there were three (3) of 35 projects only had consisted local labour more than foreign labour (exceeding 50.00% per project). Therefore, the other 32 of 35 projects had consisted foreign labour more than local labour. This situation proved that most of the Malaysian construction project and construction company preferred foreign labour rather than local labour even though, the foreign labour recruitment procedures and policies were rigid.

As a conclusion for Figure 2, 3, 4 and 5, the foreign labour had occupied most of the work position in construction project in Johor Bahru region. As roughly, the composition of labour in

iv. Objective 3: Advantages of Hiring Foreign Labour
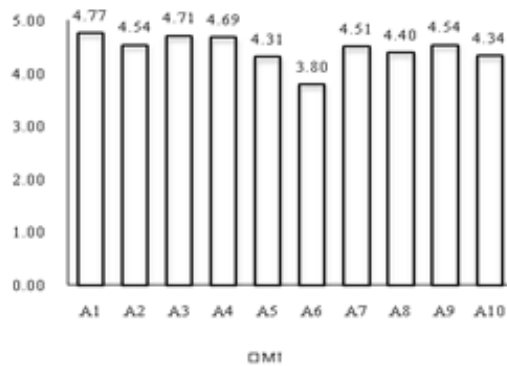
Figure 7: Advantages of Hiring Foreign Labour among Employers

Table 2: Classification of Advantages by MI

ID	Advantages	MI	Class
A1	Lower cost	4.77	Strongly Agreed
A2	Higher Discipline	4.54	Strongly Agreed
A3	Willing to work over-time	4.71	Strongly Agreed
A4	Does not need comfortable accommodation	4.69	Strongly Agreed
A5	Easy to understand instruction	4.31	Agreed
A6	Higher education	3.80	Agreed
A7	Wide experience	4.51	Strongly Agreed
A8	Can work at any condition of work place	4.40	Agreed
A9	Willing to take any risk	4.54	Strongly Agreed
A10	Better quality of work	4.34	Agreed

Figure 7 and Table 2 show the advantages of hiring foreign labour that been enjoyed by the employer in domestic construction project. The highest advantages that been strongly agreed by most of the employers was the foreign labour lower in cost compared to local labour (A1) with 4.77 MI. Then, followed by foreign labour willing to work overtime no matter in day or night (A3) with 4.71 MI, foreign labour does not need comfortable place to stay (A4) with 4.69 MI, foreign labour had higher discipline compared local labour (A2) with 4.54 MI, foreign labour willing to take all the risk arise at their work place (A9) with 4.54 MI, foreign labour had wide experience in construction sector (A7) with 4.51 MI, foreign labour does not ignore the condition and circumstances of work place (A8) with 4.40 MI, foreign labour had better quality of work compared to local labour (A10) with 4.34 MI, foreign labour was easy to understand any instruction given (A5) with 4.31 MI and the lowest advantages agreed by the employers was foreign labour had higher education level compared to local labour (A6) with

3.80 MI. In this figure, there were six (6) advantages of foreign labour that strongly agreed by the employers, it was A1, A3, A4, A2, A9 and A7. Other than that, the employers also agreed on A10, A5 and A6. Therefore, the employers mostly strongly agreed with an advantage namely because the foreign labour lower in cost compared to local labour. In this case, foreign labour cost was lower than local labour because of their salary. The foreign labour always mostly satisfied with their salary because of their lower paid in their own country.

v. Objective 4: The Negative Impact of Foreign Labour
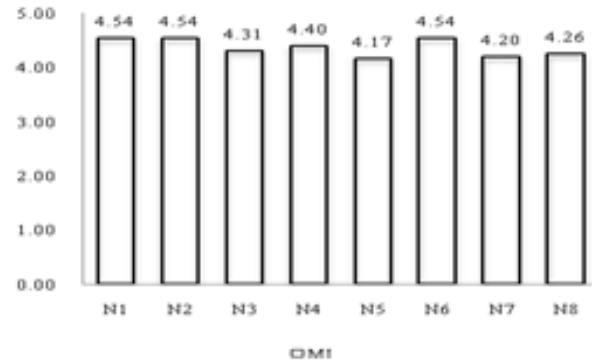
Figure 8: Negative Impact of Foreign Labour to Malaysia

Table 3: Classification of Impacts by MI

ID	Impacts	MI	Class
N1	Contamination to local culture	4.54	Strongly Agreed
N2	Social problems impact	4.54	Strongly Agreed
N3	Political instability	4.31	Agreed
N4	Economical instability	4.40	Agreed
N5	Decreased productivity	4.17	Agreed
N6	Competition for jobs	4.54	Strongly Agreed
N7	Increased labour hired rate	4.20	Agreed
N8	Accommodation problems	4.26	Agreed

Figure 8 and Table 3 show the negative impacts of foreign labour to our country, Malaysia. The highest negative impacts of foreign labour that been strongly agreed by most of the employers was foreign labour gave contamination to local culture (N1), social problems impact to local resident (N2) and increased competition for jobs among locals (N6) all three with 4.54 MI. Then, followed by contributed to domestic economical instability (N4) with 4.40 MI, contributed to domestic political instability (N3) with 4.31 MI, problems to accommodate foreign labour (N8) with 4.26 MI, increased foreign labour hired rate (N7) with 4.20 MI and the impact with the lowest MI (4.17) was decreased national productivity (N5). According to this figure, there were three (3) negative impacts that strongly agreed by the

employers, it was N1, N2 and N6. Other than that, the employers also agreed on N4, N3, N8, N7 and N5. Therefore, the most impact should be address was foreign labour contribution to contamination to local culture. Today, many foreign labours were free to go and stay anywhere same as Malaysian citizen. They also stay in local neighbourhood. They made friends and also married to local people. So, that will be the main reason for the contamination of culture occurred.

VII. CONCLUSION

This study concluded that the composition of labour in construction project in Johor Bahru region were mostly occupied by foreign labour from various country but mostly from Indonesia. This is because, the foreign labour passed all requirement to recruit labour that set by the employers especially level of working experience as a construction labour. This been proven by analysis that been made about the advantages of hiring foreign labour, the employer also strongly agreed that foreign labour had wide working experience in construction sector. It also proven in working capability criteria that been demand by employers had been fulfil by the foreign labour as strongly agreed by the employers as foreign labour had capability to work overtime even though in day or night. Therefore, this analysis proved that foreign labour had fulfilled most of the criteria set by most of the employers. However, in the other side, the employers also strongly agreed that the foreign labour had brought negative impact such as contamination to local's culture, social problems impact to local residents and increased competition for jobs among Malaysian. Therefore, even though the foreign labour gave many positive impacts to our country, it's also brought negative impacts to our country. Because of that, the reliability and dependence of our country toward foreign labour should be reduced.

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AUTHORS

First Author – Abdul Rahim Abdul Hamid is a senior lecturer at the Department of Structures and Materials, Faculty of Civil Engineering, Universiti Teknologi Malaysia. E-mail id: rahimfka@gmail.com

Second Author – Bachan Singh is a senior lecturer at the Department of Structures and Materials, Faculty of Civil Engineering, Universiti Teknologi Malaysia. E-mail id: bachan19@yahoo.com

Third Author – Muhammad Ammar Jamadi is a Postgraduate Student, Msc Construction Management, Faculty of Civil Engineering, Universiti Teknologi Malaysia. E-mail id: majy1011@gmail.com

Correspondence Author – Abdul Rahim Abdul Hamid, alternate email address (rahimhamid@utm.my), contact number (+60137531947)

Performance of Tea Clones in the Nursery through Vegetative Propagation in Darjeeling

Mrityunjay Choubey, R. Kumar, A. Chakraborty, J. S. Bisen , A.K.Singh and Mahipal Singh

Darjeeling Tea Research and Development Centre, Tea Board, A.B. Path, Kurseong, Darjeeling (W.B.), India

Abstract- The experiment was initiated at the experimental farm of Darjeeling Tea Research and Development Centre, Kurseong (Darjeeling) during 2010-11 and 2011-12 to study the performance by morphological characteristics of tea clones in the nursery through vegetative propagation. The ultimate objective was to screen out the best planting material having good establishment potential in the nursery. For morphological study, cuttings were obtained from the selected mother bushes of different Tea Estates of Darjeeling. The performance of tea clones was evaluated in respect of survival percentage, plant height, number of branches per plant, shoot and root volume, number of leaves per plant. During the study it has been observed that morphological traits such as shoot length, root length, shoot-root volume, number of leaves and branches can be used to distinguish between the camellia species. The information on morphological diversity can also be used for future breeding programmes. In this study it has been found that the highest survival percentage was obtained from old chinery plant (96.53%), followed by CP-1(96.17%), B-157(95%) and T-78(94.63). The clone T-78 perform best in respect of shoot length (60.22cm), shoot volume (30.89cc), number of leaves (39.78) and branches per plant (7.33) respectively as compare to other clones.

Index Terms- Clones, Nursery, Propagation, Tea

I. INTRODUCTION

Darjeeling produces the world's most aromatic variety of tea. The unusual mixture of erratic climatic conditions in conjunction with the production regulations imposed by the Tea Board of India and the character of the local people help Darjeeling to produce the most fragrant tea. Darjeeling tea which is world illustrious for "Flavour" is the most important quality for which it is so highly priced and ranked among other tea produced worldwide.

The clones of tea appear akin in their gross morphology because of their origin from closely related species of *Camellia* however, in field conditions, eco-climatic system, inherent vigour and cultural operations influence the growth and development of the tea plants. Similarly, in the nursery also, clones of tea species exhibit variations due to their inherent qualities, besides nutritional and hormonal factors (George and Sherrington, 1984). Further, the out breeding characters of tea species have led to a wide natural hybridization resulting in considerable heterogeneity in the existing populations. Therefore, it is difficult to assign a definite varietal status for a clone grown in a particular region. One of the basic requirements for successful tea cultivation is the planting material. It may be raised either from the seed or clone. Since, 1960s vegetatively propagated clones began to replace seed propagation and probably reduced the genetic diversity within tea cultivation. In order to produce uniform crop with predetermined characters, vegetative propagation of superior clones are practiced. However, success rate of different Darjeeling clones is perhaps not similar. The present experiment was therefore, designed to examine: (i) Survivability of different Darjeeling tea clones in the nursery, and (ii) Study of the morphology behavior of elite Darjeeling tea clones in nursery before transplanting into the main field.

II. MATERIALS AND METHODS

The experiment was conducted at the experimental farm of Darjeeling Tea Research and Development Centre, Kurseong (Darjeeling), situated at latitude 26˚55'N, longitude 88˚12'E, altitude 1240 meters above mean sea level during 2010-11 and 2011-12 to study the morphological characteristics of eight tea clones (T-78, RR-17/144, CP-1,B-668,P-312,B-157 and TA-17 including control i.e. old Chinery plant) in the nursery through vegetative propagation. The experiment was laid out according to Randomized Block Design with three replications. The soil used for sleeves filling had p^H 4.76, available N 280.75 kg $\times$ ha^{-1}, P 32.48 kg$\times$ ha^{-1}, K 15.68 kg $\times$ ha^{-1}. Polythene sleeves were filled with the soil after having been ameliorated with appropriate doses of farm yard manure, aluminium sulphate and organomax. Single nodal cuttings were obtained from different tea estates and planted during the month of May, 2010. The most successful method of vegetative propagation in tea is the use of single node cuttings from the selected bushes in the field (Sharma, 1984).The soil supplemented with Ammonium sulphate, farm yard manure and organomax was filled in polythene sleeves one month before planting the cuttings. There were 100 cuttings in each treatment planted in the sleeves. The sleeves were tunnelled with plastic sheet in nursery underneath a 08″ high nylon shade to protect them against cold injury during winter season and direct sunlight during hot weather. All the agronomic practices and application of pesticides and fungicides were continued during the study. Three plants from each treatment were sampled to record data on plant height, number of leaves, shoot length, root length, shoot volume and root volume at eight month intervals.

The pooled mean values recorded on different morphological traits during the course of investigation was subjected to statistical analysis and the results obtained along with suitable interpretations have been presented in table 1.

III. RESULTS AND DISCUSSION

The survival percentages determined in this study varied from 91.67% to 96.53% depending on tea clones set to root (Table 1). The best survival percentages were obtained from the clones *Control* (96.53%) followed by CP-1(96.17%), B-157(95%), T-78(94.63). The success of vegetative propagation depends on the selection of mother bushes with desirable characteristics, which would provide itself to a rapid and easy way of propagation. Studies of morphological characteristics of clones in relation to the components of yield should aid selection efficiency (Squire, 1985) and ultimately reduce the proportion of poor clones involved in the varietal experiments. In order to produce a uniform crop with predetermined characters, vegetative propagation through single node leaf cutting is a reliable and economic method (Hajra, 2001) and ideal selection of good planting material should be possible during the nursery stages to avoid unwanted clones in advanced yield trials.

Leaves Plant^{-1}:

The eight tea clones differed considerably for leaves plant^{-1} which ranged from 15.33 to 39.78. Maximum numbers of leaves (39.78 and 28.22) were recorded for clones T-78 and RR-17/144 respectively. The data revealed that number of leaves had positive genetic correlation with number of branches.

Branches Plant^{-1}:

Branches plant^{-1} plays an important role in increasing the number of compound leaves thereby increases in the conversion of solar energy in to the increased rate of photosynthesis which increases in dry matter per plant and yield. The pooled mean values pertaining to number of branches plant^{-1} of clones showed noteworthy difference and ranged from 2.22 to 7.33. Maximum numbers of branches were recorded for T-78 with the highest count of branches of 7.33 and control had low count of branches of 2.22. The size of bush in tea with well established frames has a definite bearing on selection.

Root Length:

The values presented   (Table 1) revealed that the root length was higher at clone B-668 (35.44cm) whereas the lowest in clone TA-17 (19.11cm). Variation in the rooting system in different clones may be due to genetic differences in endogenous auxin content,(Samartin et al, 1986). Besides these endogenous factors, growing environment of the mother bush may also play a role. Scarborough and Kayange , 1974, reported that bigger plants with bigger root system suffered less casualties in the field during vagaries of weather.

Shoot length:

Shoot length is an indication of good physiological activity going on plant. It plays a vital role to visualize the metabolic system of the plants by external look. The momentous differences were exhibited among the clones for shoot length, which ranged from 27.44 to 60.22cm. T-78 had taller plants (60.22cm) where as lower height (27.44cm) was recorded in clone TA-17.

Shoot Volume:

Differences among the eight clones shoot volume ranged from10.33 to 30.89cc. Maximum shoot volume i.e. 30.89cc was observed for clone T-78.

Root Volume:

Analysis of variance showed differences among clones for root volume per plant with a range of 6.33 to 15.67cc. Maximum root volume was observed for T-78 and P-312 with 15.67cc where as RR-17/144 had less root volume of about 6.33cc. According to Kaufmann 1981; Doley 1981, the presence of a vigorous root system with a lower shoot: root ratio is a good indication of drought tolerance.

IV. CONCLUSION

During the study it has been observed that morphological traits such as shoot length, root length, shoot- root volume, number of leaves and branches can be used to distinguish between the camellia species. The information on morphological diversity can also be used for future breeding programmes. In this study it has been found that the clone T-78 perform best in respect of shoot length, number of branches, number of leaves and shoot volume respectively as compare to other clones.

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AUTHORS

First Author – Mrityunjay Choubey, Darjeeling Tea Research and Development Centre, Tea Board, A.B. Path, Kurseong, Darjeeling (W.B.), India

Second Author – R. Kumar, Darjeeling Tea Research and Development Centre, Tea Board, A.B. Path, Kurseong, Darjeeling (W.B.), India

Third Author – A. Chakraborty, Darjeeling Tea Research and Development Centre, Tea Board, A.B. Path, Kurseong, Darjeeling (W.B.), India

Fourth Author – J. S. Bisen, Darjeeling Tea Research and
Development Centre, Tea Board, A.B. Path, Kurseong,
Darjeeling (W.B.), India
Fifth Author – A.K.Singh, Darjeeling Tea Research and
Development Centre, Tea Board, A.B. Path, Kurseong,
Darjeeling (W.B.), India
Sixth Author – Mahipal Singh, Darjeeling Tea Research and
Development Centre, Tea Board, A.B. Path, Kurseong,
Darjeeling (W.B.), India

Corresponding Author: e-mail:
choubeytearboard78@gmail.com

Clones	Survival(%)	Leaves plant[-1]				Branches plant[-1]				Root length(cm)				Shoot length (cm)				Root volume(cc)				Shoot volume (cc)			
		08 MAP	16 MAP	24 MAP	Mean	08 MAP	16 MAP	24 MAP	Mean	08 MAP	16 MAP	24 MAP	Mean	08 MAP	16 MAP	24 MAP	Mean	08MAP	16MAP	24MAP	Mean	08MAP	16MAP	24MAP	Mean
T-78	94.63	29	42	48.33	39.78	3	7	12.00	7.33	25	28	31.00	28.00	42	61	77.67	60.22	9.00	15.00	23.00	15.67	18.00	35.00	39.67	30.89
RR-17/144	92.50	15	29	34.67	26.22	2	6	9.00	5.67	20	24	30.00	24.67	29	39	44.00	37.33	3.00	5.00	11.00	6.33	6.00	19.00	27.00	17.33
CP-1	96.17	17	33	37.33	29.11	1	4	9.67	4.89	18	22	29.00	23.00	39	58	66.33	54.44	5.00	8.00	17.67	10.22	11.00	27.00	38.00	25.33
B-668	93.37	11	20	24.67	18.56	2	6	8.67	5.56	32	35	39.33	35.44	28	38	44.33	36.78	6.00	14.00	22.00	14.00	5.00	16.00	27.00	16.00
P-312	91.67	14	27	33.33	24.78	1	7	9.00	5.67	16	20	28.33	21.44	35	49	58.00	47.33	8.00	16.00	23.00	15.67	9.00	23.00	31.33	21.11
B-157	95.00	16	32	36.67	28.22	1	4	6.67	3.89	21	26	30.00	25.67	28	38	40.00	35.33	5.00	11.00	21.33	10.78	6.00	19.00	20.00	15.00
TA-17	93.33	09	16	19.00	14.67	0	3	5.33	2.78	15	19	23.33	19.11	21	29	32.33	27.44	4.00	6.50	14.00	8.17	5.00	9.00	17.00	10.33
Selection-1	96.53	11	22	27.67	20.22	1	2	3.67	2.22	15	24	25.67	21.56	26	44	36.00	35.33	4.00	9.00	19.00	10.67	6.00	18.00	22.00	15.33
CD at 5%	1.45	4.13	3.65	8.10		1.42	2.88	3.80		3.32	3.58	2.95		3.19	2.72	2.10		2.83	2.93	3.68		2.72	3.44	3.98	

High Level Anatomy for Energy Conversations schemes in Wireless Sensor Networks

Gayathri Devi Kotapati*, Bhargavi Vepuri**, Mannam Venkata Deepak**

* Computer Science Department, K L University,Guntur,Andhra Pradesh

   Abstract-In the past years; wireless sensor networks (WSNs) have gained increasing attention from both the research community and actual users. Wireless Sensor Networks (WSN) are used in variety of fields which includes environmental, healthcare, military, biological and other commercial applications. The critical aspects to face concern "how to reduce the energy consumption of nodes" and sensor nodes are generally battery-powered devices so that the network lifetime can be extended to reasonable times. However, we conducted that first break down the energy consumption for the components of a typical sensor node i.e. discussion of the main directions to energy conservation in WSNs. We present a systematic and comprehensive taxonomy of the energy conservation schemes that are subsequently discussed in depth. A technique for energy efficient data acquisition special attention has been devoted to promising solutions that have not yet obtained a wide attention in the literature.

   Index Terms- Sensor, energy conservation, Anatomy, Data driven, Mobility based.

I.   INTRODUCTION

A wireless sensor network consists of sensor nodes deployed over a geographical area for monitoring physical phenomena like humidity, temperature, seismic events, vibrations, and so on [2]. Wireless sensor networks (WSNs) are distributed measurement systems consisting of a large number of measurement units deployed over a geographical area; each unit is a low-power device that integrates processing, sensing and wireless communication abilities [3].A sensor node is a tiny device that includes three basic components:

   a.   A sensing subsystem for data acquisition from the physical surrounding environment
   b.   A processing subsystem for local data processing and storage
   c.   A wireless communication subsystem for data transmission

A power source supplies the energy needed by the device to perform the programmed task. However, the power source consists of limited energy resource. It could be impossible or inconvenient to recharge the battery, because nodes may be deployed in a hostile or unpractical environment. Among the set of potential scenarios, monitoring applications can particularly benefit from this technology as WSNs allow a long-term data collection at scales and resolutions that are difficult to achieve with traditional techniques. The sensor network should have a lifetime long enough to fulfill the application requirements. The crucial question is "how to prolong the network lifetime to such a long time?" External power supply sources often exhibit a non-continuous behavior so that an energy buffer is needed as well. Therefore, energy conservation is a key issue in the design of systems based on wireless sensor networks.
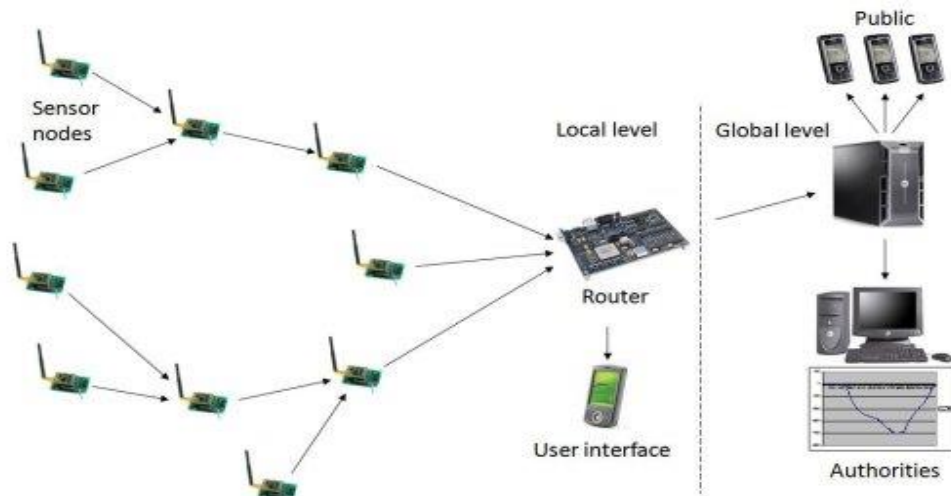
FIG. 1. Sensor network architecture.

As shown in the fig.1 we consider the sensor network consisting of base station and number of sensor nodes deployed over a large geographic area [4]. Data are transferred from sensor nodes to the sink through a multi-hop communication paradigm. Experimental measurements have shown that generally data transmission is very expensive in terms of energy consumption, while data processing consumes significantly less [5]. The energy cost of transmitting a single bit of information is approximately the same as that needed for processing a thousand operations in a typical sensor node. The energy consumption of the sensing subsystem depends on the specific sensor type. Energy consumption remains the major obstacle for the full diffusion and exploitation when batteries can be recharged. In general energy-saving techniques focus on two subsystems:

- The networking subsystem:
  The energy management is taken into account in the operations of each single node, as well as in the design of networking protocols.
- The sensing subsystem
  The techniques are used to reduce the amount or frequency of energy-expensive samples.

Energy efficient protocols are aimed at minimizing the energy consumption during network activities. Power management schemes are thus used for switching off node components that are not temporarily needed. We will survey the main enabling techniques used for energy conservation in wireless sensor networks. We will also survey the main techniques suitable to reduce the energy consumption of sensors when the energy cost for data acquisition cannot be neglected. These techniques are the basis for any networking protocol and solution optimized from an energy-saving point of view.

II.   APPROACHES FOR ENERGY CONSERVATION

We mainly consider the most widely adopted model in the literature, which is depicted in the fig.1.
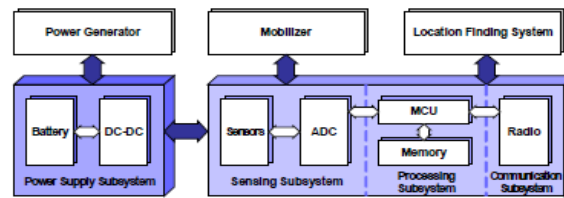
FIG. 2: Architecture of a typical wireless sensor node.

As shown in the fig.2 typical wireless sensor node as usually assumed in the literature. It mainly consists of the four components:
- ✓ A sensing subsystem including one or more sensors for data acquisition
- ✓ A processing subsystem including a micro-controller and memory for local data processing
- ✓ A radio subsystem for wireless data communication
- ✓ A power supply unit

Sensor nodes may also include additional components such as a location finding system to determine their position. As the latter components are optional and only occasionally used. We identify three main enabling techniques namely:

i.   *Duty cycling*

It is mainly focused on the networking subsystem. The most effective energy-conserving operation is putting the radio transceiver in the (low-power) sleep mode whenever communication is not required [8]. The radio should be switched off as soon as there is no more data to send/receive and should be resumed as soon as a new data packet becomes ready. However, in this way nodes alternate between active and sleep periods depending on network activity.

FIG. 3: Taxonomy of approaches to energy savings in sensor networks.

ii. Data-driven approaches

It can be used to improve the energy efficiency even more. Data sensing impacts on sensor nodes' energy consumption in two ways:

✓ *Unneeded samples:* Sampled data generally has strong spatial and/or temporal correlation. Therefore, there is no need to communicate the redundant information to the sink [6].

✓ *Power consumption of the sensing subsystem:* Reducing communication is not enough when the sensor itself is power hungry.

iii. Mobility

It can finally be used as a tool for reducing energy consumption. In a static sensor network packets coming from sensor nodes follow a multi-hop path towards the sink(s). A few paths can be more loaded than others can and nodes closer to the sink have to relay more packets so that they are more subject to premature energy depletion [7]. The traffic flow can be altered if mobile devices are responsible for data collection directly from static nodes.

Ordinary nodes can save energy because path length, contention and forwarding overheads are reduced as well. The mobile device can visit the network in order to spread more uniformly the energy consumption due to communications.

III. HIGH LEVEL ANOTOMY

Duty cycling

It can be achieved through two different and complementary approaches as shown in the fig.3. From one side it is possible to exploit node redundancy that is typical in sensor networks and adaptively select only a minimum subset of nodes to remain active for maintaining connectivity [8]. Finding the optimal subset of nodes that guarantee connectivity is referred to as topology control. The basic idea behind topology control is to exploit the network redundancy to prolong the network longevity. On the other hand, active nodes do not need to maintain their radio continuously on.
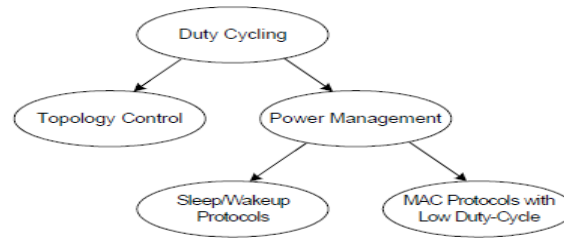
FIG. 4: Anatomy of duty cycling schemes.

Throughout we will refer to duty cycling operated on active nodes as power management. Topology control and power management are complementary techniques that implement duty cycling with different granularity. Power management protocols can be implemented either as independent sleep/wakeup protocols running on top of a MAC protocol [9][10]. Topology control protocols can be broadly classified in the following two categories:

- Location driven protocols: It define which node to turn on and when based on the location of sensor nodes that are assumed to be known
- Connectivity driven protocols: dynamically activate/deactivate sensor nodes so that network connectivity, or complete sensing coverage are fulfilled

Sleep/wakeup schemes can be defined for a given component of the sensor node, without relying on topology or connectivity aspects [14]. Independent sleep/wakeup protocols can be further subdivided into three main categories:

- *on-demand*

It takes the most intuitive approach to power management. The main problem associated with on-demand schemes is how to inform the sleeping node that some other node is willing to communicate with it. A low-rate and low-power radio for signaling, and a high rate but more power hungry radio for data communication is typically using multiple radios.

- *scheduled rendezvous*
  The basic idea behind scheduled rendezvous schemes is that each node should wake up at the same time as its neighbors. Nodes wake up according to a wakeup schedule and remain active for a short time interval to communicate with their neighbors.
- *asynchronous*

A node can wake up with asynchronous protocols when it wants and still be able to communicate with its neighbors. The goal is achieved by properties implied in the sleep/wakeup scheme, thus no explicit information exchange is needed among nodes.

We will focus mainly on power management issues rather than on channel access methods. We will survey below the most common MAC protocols by classifying them according to the taxonomy.

TDMA (Time Division Multiple Accesses): The schemes naturally enable a duty cycle on sensor nodes as channel access is done on a slot-by-slot basis.

Contention-based protocols: These are the most popular class of MAC protocols for wireless sensor networks. It achieves duty cycling by tightly integrating channel access functionalities with a sleep/wakeup scheme.

Hybrid protocols: It adapts the protocol behavior to the level of contention in the network. It behaves as a contention-based protocol when the level of contention is low and switch to a TDMA scheme when the level of contention is high.

Data-driven approaches
It can be divided according to the problem they address as shown in the fig.4. Data-reduction schemes address the case of unneeded samples that the energy-efficient data acquisition schemes are mainly aimed at reducing the energy spent by the sensing subsystem. All these techniques aim at reducing the amount of data to be delivered to the sink node. In-network processing consists in performing data aggregation at intermediate nodes between the sources and the sink. Hence, we can reduce the amount of data reduction while traversing the data in network.
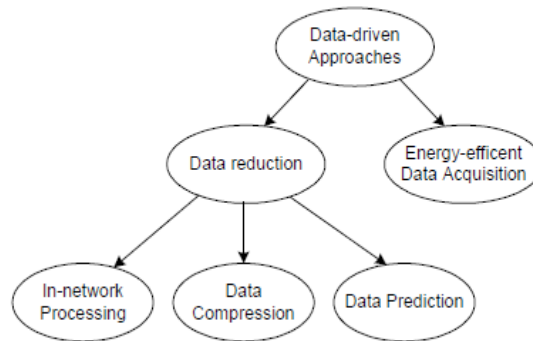
FIG. 5: Anatomy of data-driven approaches to energy conservation.

Data compression can be applied to reduce the amount of information sent by source nodes [11] [12]. It involves encoding information at nodes that generate data and decoding it at the sink. As compression techniques are general we will omit a detailed discussion of them to focus on other approaches specifically tailored to WSNs. Data prediction consists in building an abstraction of a sensed phenomenon [13]. The model can predict the values sensed by sensor nodes within certain error bounds and reside both at the sensors and at the sink. Data prediction techniques build a model describing the sensed phenomenon. Hence, the queries can be answered using the model instead of the actually sensed data.

 Two instances reside in the model; they are one at sink and the other at source end. The model at the sink can be used to answer queries without requiring any communication, thus reducing the energy consumption. Techniques to a stochastic characterization of the phenomenon. Two main approaches of this kind are the following:

   a) It is possible to map data into a random process described in terms of a probability density function
   b) A state space representation of the phenomenon can be derived and forthcoming samples can be guessed by filtering out a non-predictable component modeled as noise.

Data prediction techniques are time series forecasting that a set of historical values obtained by periodical samplings are used to predict a future value in the same series. A time series can be represented as a combination of a pattern and a random error. Thus it is characterized by its trend and its seasonality.

Mobility-based

It schemes can be classified as mobile-sink and mobile-relay schemes as shown in the fig.5. Nodes are assumed static here and their density is expected to be large enough to allow communication between any two nodes, eventually by using a multi-hop path[7]. Mobility has been considered as an alternative solution for energy-efficient data collection in wireless sensor networks. We complete the survey by introducing the last energy conservation scheme as shown in the fig.5.
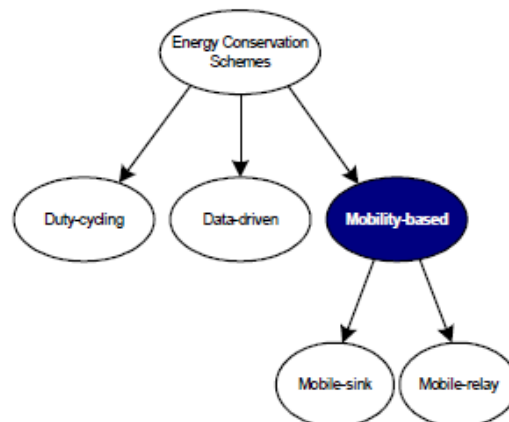
FIG. 6: Classification of data reduction techniques to energy conservation.

Energy consumption is reduced by the mobility. Packets coming from sensor nodes traverse the network towards the sink by following a multi-hop path. Depending on the network topology and packet generation rates at sources a few paths can be more loaded than

others. Nodes closer to the sink also have to relay more packets so that they are subject to premature energy depletion. Ordinary nodes wait for the passage of the mobile device and route messages towards it. So that the communication with mobile data collector takes place in proximity. As mobilizers are generally quite expensive from the energy consumption standpoint, adding mobility to sensor nodes may be not convenient. The resulting energy consumption may be greater than the energy gain due to mobility itself, instead of making each sensor node mobile.

Mobility can be limited to special nodes, which are less energy constrained than the ordinary ones[15][16]. When the mobile elements visit the same node more than once at different distances, from an energy consumption standpoint it may be convenient for static sensors to defer transmissions at the instant in which the mobile element is closer to the source node. The energy consumption has to be better characterized with reference to Quality of Service parameters such as the fraction of reported data or the maximum latency. Most of these proposals give a little attention to the energy spent per transferred message, but focus on the way the mobile element should move to visit nodes in a timely fashion.

IV.   CONCLUSION

We have surveyed the main approaches to energy conservation in wireless sensor networks. A systematic and comprehensive classification of the solutions has proposed in the literature. Our discussion has no limitations to topics that have received wide interest in the past. However, we have also stressed the importance of different approaches such as data-driven and mobility-based schemes. As far as "traditional" techniques to energy saving, an important aspect, which has to be investigated more deeply, is the integration of the different approaches into a single off-the-shelf workable solution. The energy consumption of the radio is much higher than the energy consumption due to data sampling or data processing. We have shown the power consumption of the sensor is comparable to the power needed by the radio. We think that the field of energy conservation targeted to data acquisition has not been fully explored yet. We observe an increasing interest towards sparse sensor network architecture. A network can be very efficient and robust if communication protocols can appropriately exploit the mobility of collector nodes. We conclude the paper with insights for research directions about energy conservation in WSNs.

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AUTHORS

First Author – Gayathri Devi Kotapati , Student , Department of Computer Science and Engineering , KLUniversity gayathrikotapati@gmail.com , 9492686878

Second Author – Bhargavi Vepuri , Department of Computer Science and Engineering , KLUniversity bharagavivepuri538@gmail.com ,885792356

Third Author – Mannam Venkata Deepak, Department of Computer Science and Engineering , KLUniversity deepak.mannam@gmail.com ,9032357406

Analysis of the Effects of Rectangular Ground Plane on Radiation Pattern of the Monopole Antenna

Lusekelo Kibona

Information and Communication Technology Department, Ruaha University College (RuCo) – Iringa, Tanzania

Abstract- The aim of this paper was to analyze the impact of rectangular plane ground on the radiations pattern of the monopole antenna. Several simulations have been performed where the monopole antenna with wavelength 4m was placed on top of the rectangular plane ground and then radiations pattern was obtained in terms of directivity, electric field and gain, and finally the results were analyzed and concluded that large the ground plane is, the lower the direction of maximum radiation and as the ground plane approaches infinite size, the radiation pattern approaches a maximum in the x-y plane.

Index Terms- Directivity, Far field, Finite ground plane, Monopole antenna, Radiation pattern.

I. INTRODUCTION

Monopole antennas are half the size of their dipole counterparts, and hence are attractive when a smaller antenna is needed. Wire-type antennas are made of conducting wires and are generally easy to construct, thus the cost is normally low. Monopole antenna falls into this category of wire type antennas and it is the omnidirectional one in the sense that it has the same gain in every direction.

Many methods are used to improve the performance of monopole antenna[1] one of these methods can be varying the size and the type of ground plane for example you can employ finite or infinite ground plane, cylindrical, spherical or the rectangular sheet ground plane . In practice, monopole antennas are used on finite-sized ground planes. This affects the properties of the monopole antennas, particularly the radiation pattern[2].

The length of the monopole trace mainly determines the resonant frequency of the antenna, but because of the very wide gain bandwidth of a quarterwave monopole, the antenna length is not too critical. But like any other antenna types, the gain of a quarterwave monopole will vary if parameters in the surroundings, such as case/box materials, distance to the ground plane, and size of the ground plane are varied. If any of these parameters are changed, a retuning of the monopole trace length may be necessary for optimum performance in each application. A quarterwave monopole is a ground plane dependent antenna that must be fed single-ended. The antenna must have a ground plane to be efficient, and ideally the ground plane should spread out at least a quarter wavelength, or more, around the feed-point of the antenna. The size of the ground plane influences the gain, resonance frequency and impedance of the antenna.[3]

II. CONCEPTS AND THEORY

The monopole antenna is half of the dipole antenna and almost always mounted above some sort of ground plane, and the best way to investigate the monopole antenna is to utilize the image theory. The *image theory* states that if there is a current *A/B/C* above an infinite perfect conducting ground plane, the ground will act as a mirror to generate its image, *A'/B'/C'* [4].

The monopole antenna shown below, consists of a single leg perpendicular to a ground plane of height h =l/2. The monopole is fed at its base with respect to the ground plane. For purposes of analysis, the ground plane is considered to be infinite and perfectly conducting. In practice, this ideal ground plane is approximated[5].

Analysis of propagation pattern is of important before the deployment of any antenna. Propagation patterns of wireless systems may be affected by outside influences such as vegetation, solar radiation, climate conditions, interference from other RF sources, and ground reflection. As the RF waves propagate though space signal tend to reflect or absorbed in nearby objects and surfaces. Some RF waves would reflect off the ground surface while some would be absorbed by the ground. The amount of RF reflection and RF absorption depends on the earth's ground dielectric(ε_r) and ground conductivity(σ) properties[6]

The impedance of a monopole antenna is minimally affected by a finite-sized ground plane for ground planes of at least a few wavelengths in size around the monopole.[2]
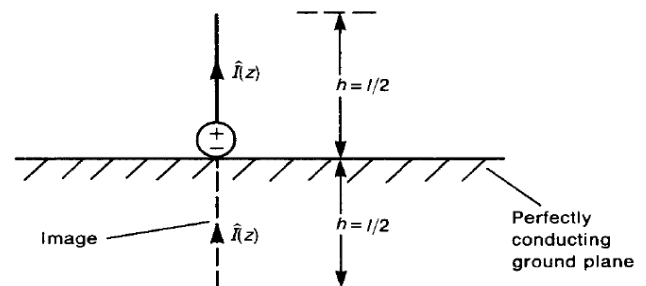
Figure 1: Illustration of the monopole antenna with perfectly conducting ground.[5]

The fields above the ground plane can be found by using the equivalent source (antenna) in free space. The monopole antenna fields below the ground plane in Figure 1 above are zero. So in practice the monopole antenna acts like dipole antenna with the concept of image the only change that needs to be noted is that the impedance of a monopole antenna is one half of that of a full

dipole antenna. For a quarter-wave monopole ($l=0.25*\lambda$), the impedance is half of that of a half-wave dipole.

From the concept that the size and type of ground affects the radiation intensity, the radiation intensity of the monopole antenna with the ground being finite and rectangular in shape can be derived through the following formulae:

The electric field intensity:

$$E_\theta \approx \frac{jnI_o e^{j\beta r}}{2\pi r}\left(\frac{\cos(\beta l\cos\theta)-\cos(\beta l)}{\sin\theta}\right) \quad (1)$$

Where:

$$E_\theta = Electric\ field\ intensity$$

$$n = Intrinsic\ impedance = \sqrt{\frac{\mu}{\varepsilon}} = 120\pi\sqrt{\frac{\mu_o}{\varepsilon_o}}$$

$\beta = phase\ constant\ or\ wave\ number = 2\pi/wavelength$
$r = radius$
$I_o = Maximum\ possible\ current$
$l = length\ of\ the\ monopole\ antenna$

Magnetic field intensity of the monopole antenna in ground plane is given by:

$$H_\emptyset = \frac{E_\theta}{n} = \frac{jI_o e^{j\beta r}}{2\pi r}\left(\frac{\cos(\beta l\cos\theta)-\cos(\beta l)}{\sin\theta}\right)$$
$$(2)$$

The average power density also known as Poynting vector is given by:

$$S_{av} = \frac{1}{2}*R_e\left(E_\theta \times H_\emptyset^*\right) =$$
$$\hat{r}\ \frac{nI_o^2}{8\pi^2 r^2}\left(\frac{\cos(\beta l\cos\theta)-\cos(\beta l)}{\sin\theta}\right)^2$$
$$(3)$$

Finally the radiation intensity is found from the following relation:

$$U = r^2 \times S_{av} =$$
$$\frac{nI_o^2}{8\pi^2 r^2}\left(\frac{\cos(\beta l\cos\theta)-\cos(\beta l)}{\sin\theta}\right)^2$$
$$(4)$$

Directivity is found by:

$$D = \frac{4\pi U(\theta,\emptyset)}{\int_o^{2\pi}\int_o^\pi U\sin\theta\ d\theta\ d\emptyset} \quad (5)$$

Where U= radiation intensity found on equation (4) above.

III. METHODOLOGY

A quarter wave monopole antenna on a finite rectangular ground plane is constructed and simulated. The rectangular plane ground was assumed to have a circumference of three wavelengths, and the wire has a radius of $1 \times 10-5$ of a wavelength. The free space wavelength was chosen as 4 m (approximately 74 MHz).
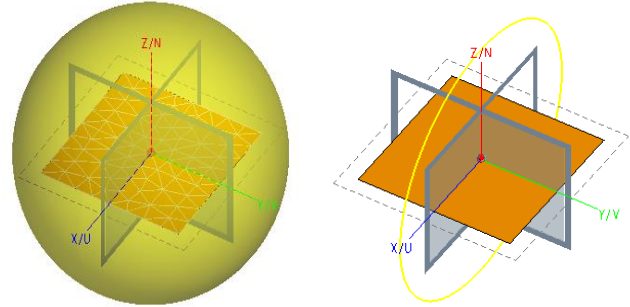
Figure 2: The rectangular ground plane and the monopole antenna placed above it.
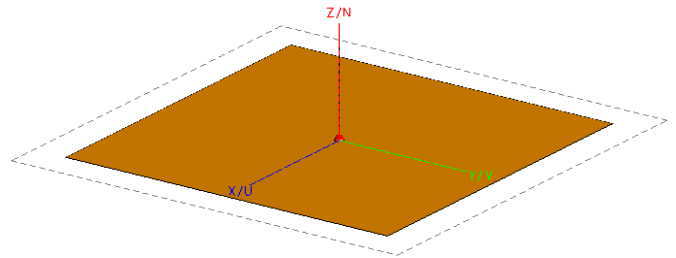
Figure 3: The rectangular ground plane with the monopole antenna placed at the center above it.

So the set up was done by considering the quarter wavelength monopole antenna with wavelength taken as 4m for free space and the frequency(f=c0/wavelength) was found with the dimensions of rectangle assumed and varied(height and width), the total source of power was set to 2W. And the pattern radiation analysis was taken for far field.

Two planes of magnetic symmetry were defined with x=0 and y=0 planes, while in Z-plane, no symmetry was defined because it the one in which our monopole antenna stands or pointing.

IV. RESULTS AND DISCUSSION

The following results were obtained after careful simulations using FEKO software in which the ground plane which was rectangular ground plane were defined.
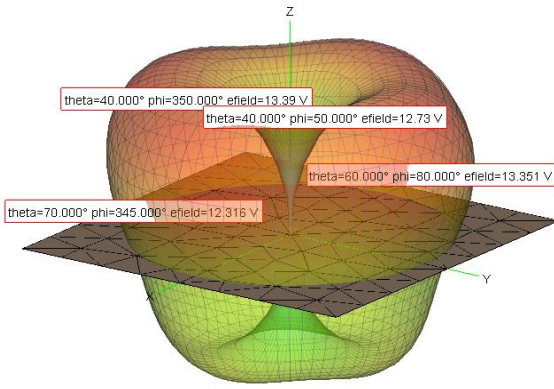
(a)
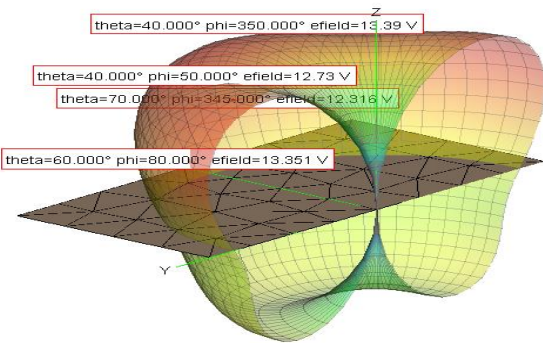
(b)

Figure 4: (a) A full 3D plot of the radiated E-field. (b) A cut wave plane 3D plot of the radiated E-field
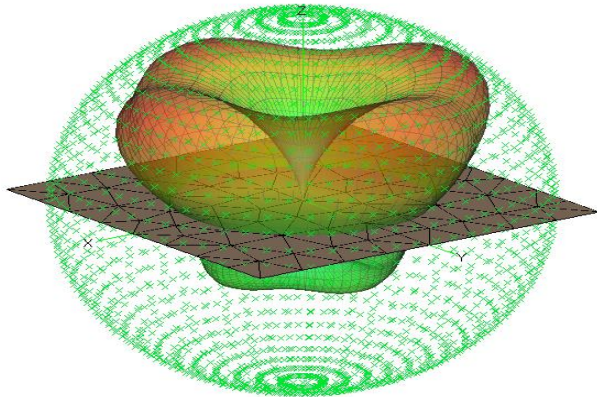
Figure 5: Requested far field directivity of the monopole antenna on rectangular ground plane.
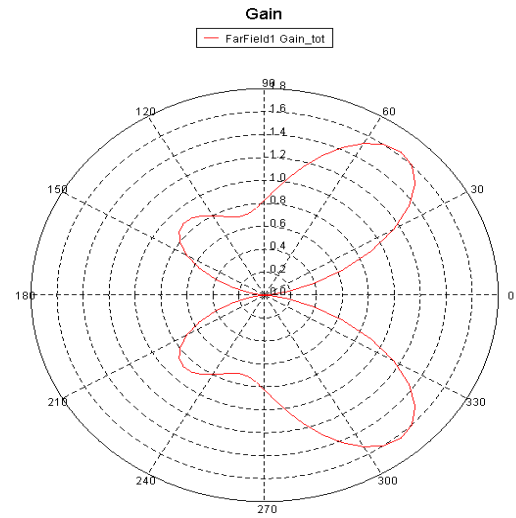
(a)
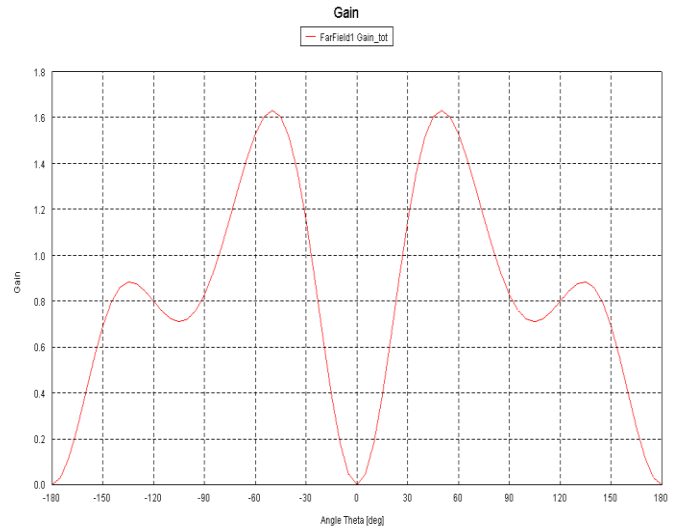
(b)

Figure 6: (a) Polar plot for total Gain in horizontal cut. (b) A graph of Total gain against angle theta.
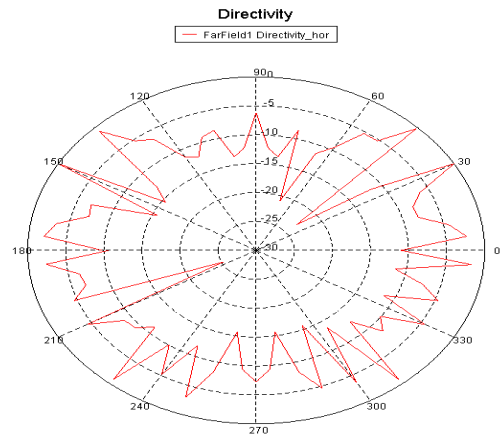
(a)
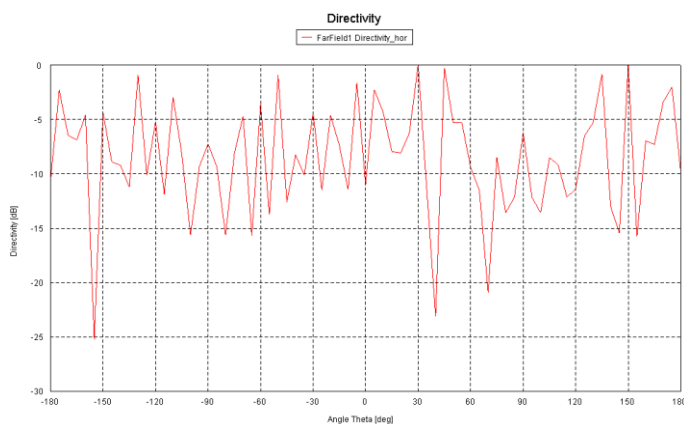
(b)

Figure 7: (a) Polar plot of far field directivity pattern in horizontal (b) Graph of Directivity against angle theta in horizontal.

From the above results it can be easily seen that there is great variations in terms of gain, directivity, and electric field intensity of the monopole antenna when the rectangular plane ground is placed, so the size of the plane ground also affects the radiations pattern the antenna as seen in figure 7 where the directivity patterns follows the size of the ground plane placed together with the height of the antenna, the resulting radiation pattern radiates in a direction, away from the horizontal plane and the resulting radiation pattern for this monopole antenna is still omnidirectional. However, the direction of peak-radiation has changed from the x-y plane to an angle elevated from that plane.

V. CONCLUSION

The monopole antenna works generally on finite sized ground which affects the radiation patterns of the antenna strongly as it can be observed on different figures above. So the large the ground plane is, the lower the direction of maximum radiation and as the ground plane approaches infinite size, the radiation pattern approaches a maximum in the x-y plane.

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AUTHORS

First Author – Lusekelo Kibona, Tutor, Ruaha University College, Iringa Tanzania and kibonal@nm-aist.ac.tz.

Correspondence Author – Lusekelo Kibona, Tutor, Ruaha University College(RuCo), Iringa-Tanzania and kibonal@nm-aist.ac.tz. +255 754 406025

Emergence of Agile Methodologies: "Perceptions from Software Practitioners in Sri Lanka"

S.Nithila, K. Priyadharshani, Y. S. G. Attanayake, T. Arani and C.D. Manawadu

Srilankan Institute of Information Technology, New Kandy Road, Malabe,Colombo 10115,Western Province

Abstract- Agile software development methods have caught the attention of software practitioners and researchers worldwide. Several issues have arisen from the experience of software methodologies, including the nature of research questions that such studies address the advantages and challenges associated with being a member of the community under study, and how to maintain the rigour in data collection. A systematic review of empirical studies of agile software development up to and including 2005 was conducted. The search strategy identified 1996 studies, of which 36 were identified as empirical studies. The studies were grouped into four themes: introduction and adoption, human and social factors, perceptions on agile methods, and comparative studies. The review investigates what is currently known about the benefits and limitations of, and the strength of evidence for, agile methods. The main implication for research is needed perception from software practitioner. For the industrial readership, the review provides a map of the findings, according to topic, that is compared for relevance to their own settings and situations. This paper focused on the various methods which software practitioners adopt Agile to enhance their business operations, which aims to organize, analyze and make sense out of the dispersed field of agile software development methods. The comparative analysis is performed using the method's life-cycle coverage, project management support, type of practical guidance, fitness-for-use and empirical evidence as the analytical lenses. The results show that agile software development methods, without rationalization, cover certain, different phases of the software development life-cycle and most of them do not offer adequate support for project management, uncovering of the better ways of developing software by doing it and helping others do it, while there is value in the items on the right and value the items on the left more.

Index Terms- Software practitioners, Perceptions on agile methods,strength of evidence,method's life-cycle coverage,Project management support

I.   INTRODUCTION

The current software development environment is dynamic. The requirements of the client may change time to time while the product is in the process. The software companies and practitioners try to catch the clients as much as possible. Current competition among software development firms is high. Therefore, the companies treat the client as "god" and try to accept the changes in requirements from client without any issue to them. The Agile methodologies enable the company to react to changes effectively and release the small versions and get feedback from the client for future versions.

Recently, many of the suggestions for improvement have come from experienced practitioners, who have labelled their methods as agile software development. This movement has had a huge impact on how software is developed in Sri Lanka. However, though there are many agile methods known about how these methods are carried out in practice and what are the effects. According to current trend IT industry is one of the fast growing firms. Nowadays software practitioners in Sri Lanka are moving from traditional methodologies to agile.

This Systematic review seeks to evaluate, synthesize and resent the [1] empirical finding on agile software development to date and provide an overview of topics analyzed. This overview discusses the certain research questions. Such as, what are the outlook about the agile methodologies among software practitioners in Sri Lanka? What are the welfares and issues are occurred by practicing agile methodologies in Sri Lanka? How the agile methodologies is involved with software practitioner in Sri Lanka? How the practitioners in Sri Lanka, have the impression of the differentiation through other methodologies?What are the strength of the findings and suggestions for research and practice in Sri Lanka?

This review will also help the scientific community that works with agile development to build a common understanding of the challenges that must be faced when investigating the effectiveness of agile methods. The results of such investigation will be relevant to the software industry.

This document is contained the background study of the existing research and the current research of the agile methodologies. Also it included the result and the discussion about the awareness of this Methodologies which is insight from Software Practitioners in Sri Lanka. It mentioned the conclusion what are we gathered from the discussion.

II.   LITERATURE REVIEW

Agile methods are an established process for developing software nowadays. There is, however, less evidence of their usage among software practitioners in Malaysia. While the methods have become mainstream in other regions, that is not the case in this country. This paper empirically investigates the perceptions of Agile methods usage from [1] seven organizations involving 14 software practitioners in Malaysia. Our participants are using Scrumand have a maximum of five years experience. We categorized our findings in terms of awareness, introduction, and challenges they are facing,

together with the suggested and practiced solution from them. The challenges with developing software systems led to a switch from traditional software methodologies like Waterfall towards the Agile software methodologies. These Agile software methodologies have become more and more popular in recent times, and Scrum in particular has been adopted by many companies. The current literature suggests that these Agile methodologies are indeed more effective in project management, particularly in dealing with the complexity of modern software systems and the rapidly changing business environment. Given however a lack of available evidence of such research on the factors leading to the adoption of Scrum, its usage and its impact within Sri Lanka, this thesis investigates [2] the efficacy of Scrum in project management in the Sri Lankan context. Agile methodologies were initially proposed as being effective in specialized scenarios, for example, with small co-located teams, but studies have shown that these methodologies are also effective in many other settings. The existing literature further proposes that many factors can affect the effectiveness of these methodologies. This thesis therefore sets out to compare some of the critical success factors identified in the existing literature against various characteristics found in the Sri Lankan environment.

The purpose of this study was to investigate whether the software development companies can achieve expected software quality through agile development. In order to reach this goal, the first objective of the research was to identify the [3] software quality factors through various quality models and quality management philosophies. To identify the software development process models. Toanalyze the software quality difference between development methodologies in terms of selected quality factors. And finally to identify the development technique by which high quality software products could develop. The research was conducted in the Sri Lankan context focusing on software development companies registered with the Sri Lanka Exports Association. After the preliminary investigation on obtaining relevant information, four companies namely; Virtusa, Team Work, DMS and E- College were selected for the research. The second pilot survey reflected that it was impossible to collect data from clients. Thus, the research was aimed only at developer oriented quality factors.

There has been a noticeable focus shift from agile methods such as eXtreme Programming (XP) and Scrum to lean software development in the last several years, which is indicated as "from agile to lean". However, the reality may not be as simple or linear as the term implies. To provide a better understanding of the combined use of agile and lean approaches in software development, a set of experience reports were analyzed. These reports were published in the past conferences dedicated to agile software development and report experiences of using both agile and lean. The results of the analysis show that agile and lean can be [4] combined in different manners for different purposes in software development. Lean is often applied as guiding principles for agile development. When combined at practice level, flow based lean processes tend to substitute time-boxed agile processes.

The software Requirement Engineering (RE) is one of the most important and fundamental activities in the software life cycle. With the introduction of different software process paradigms, the Requirement Engineering appeared in different facets, yet remaining its significance without a doubt.

This study was conducted to analyze the impact of poor Requirement Engineering in outsourced software projects from the developers' [5] context (sample size n = 57). It was identified that the present outsourcing scenario has created to have frequent requirement changes, shrunk design and stretched development phases, and frequent deliverables, which have to be accommodated by the software developer with extra effort and commitment beyond the project norms. The results reveal important issues and open policy level discussions while questioning our insights on the outsourcing benefits as a whole.

Product-Line Engineering and our study aimed to describe what agility is for software product lines and find out more on how this approach could be realized. [6]Agile Software Product-Line Engineering could reap benefits from the best of the two software engineering approaches combining long term strategic efforts with short term agility.

The companies under study seem to combine Software Product-Line Engineering and Agile Software Development with success, reducing initial investment and exploiting reuse, and we found several practices that are interesting for further study. Based on these practices we present our view of a top- down approach to Agile Software Product-Line Engineering starting with several characteristics and a proposal for a definition of the field. Further, a framework for implementing the approach based on our research is presented, before we describe our thoughts on how the practice areas of Software ProductLine Engineering can be combined with Agile Software Development practices.

Agile software development represents a major departure from traditional, plan-based approaches to software engineering. A systematic review of empirical studies of agile software development up to and including 2005 was conducted. The search strategy identified. 1996 studies, of which 36 were identified as empirical studies. [7]The studies were grouped into four themes: introduction and adoption, human and social factors, perceptions on agile methods, and comparative studies. The review investigates what is currently known about the benefits and limitations of, and the strength of evidence for, agile methods. Implications for research and practice are presented. The main implication for research is a need for more and better empirical studies of agile software development within a common research agenda. For the industrial readership, the review provides a map of findings, according to topic, that can be compared for relevance to their own settings and situations.

A survey was conducted among Agile professionals, [8] gathering survey data from 109 Agile projects from 25 countries across the world.

Multiple regression techniques were used, both at the full regression model and at the optimized regression model via the stepwise screening procedure. The results revealed that only 10 out of 48 hypotheses were supported, identifying three critical success factors for Agile software development projects: (a) Delivery Strategy, (b) Agile Software Engineering Techniques, and (c) Team Capability.

Limitations of the study are discussed together with interpretations for practitioners. To ensure success of their projects, managers are urged to focus on choosing a high- caliber team, practicing Agile engineering techniques and following Agile-style delivery strategy.

Participants agree that documentation tools should seek to better extract knowledge from core resources. These resources include the system's source code, test code and changes to both. Resulting technologies could then help reduce the effort required for documentation maintenance, something that is shown to rarely occur. Our data reports compelling evidence that software professionals value technologies that improve automation of the documentation process, as well as facilitating its maintenece. [9]

III. METHOLOGY

The team has gathered information form quantitative research method which is used to aim to gather an in-depth understanding of software practitioner in Sri Lanka. The research methodology was based on a comprehensive survey conducted through software practitioner in Software development industry in Sri Lanka. Since the main objectives of the study and the research problem are generic to any Information technology industry company and country as a whole the survey and its findings could easily be generalized with minor alterations. For this study, 32 software developers from 8 Small to Medium software developing enterprises were used.
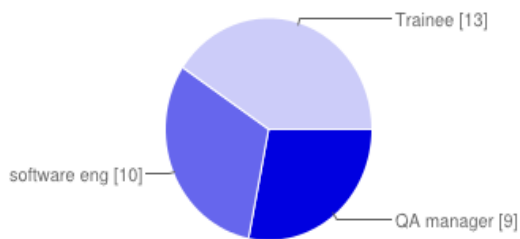
Figure 1: Current position of software practitioner

Type	No of Practitioners	Percentage
QA Manager	9	28%
Software Engineer	10	31%
Trainee	13	41%

Table 1: Current position of software practitioners
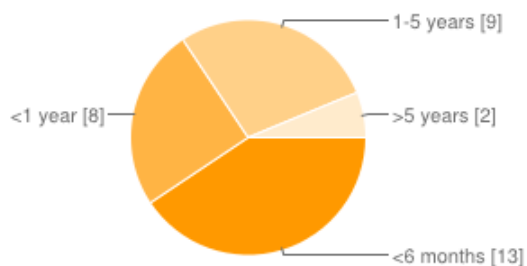
Figure 2: Working Experience

Duration	No of Employee	Percentage
< 6 Months	13	41%
< 1 Year	8	25%
1-5 Years	9	28%
> 5 Years	2	6%

Table 2: Working Experience

IV. RESULT AND DISCUSSION

In this study the team has come up with a decision that agile methodology is used by 94% of software practitioners in Sri Lanka. There are only 11% of practitioners gained full of satisfactions. 12% of practitioners are extremely interested in agile methodology. By comparing with other practices the agile methodology got 84% in performance.
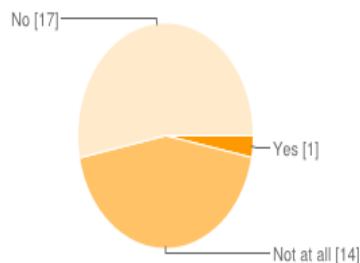
Figure 3 : Issues Occurred While Practicing Agile

Issues	No Of Practitioners	Percentage
Yes	1	3%
No	17	53%
Not at all	14	44%

Table 3: Issues Occurred While Practicing Agile

Figure 4: Agile is compared with other methodologies
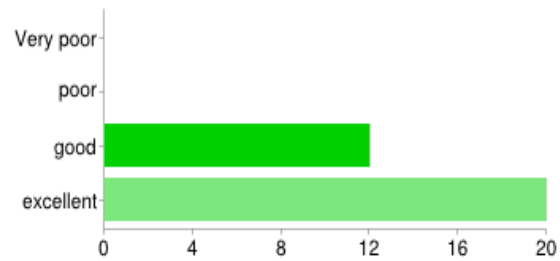
Performance	No of Practitioners	Percentage
Better	27	84%
Same	0	0%
Bad	0	0%
N/A	5	16%

Table 4: Agile is compared with other methodologies

Figure 5: No of practitioners are using Agile

Usage	No of Practitioners	Percentage
Yes	30	94%
No	2	6%

Table 5: No of practitioners are using Agile

Figure 6: Interest in Agile Methodology

Interest	No of Practitioners	Percentage
Not at all	10	31%
Neither interest	1	3%
Interest	9	28%
Extremely Interest	12	38%

Table 6: Interest in Agile Methodology

Figure 7: Practitioners Satisfaction (Quality)

Quality	No of Practitioners	Percentage
Very Poor	0	0%
Poor	0	0%
Good	12	38%
Excellent	20	63%

Table 7: Practitioners Satisfaction(Quality)

Figure 8: Experience of using Agile

Experience	No of Practitioners	Percentage
Very Poor	0	0%
Poor	6	19%
Good	15	47%
Excellent	11	34%

Table 8: Experience of using Agile

V. CONCLUSION

The outcome of this research, there are some possible future studies relevant to this research, which can be considered as further extensions. The main goal of this study is focused on appearance of Agile Methodologies, insight from Software Practitioners in Sri Lanka. The objective of this study was to investigate how agile and lean approaches have been combined in software development. To explore this phenomenon, a data analysis of 32 experience reports containing real-world experiences of combining agile and lean in software development was conducted. The patterns of combining agile

and lean in these experience reports were identified and categorized in a more systemic way. The findings of the study would enrich our understanding of how agile can be combined in software development. The combination types identified in the study can serve as a thematic map for the researchers who intend to conduct more in-depth study of the phenomenon of agile. The practical implication of the study is that it reveals different ways to agile. There is no one-type-fits-all solution. Each organization should reflect on its own situation and needs before embarking on the journey of combining agile. Then the potential combinations summarized in this study could provide them with some promising directions to explore. However, how to effectively tailor the combination types to suit the specific situation and needs of the organization is a challenge yet to be addressed satisfyingly and worth further studying.

One main limitation of the study is lack of practitioners in the software industry have been selected for the research.Even though there are number of software firms in Sri Lanka and some of the companies has to be selected and there are many field of practitioners in the industry. But our target is few of them. There are different type of software methodologies available, although the different kinds of project has to be focused on several methodologies it may depend on the life time, complexity, cost and knowledge of the practitioners in their project the team has not been considered them. There are some sub practices in agile such as Xtreme Programming and scrum; the team did not deeply consider those methodologies. Agile methodology has some critical success factors as same as a correct delivery strategy, a proper practice of Agile software engineering techniques and a high-caliber team.

Another interesting study is to bring the analysis presented in the paper one step deeper and analyze specific agile practices that are possibly disjoint, to reveal how and why these practices are related and enacted indifferent organizational contexts to the future researchers. This review holds a precise conclusion of this master thesis summarizing the important points and findings of our work.

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AUTHORS

First Author – S.Nithila, Srilankan Institute of Information Technology, New Kandy Road, Malabe,Colombo 10115,Western Province

Second Author – K. Priyadharshani, Srilankan Institute of Information Technology, New Kandy Road, Malabe,Colombo 10115,Western Province

Third Author – Y. S. G. Attanayake, Srilankan Institute of Information Technology, New Kandy Road, Malabe,Colombo 10115,Western Province

Fourth Author – T. Arani, Srilankan Institute of Information Technology, New Kandy Road, Malabe,Colombo 10115,Western Province

Fifth Author – C.D. Manawadu, Srilankan Institute of Information Technology, New Kandy Road, Malabe,Colombo 10115,Western Province

Evaluation of Local, Improved and Hybrid Rice Varieties against Insect Pests in District Rewa (M. P.), India

Kalpana Tripathi[*] and Arti Saxena[**]

[*] Department of Zoology, Govt. T. R. S. College, Rewa (M.P.)
[**] Department of Zoology, Govt. Science College, Rewa (M.P.)

Abstract- The field studies were carried out for evaluation of local, improved and hybrid varieties of rice for insect pest complex in rewa region. Study of insect pest complex was done from 2006-07 to 2007- 08. To study the incidence of various pests 16 rice cultivars five were local cultivars namely Dehula, Newari, Bhataphool, Loachai & Lohindi & six were improved varieties viz Pusabasmati, IR-36, IR-64, Vandana, IR-20 & Pusa Sugandha and five were hybrid varieties i.e. PA-6201, KRH-2, PRH-10, JRH-4 & JRH-5. The observations were made regarding the incidence of insect pests, their spread, type and extent of damage.

Index Terms- Insect pests complex, *Oryza sativa,* India

I. INTRODUCTION

Rice (*Oryza sativa* Linn.) is a basic food crop for a large proportion of the world's population. Consequently, it is receiving major attention in the current efforts to improve the world food situation. Rice continues to remain as the staple food for more than 65 per cent Indian population and with largest area of 44.6 million hectares and with second largest milled rice production of 93.3 million tones (2006-2007). Rice cultivation extends from 8° to 35^ON latitudes across diverse ecosystems such as irrigated (52.6%), upland (12%), rain fed low land (32.4%), semi deep water and deep water (3%) as well as coastal saline regions. Based on the water availability rice is taken up as a single crop or as high as three crops in a year. [1]

Rice is a major food grain crop of the country and it is widely grown in north-eastern parts of Madhya Pradesh comprising Rewa district. In modern agriculture, high yielding rice varieties are extensively grown with the use of fertilizers and manures. Such cultivation pattern of rice accidentally or inadvertently offers infestation of a large number of insect pests, which results in to severe loss in crop yields. [2]

Insects are major constraint to rice production. Most of the rice plant parts are vulnerable to insect feeding from the time of sowing till harvesting. Both the mature and immature stages of insects injure rice plants by chewing leaf and root tissues, boring and tunneling into stems, or sucking fluid sap from stems and grains. The injury from feeding leads to damage showing symptoms of skeletonized and defoliated leaves, dead hearts, whiteheads, stunted and wilted plants and unfilled or pecky grains. Ultimately insect damage affects the plant physiology leading to reduction in measurable yield, utility or economic return. As the insect pests cause damage to rice plants and are one of the reasons of total annual yield loss of rice, it is important to study the rice insect pests, especially their seasonal abundance and incidence, to evaluate the control measures. [3]

The present investigation was evaluated local, improved and hybrid rice varieties against insect pests.

II. MATERIALS AND METHODS

The present study was done in Kuthulia farm of Agriculture College of District Rewa. The study was conducted in the seasons of 2006-07 and 2007-08. During this time period average temperature was 30.4 ^{0}C (maximum) and 15.61 ^{0}C (minimum). During 2007 the monsoon was received on 16th June whereas in 2008 it was on 12th June. Rainfall was adequate in 2007 (669.5mm) in 41 rainy days but the year 2008 it was comparatively high ranging up to 672.6mm.

In order to study the incidence of various pests 16 rice cultivars were tested during years 2006-07 and 2007- 08. Among the tested cultivars, five were local cultivars namely Dehula, Newari, Bhataphool, Loachai & Lohindi & six were improved varieties viz Pusabasmati, IR-36, IR-64, Vandana, IR-20 & Pusa Sugandha and five were hybrid varieties i.e. PA-6201, KRH-2, PRH-10, JRH-4 & JRH-5.

The observations were made regarding the incidence of insect pests, their spread, population and nature, type and extent of damage. Ten spots in the selected rice fields were marked at diagonal line with the help of a quadrate of 0.5m x 0.5m size. This area was marked by using a quadrate by fixing bamboo sticks at the seedling stage of the crop. These marked areas were used for counting the number of insects without disturbing the crop plant in *situ*. As various insect pests damage the rice crop at various stages starting from the early seedling stage to maturity of crop different methodologies were adopted for counting their numbers. Light trap method was used in insect pest complex study. [4]

III. RESULTS AND DISCUSSION

Rice, the staple diet of over half of the world's population, is grown on over 145 million ha in more than 110 countries, and occupies almost one-fifth of the total world cropland under cereals [5]. John (1981) reported that inadequate crop protection in India causes annual losses more than 36 percent by insects alone. [6]

In the present study during both 2006-07 and 2007-08 seasons, a pest complex of about 5 insect pests were recorded. The common and scientific names have been given in Table 1. The study of insect population on different rice varieties at

various growth stages was studied in 2006-07 & 2007-08. The mean of population has been calculated for both the years are shown in Table No. 2 to 6.

Its presence was not seen at 30DAS and thereafter its infestation increased severely at 45 to 105 DAS, growth stages. Again, its infestation declined till 105 DAS. The incidence of gundhi bug was recorded earliest in Dehula, Lohnadi, Vandana and IR-201 in 45 DAS and it remained latest upto 105 DAS on Bhataphool, Lochai, Pusabasmati IR-36, IR-64, Pusa sugandha, PA 6201, KRH – 2 and PRH – 10. On 45 DAS the severity of their incidence was highest on Vandana ($4.2/m^2$) and lowest on Dehula ($2.4/m^2$). After 60 DAS the severity of their incidence was highest i.e. $17.25/m^2$ on Vandana and $1.05/m^2$ on JRH-4 the lowest. After 75 DAS Pusabasmati was recorded to be the highest infested variety i.e. $15.2/m^2$ and PRH-10 having $3.95/m^2$, being the lowest infected one. After 90 DAS Pusabasmati remained with highest incidence as $29.85/m^2$ and JRH-4 as $3.2/m^2$ as of the lowest incidence. After 105 DAS the highest incidence remained on Pusabasmati as $17.95/m^2$ but the least occurrence was recorded on PA 6201 as $4.1/m^2$ (Table 2). Durge *et al,* 1972 [7] have been reported gundhi bug from all the rice growing areas and cause economic damage to the crop.

It is evident from the data that the presence of WBPH was seen first time form early stage (30DAS) and then successively increased till 75 DAS.WBPH was recorded on 30 DAS, the severity of its incidence was highest on Pusabasmati ($7.45/m^2$) and lowest on PRH-10 ($1.45/m^2$). After 45 DAS the severity of its incidence was highest i.e. $23.35/m^2$ on Pusabasmati and $5.55/m^2$ on PRH-10, the lowest. After 60 DAS Pusabasmati was recorded to be the highest infested variety i.e. $8.6/m^2$ and JRH-5 i.e. $2.2/m^2$, the lowest infested one. After 75 DAS Pusabasmati remained with highest incidence as $3.4/m^2$ and PA 6201 having $0.45/m^2$ occurence as of the lowest incidence variety (Table 3). The Similar studies were done by Pathak 1975 [8].

Mean number of caterpillars/m^2 of rice case worm on different rice varieties at various growth stages during the years 2007-2008 at experimental site are given in Table 4. It is evident from the data that the occurrence of this pest was increased at 30DAS growth stage and then declined gradually till 75 DAS. Case worm was recorded on 30 DAS. The severity of its incidence was highest on Pusabasmati ($5.35/m^2$) and lowest on JRH-4 ($0.6/m^2$). After 45 DAS the severity of their incidence was highest i.e. $8.75/m^2$ on Pusabasmati and $1.85/m^2$ on JRH-4, the lowest. After 60 DAS Pusabasmati was recorded to be the highest infested variety i.e. $2.3/m^2$ and KRH-2 and JRH-4 having $0.15. /m^2$ became lowest infested ones. Ramasubbaiah *et al,* 1978 [9] have reported crop damage due to rice case worm.

Leaf folder was recorded on 30 DAS the severity of their incidence was highest on Pusabasmati ($7.3/m^2$) and lowest on JRH-4 ($1.45/m^2$). After 45 DAS the severity of their incidence was highest i.e. $16.2/m^2$ on Pusabasmati and $4.75/m^2$ on JRH-5, the lowest. After 60 DAS Pusabasmati was recorded to be the highest infested variety i.e. 8.75 and JRH-4 i.e. $1.8/m^2$, the lowest infested one. After 75 DAS Pusabasmati remained with highest incidence as $3.2/m^2$ and JRH-4 as $0.5/m^2$, as having the lowest incidence (Table 5). Mishra and Kulshrestha 1971 have been described leaf folder is a more serious problem in high fertiliser responsive semidwarf varieties. [10]

It as evident from the data the damage by stem borer was observed in the crop from very early stage i.e. (30 DAS) which gradually increased till 75 DAS. Thereafter, a little reduction in the damage was noted at 90 DAS. On 30 DAS the severity of the incidence of stem borer was highest on Pusabasmati ($2.55/m^2$) and lowest on JRH-5 ($0.15/m^2$). After 45 DAS the severity of its incidence was highest i.e. $3.55/m^2$ on Pusabasmati and 0.4% on PA6201 and KRH-2, the lowest. After 60 DAS Pusabasmati was recorded to be the highest infested variety having. $5.3/m^2$ and PA6201 having $1.4/m^2$ incidence, being the lowest infested one. After 75 DAS Pusabasmati remained with highest incidence as $2.55/m^2$ and PA6201 as $0.1/m^2$, the lowest incidence. After 90 DAS the highest incidence remained on Pusabasmati as $0.5/m^2$ but least occurrence was recorded on Lochai and IR-64 as $0.05/m^2$ (Table 6). Murthy and Chiranjeevi 1996 [11] have showed similar results. Pandya, *et al* 1987 have been described crop damage due to yellow stem borer. [12]

Table -1: A Qualitative Composition of Insect Pests Complex of Rice Ecosystem (2007-2008)

S. No.	Common Name	Scientific Name
1.	Rice bug/ gundhi bug	*Leptocorisa varicornis* (Fabricius)
2.	Whitebacked Planthopper (WBPH)	*Sogatella furcifera* (Horvath)
3.	Rice case worm, case bearer	*Nymphula depunctalis* (Guenee)
4.	Rice leaf folder, rice leaf roller	*Cnaphalocrocis medinalis* (Guenee)
5.	Yellow stem borer (YSB)	*Scirpophaga incertulas* (Walker).

Table – 2: Mean numbers of nymph/adults of gundhi bug/m^2 on different rice varieties at various growth stages during the year (2007-2008).

Variety	Crop Growth Stages DAS Gundhi bug						
	15	30	45	60	75	90	105
Dehula	0.0	0.0	2.4	14.65	9.65	0.0	0.0
Newari	0.0	0.0	0.0	3.55	12.0	6.1	0.0
Bhantaphool	0.0	0.0	0.0	0.0	11.6	24.05	11.95
Lochai	0.0	0.0	0.0	0.0	8.05	18.45	10.45
Lohnadi	0.0	0.0	2.55	10.45	4.1	0.0	0.0
Pusabasmati	0.0	0.0	0.0	0.0	15.2	29.85	17.95
IR – 36	0.0	0.0	0.0	0.0	12.25	26.2	13.25
IR - 64	0.0	0.0	0.0	0.0	13.1	27.1	14.6
Vandana	0.0	0.0	4.2	17.25	14.25	0.0	0.0
IR – 201	0.0	0.0	3.8	14.7	9.75	0.0	0.0
Pusa sugandha	0.0	0.0	0.0	0.0	13.2	25.6	11.5
PA 6201	0.0	0.0	0.0	0.0	4.3	8.4	4.1
KRH – 2	0.0	0.0	0.0	0.0	4.15	7.45	4.7

PRH – 10	0.0	0.0	0.0	0.0	3.95	7.05	4.7
JRH – 4	0.0	0.0	0.0	1.05	5.2	3.2	0.0
JRH – 5	0.0	0.0	0.0	1.55	5.25	3.8	0.0

Table – 3: Mean population of wbph/m2 on different rice variety at various growth stage of crop during the year (2007-2008)

Variety	Crop Growth Stages DAS. WBPH						
	15	30	45	60	75	90	105
Dehula	0.0	3.2	10.25	3.7	1.65	0.0	0.0
Newari	0.0	3.25	9.6	3.75	1.35	0.0	0.0
Bhantaphool	0.0	2.95	10.55	3.7	1.6	0.0	0.0
Lochai	0.0	3.05	10.65	4.3	1.6	0.0	0.0
Lohnadi	0.0	3.2	11.6	4.3	1.4	0.0	0.0
Pusabasmati	0.0	7.45	23.35	8.6	3.4	0.0	0.0
IR – 36	0.0	4.8	20.6	6.1	2.2	0.0	0.0
IR - 64	0.0	5.7	20.3	5.7	2.25	0.0	0.0
Vandana	0.0	5.45	21.0	7.2	2.15	0.0	0.0
IR – 201	0.0	5.1	19.95	6.55	2.3	0.0	0.0
Pusa sugandha	0.0	5.7	20.8	6.75	2.05	0.0	0.0
PA 6201	0.0	1.5	5.7	2.7	0.45	0.0	0.0
KRH – 2	0.0	1.7	6.25	2.75	0.7	0.0	0.0
PRH – 10	0.0	1.45	5.55	2.5	0.7	0.0	0.0
JRH – 4	0.0	1.55	6.45	2.95	0.6	0.0	0.0
JRH – 5	0.0	1.55	5.6	2.2	0.7	0.0	0.0

Table-4: Mean number of caterpillars/m^2 of rice case worm on different rice variety at various growth stages during the year (2007-2008)

Variety	Crop Growth Stages DAS case worm						
	15	30	45	60	75	90	105
Dehula	0.0	1.75	4.1	0.7	0.0	0.0	0.0
Newari	0.0	1.95	3.45	0.8	0.0	0.0	0.0
Bhantaphool	0.0	2.35	3.65	0.8	0.0	0.0	0.0
Lochai	0.0	2.55	3.9	1.3	0.0	0.0	0.0
Lohnadi	0.0	2.15	3.5	0.55	0.0	0.0	0.0
Pusabasmati	0.0	5.35	8.75	2.3	0.0	0.0	0.0
IR – 36	0.0	3.5	6.7	1.5	0.0	0.0	0.0
IR - 64	0.0	3.75	6.75	1.25	0.0	0.0	0.0
Vandana	0.0	4.05	7.9	1.4	0.0	0.0	0.0
IR – 201	0.0	3.4	5.95	1.4	0.0	0.0	0.0
Pusa sugandha	0.0	3.55	7.7	1.6	0.0	0.0	0.0
PA 6201	0.0	0.75	2.0	0.2	0.0	0.0	0.0
KRH – 2	0.0	0.8	2.0	0.15	0.0	0.0	0.0
PRH – 10	0.0	0.75	2.3	0.55	0.0	0.0	0.0
JRH – 4	0.0	0.6	1.85	0.15	0.0	0.0	0.0
JRH – 5	0.0	0.7	1.95	0.0	0.0	0.0	0.0

Table: 5 Mean population of rice leaf folder/m2 different rice variety at various growth stages of crop during the year (2007-2008)

Variety	Crop Growth Stages DAS. Leaf Folder						
	15	30	45	60	75	90	105
Dehula	0.0	3.85	8.2	5.05	1.4	0.0	0.0
Newari	0.0	3.7	8.4	4.65	1.55	0.0	0.0
Bhantaphool	0.0	4.9	10.2	5.7	1.7	0.0	0.0
Lochai	0.0	3.8	9.5	5.3	1.5	0.0	0.0
Lohnadi	0.0	4.3	9.35	5.4	1.2	0.0	0.0
Pusabasmati	0.0	7.3	16.2	8.75	3.2	0.0	0.0
IR – 36	0.0	5.4	12.5	7.1	2.35	0.0	0.0
IR - 64	0.0	5.75	11.9	6.9	2.2	0.0	0.0
Vandana	0.0	5.9	12.4	7.55	2.6	0.0	0.0
IR – 201	0.0	5.35	11.75	6.8	2.3	0.0	0.0
Pusa sugandha	0.0	5.8	13.1	7.3	2.8	0.0	0.0
PA 6201	0.0	1.65	5.1	2.8	0.85	0.0	0.0
KRH – 2	0.0	1.7	5.15	2.8	0.8	0.0	0.0
PRH – 10	0.0	2.4	4.8	2.05	0.7	0.0	0.0
JRH – 4	0.0	1.45	4.85	1.8	0.5	0.0	0.0
JRH – 5	0.0	1.4	4.75	2.0	0.9	0.0	0.0

Table- 6: Mean number of damaged shoots (dead hard/white earhead)/m2 yellow stem borer on different rice variety at various growth stages during the year (2007-2008).

Variety	Crop Growth Stages DAS stem borer						
	15	30	45	60	75	90	105
Dehula	0.0	0.5	1.75	1.9	0.95	0.0	0.0
Newari	0.0	0.8	1.65	2.25	0.45	0.0	0.0
Bhantaphool	0.0	0.6	1.5	2.2	0.75	0.15	0.0
Lochai	0.0	0.7	1.3	1.6	0.8	0.05	0.0
Lohnadi	0.0	0.9	1.65	2.15	0.4	0.0	0.0
Pusabasmati	0.0	2.55	3.55	5.3	2.55	0.5	0.0
IR – 36	0.0	1.6	2.65	3.6	1.85	0.2	0.0
IR - 64	0.0	1.55	2.4	3.45	1.8	0.05	0.0
Vandana	0.0	1.95	2.65	3.4	2.05	0.0	0.0
IR – 201	0.0	1.85	2.25	3.65	1.8	0.0	0.0
Pusa sugandha	0.0	2.15	2.85	4.05	2.2	0.25	0.0
PA 6201	0.0	0.2	0.55	1.4	0.1	0.0	0.0
KRH – 2	0.0	0.3	0.04	1.6	0.2	0.0	0.0
PRH – 10	0.0	0.25	0.6	1.5	0.0	0.0	0.0
JRH – 4	0.0	0.2	0.6	1.5	0.0	0.0	0.0
JRH – 5	0.0	0.15	0.6	1.6	0.2	0.0	0.0

IV. CONCLUSION

In the present course of investigation, we have to explore the evaluation of Local, Improved and Hybrid Rice Varieties against Insect Pests. It is more than knowing that when a rice insect pest is present it should be controlled. It then requires adequate knowledge about all the factors responsible for the pest population reaching economic threshold levels. Considering the

pest and disease constraints affecting the productivity of rice in different agro-climatic condition/zones various strategies have been evolved to improve and sustain the productivity of rice.

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AUTHORS

First Author – Kalpana Tripathi, PhD, Department of Zoology, Govt. T. R. S. College, Rewa- drkalpanatripathi@gmail.com
Second Author – Arti Saxena, PhD, Department of Zoology, Govt. Science. College, Rewa.

Correspondence Author – Kalpana Tripathi, email drkalpanatripathi@gmail.com, +919009222591

A Report on the 40th Annual Conference of Association of Preventive and Social Medicine of India January 22-24, 2013; Government Medical College, Nagpur, India.

Thakre SB[*], **Thakre SS**[**], **Ughade SN**[*] **Narlawar UW**[*], **Chavan AB**[*], **Parmar A**[*], **Dhok RS**[*]

[*]Preventive and Social Medicine, Government Medical College, Nagpur
[**] Preventive and Social Medicine, Indira Gandhi Government Medical College, Nagpur

Abstract- Association of Preventive and Social Medicine/Public Health Experts of India (IAPSM) is one of the most reputed scientific organizations. It provides a scientific forum for young professionals in public health professionals, public health practicing physicians and other allied disciplines. IAPSM holds its annual conferences at some premier established Community Medicine Department, Medical Colleges of the country. For the first time in the history of Annual National Conference of IAPSM online structured abstract submission has been introduced by the organizer of IAPSM Conference 2013 at Nagpur. Each year far more abstracts are submitted and limited slots are available for oral and poster presentation. Hence, we have carried out an appraisal of abstracts published in the souvenir of the National Conference of IAPSM held at Nagpur during January 2013• A separate committee with two reviews reviewed all abstracts as per the standard journal article review guideline. Mean (SD) score of accepted abstract by one reviewer was 13.23 (1.74) with 95% confidence interval (CI) (13.05-13.4). Mean (SD) score of accepted abstract by another reviewer was 13.72 (2.18) with 95% confidence interval (CI) (13.5-13.9). Agreement analysis between two raters substantial agreement (Kappa=0.61) and it was found to be statistically significant P<0.001.

Index Terms- National conference, Appraisal, abstracts, oral poster presentation.

I. INTRODUCTION

Association of Preventive and Social Medicine/Public Health Experts of India (IAPSM) is one of the most reputed scientific organizations. It provides a scientific forum for young professionals in public health professionals, public health practicing physicians and other allied disciplines. IAPSM holds its annual conferences at some premier established Community Medicine Department, Medical Colleges of the country. In this series, the 40th Annual Conference of IAPSM being organized at Government Medical College(GMC), Nagpur, Maharashtra, in association with Indian Public Health association(IPHA) and IAPSM Maharashtra Chapter during 22-24th January, 2013. The conference theme was **"Women's Health : Today's Evidence, Tomorrow's Agenda"** which included plenary session. More than 800 delegates including 38 speakers representing WHO, UNCEF, PATH, other representative of government and non government organizations attended this conference.

During inaugural programme the chief guest, Dr. Bhatkar, His Excellency, Hon'ble well-known Indian scientist and inventor of Param computer, addressed the need for public health research in the country and emphasized the role of such conferences in bringing the researchers from academia, non governmental organizations and government together towards knowledge contribution for country. Guest of honor, Dr. Tarun Viz, Country Programme Leader (PATH), India and Dr. Rani Bang, Social Activist, SEARCH, Gadchirol, Maharashtra addressed auspicious gathering about need of rural and tribal women health research. They emphasized need of innovative, novel and socially relevant research helps in addressing women and child health of India. Dr. Sriniwas S.Vaishya, Hon'ble Special Secretary of Health for Daman, Diu, Dadra and Nagar Haveli, who is one of the life member of our association has been selected this year for Padmashree award in the field of Medicine and Health care. A special felicitation ceremony was held during the inaugural function of conference. During the secretarial address, Prof. Shashikant, Secretary General of IAPSM deliberated on the growth of IAPSM organization. He urged public health expert and academician to take initiatives for fighting new and emerging challenges and working for human society. He appreciated the organizers for their efforts and about the support of various funding agencies and ministry on special session. Prof. A. Humne, Chairman, Organizing Committee Conference, welcomed all invited speakers, guests and participants. They also highlighted the importance of cross-disciplinary research areas of women's health. Further, Prof. U Narlawar, IAPSM CON 2013 General Secretary, presented the overview of conference proceeding and its recent developments and contributions of scientists and academicians in making it a stronger organization. Dr. S.S. Rajderkar, Pro-Vice-Chancellor, MUHS, Nashik was prominently present during the inaugural programme.

Professor Dr. Zile Singh, delivered the Dhanwantari (National) oration. During plenary session Dr. Arvind Mathur (WHO), Dr. Sunita Paliwal (MOHFW) and Dr. D.K. Mangal (UNFPA) discussed about conference Theme "Women's Health : Today's Evidence, Tomorrow's Agenda. Concisely the scientific programme of IAPSM CON 2013 was composed of 14 plenary sessions, 21 oral presentation sessions, 16 poster presentation sessions and an epidemiology –Grant session were held during the conference. Other plenary sessions were Gender main streaming in medical Education, PPTCT and early infant diagnosis, Vaccine Vial monitoring, Myths and realities on hormonal contraceptives, Pannel Discussion: Making injection

safer-A way forward, HIV Sentinel surveillance 2010-11challenges and evidence for National AIDS Control Programme (NACP-4), Meeting the sexual and reproductive needs of women in India, Innovative capacity building initiative in public health, visceral Leishmaniasis- An overview of clinical trial, Public Health response in disaster, Introducing a comprehensive evidence based tobacco cessation curriculum in Indian Medical Colleges: Quit Tobacco India, Experience, Non pneumatic anti shock garments reduces mortality in Indian women with PPH, and Human Papiloma virus vaccine (HPVV): An Australian perspective. In panel discussion of this session, many eminent speakers discussed the possibilities of research and it application. For entire conference Dr. Sushama Thakre, Editor of Souvenir, IAPSMCON2013 was a master of Ceremony. For the first time in the history of Annual National Conference of IAPSM online structured abstract submission has been introduced by the organizer of IAPSM Conference 2013 at Nagpur [1]. Many of the researchers and students were generous enough to adopt the online method. It was heartening to receive positive feedback on suitability of the online submission. Extensive and exclusive electronic communication was made with every member of IAPSM. Hence entire process was paperless in the conference. Each year far more abstracts are submitted and limited slots are available for oral and poster presentation. Hence, we have carried out an appraisal of abstracts published in the souvenir of the National Conference of IAPSM held at Nagpur during January 2013• A separate committee with two reviews reviewed all abstracts as per the Indian Journal of Community Medicine Article Review guideline (IJCM). The data were analyzed using the STATA (version 10.2) software packages. Descriptive statistics was used to determine mean, percentages and SD. Categorical data were analyzed using Chi-square test. Intra rater agreement was measured using agreement analysis (kappa test).

These abstracts are reviewed by two independent reviewers as per the guidelines provided by Indian journal of community Medicine [2]. Out of 556 abstracts; 374 were accepted (67.38% overall acceptance rate) and published in souvenir of IAPSM conference[3]. Scientific presentation rate was 344(91.97%). Maternal and child health papers formed the greatest proportion of total accepted 82(21.93%), followed by non communicable and miscellaneous group; 53 (14.17%) and 50 (13.73%) respectively. reproductive health 27(7.22%),nutrition 23 (6.15%) and adolescent health 25(6.68%), Other research priorities were immunization, HIV/AIDS, communicable diseases, adolescent health, vector born diseases, mental health illness, geriatric health, Tuberculosis and occupational Health (2.14-4.55%). Mean (SD) score of accepted abstract by one reviewer was 13.23 (1.74) with 95% confidence interval (CI) (13.05-13.4). Mean (SD) score of accepted abstract by another reviewer was 13.72 (2.18) with 95% confidence interval (CI) (13.5-13.9). Agreement analysis between two raters substantial agreement (Kappa=0.61) and it was found to be statistically significant P<0.001. Commonest type of submissions were descriptive and cross sectional 357 (95.45%) followed by retrospective study 12 (3.20%). Overall acceptance rate was (67.38%). Acceptance rate was significantly more in structured abstract, research results, clear objectives, case control and randomized control trials and conclusion supported with results (P<0.001). These findings are consistent with earlier study 1997 Zodapey[4] et al. Major reasons for not acceptance like incomplete submission, non compliance for resubmission, study design not provided, no objectives and no results were submitted. This paper provides a broad overview of the data readily available in the public health conference related to essential health information in India. It highlights a number of issues that need to be addressed to improve the scope and characteristics of abstracts submitted in National conference of IAPSM. The analysis of the contents of all these abstracts eventually would help IAPSM to design its future research policy and would give an interesting information to its members.

II. CONCLUSION

To conclude, purpose of this study was not evaluation but was appraisal and introspection of our own research. Today with the increasing standards of research publications, an immediate application of our skills lies in the use of epidemiology, research methodology and biostatistics to improve the quality of our research and publications. We the community medicine professionals are looked as methodologists among medical fraternity, which call upon us to set standards in medical research. Another option open to us is to make sure that our own work and research interests address of practical problems relevance to the nation. Our research must reflect this priority and concern.

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AUTHORS

First Author – Thakre SB, Associate Professor, preventive and Social Medicine, Government Medical College, Nagpur drsubhasht@rediffmail.com

Second Author – Thakre SS, Associate Professor, preventive and Social Medicine, Indira Gandhi Government Medical College, Nagpur., sushamathakre@rediffmail.com

Third Author – Ughade SN, Assistant Professor, preventive and Social Medicine, Government Medical College, Nagpur
Fourth Author – Narlawar UW, Associate professor, Preventive and social Medicine, Government Medical College, Nagpur
Fifth Author – Chavan AB, Assistant Professor, preventive and Social Medicine, Government Medical College, Nagpur
Sixth Author – Parmar D, Assistant Professor, preventive and Social Medicine, Government Medical College, Nagpur
Seventh Author – Dhok SR, Sr. Resident, Assistant Professor, preventive and Social Medicine, Government Medical College, Nagpur

Correspondence Author – Thakre SB, Associate Professor, preventive and Social Medicine, Government Medical College, Nagpur, Email : drsubhasht@rediffmail.com , mobile 9822366532
Address for correspondence: Dr. Subhash B Thakre, Plot No 9, Swami Swarupanand Society, Narendra Nagar, Nagpur, MS, India. PIN 440015

Transient Analysis of Electrical Circuits Using Runge-Kutta Method and its Application

Anuj Suhag

School of Mechanical and Building Sciences, V.I.T University

Abstract- An RLC circuit (or LCR circuit) is an electrical circuit consisting of a resistor, an inductor, and a capacitor, connected in series or in parallel. The RLC part of the name is due to those letters being the usual electrical symbols for resistance, inductance and capacitance respectively. The circuit forms a harmonic oscillator for current and will resonate in a similar way as an LC circuit will.

Index Terms- Damping in, Impedance, Kirchhoff Current Law, Kirchhoff Voltage Law, Runge Kutta Method, Second Order Equation

I. INTRODUCTION

The time varying currents and voltages resulting from the sudden application of sources, usually due to switching are called TRANSIENTS. In transient analysis we start by writing the circuit equations using basic concepts of KCL, KVL, node-voltage analysis and mesh-current analysis. Due to the involvement of integrals and derivatives in current-voltage relationships for inductances and capacitances, we obtain integro-differential equations which are converted to pure differential equations by differentiating with respect to time. Thus the study of transients requires solving of differential equations. The order of the differential equation depends on the number of energy storage elements present in the circuit.

Some Basic Concepts:-

1. Kirchhoff's Current Law – The sum of currents flowing in and out of a node is zero.

    For a node, $\sum I = 0$.

2. Kirchhoff's Voltage Law –The sum of voltages across various circuit elements in a mesh is zero.

    In a mesh, $\sum v = 0$.

3. Voltage across a capacitor– $V = (\int i\, dt)/C$ i.e integral of current flowing through it over a period of time divided by capacitance

4. Current supplied by capacitor- $I = C(dv/dt)$ i.e product of capacitance and derivative of voltage across capacitor
       with respect to time.

5. Voltage across an inductor- $V = L(di/dt)$ i.e product of inductance and derivative of current through inductor with respect to time

6. Current stored in an inductor- $I = (\int v\, dt)/L$ i.e integral of voltage across it over a period of time divided by inductance.

II. ANALYSIS OF RLC CIRCUIT

An RLC circuit (or LCR circuit) is an electrical circuit consisting of a resistor, an inductor, and a capacitor, connected in series or in parallel. The RLC part of the name is due to those letters being the usual electrical symbols for resistance, inductance and capacitance respectively. The circuit forms a harmonic oscillator for current and will resonate in a similar way as an LC circuit will. The main difference that the presence of the resistor makes is that any oscillation induced in the circuit will die away over time if it is not kept going by a source. This effect of the resistor is called damping. The presence of the resistance also reduces the peak resonant frequency somewhat. Some resistance is unavoidable in real circuits, even if a resistor is not specifically included as a component.

Figure 5.RLC Circuit diagram

The RLC filter is described as a second-order circuit, meaning that any voltage or current in the circuit can be described by a second-order differential equation in circuit analysis.

$I(t)=c.\partial V_c(t)/\partial t$
Where,
C=capacitance
$V_c(t)$=voltage across capacitance

Then we write KVL equation for the circuit as:
$L\partial I(t)/\partial t+RI(t)+Vc(t)=Vin$

Substituting for I(t),we get:
$LC\, \partial^2 V_c(t)/\partial^2(t)+RC\, \partial V_c(t)/\partial(t)+Vc(t)=Vin$

For the case of the series RLC circuit these two parameters are given by:

$$\alpha = \frac{R}{2L} \qquad \omega_0 = \frac{1}{\sqrt{LC}}$$

Where ω_0 = natural frequency.

A useful parameter is the damping factor, ζ, which is defined as the ratio of these two,

$$\zeta = \frac{\alpha}{\omega_n}$$

In the case of the series RLC circuit, the damping factor is given by,

$$\zeta = \frac{R}{2}\sqrt{\frac{C}{L}}$$

The value of the damping factor determines the type of transient that the circuit will exhibit.

Some authors do not use ζ and call α the damping factor.

Different conditions for damping factors,

If,

$\zeta > 1$, the system is called over damped.

$\zeta = 1$, the system is called critically damped.

$\zeta < 1$, the system is called under damped.

III. FORMULATION OF RK METHOD

Runge–Kutta method is an effective method of solving ordinary differential equations of 1st order. If the given ordinary differential equation is of higher order say 'n' then it can be converted to a set of n 1st order differential equations by substitution.

The Runge-Kutta method uses the formulas:

$t_{k+1}=t_{k+h}$

$Y_{j+1}=Y_j+(k1+2k2+2k3+k4)/6$ where K=0,1,2….m-1

Where:

$k_1=hf(t_j, Y_j)$

$k_2=hf(t_{j+h}/2,Y_j+k_1/2)$

$k_3=hf(t_{j+h}/2,Y_j+k_2/2)$

$k_4=hf(t_{j+h},Y_j+k_3)$

k_1 is the increment based on the slope at the beginning of the interval, using y_n;

k_2 is the increment based on the slope at the midpoint of the interval, using $y_n+k_1/2$;

k_3 is again the increment based on the slope at the midpoint, but now using $y_n+k_2/2$;

k_4 is the increment based on the slope at the end of the interval, using y_n+k_3.

$$LC\ \frac{\partial^2 Vc(t)}{\partial t^2}+RC\frac{\partial Vc(t)}{\partial t}+Vc(t)=Vin$$

$$I(t)=c\frac{\partial Vc(t)}{\partial t}$$

So,

$$\frac{\partial I(t)}{\partial t}=Vin-RI(t)-Vc(t)/L$$

Now let,

$I(t)=x_1$

$Vc(t)=x_2$

$$\frac{\partial I(t)}{\partial t}=Vin-R*x1-x2/L=g(t,x1,x2)$$

$$x1/c=\frac{\partial Vc(t)}{\partial t}=f(t,x1,x2)$$

Let,

$X(i)=x_1$

$Y(i)=x_2$

Solving the above equation using 4th order R-K method:

f1=h*f(t,x1,x2)

g1=h*g(t,x1,x2)

f2=h*f((t+h/2),(x1+f1/2),(x2+g1/2))

g2=h*g((t+h/2),(x1+f1/2),(x2+g1/2))

f3=h*f((t+h/2),(x2+f2/2),(x2+g2/2))

g3=h*g((t+h/2),(x1+f2/2),(x2+g2/2))

f4=h*f((t+h),(x1+f3),(x2+g3))
g4=h*g((t+h),(x1+f3),(x2+g3))

IV. SOLUTION OF THE RLC CIRCUIT

Voltage equation across 2nd Order RLC circuit is given by,

x1=x1+((f1+f4)+2*(f2+f3))/6.0

x2=x2+((g1+g4)+2*(g2+g3))/6.0

Where,

h=(T$_f$-T$_0$)/n

here:

h=step size

T$_f$=final time

T$_o$=initial time

Example: Let's take an example to get the transient analysis of circuit for an over damped system.

Let:

R=300, L= 10mH,C=1uF and Vin=10V

Here,

I(0)=0,Vc(0)=0

$$\omega_0 = \frac{1}{\sqrt{LC}}$$

So, w$_0$ =1000

$$\alpha = \frac{R}{2L}$$

This gives a result with magnitude 15000

Now, after dividing the two values we get 1.5, therefore the condition is over damped

V. GRAPHS FOR DIFFERENT CONDITIONS OF DAMPING

A. Over Damped Condition

A plot for voltage developed across capacitor and time for a time interval of 1ms. This graph shows that as the time increases, the voltage also increases parabolic ally. The voltage reaches steady state at or after 1 millisecond
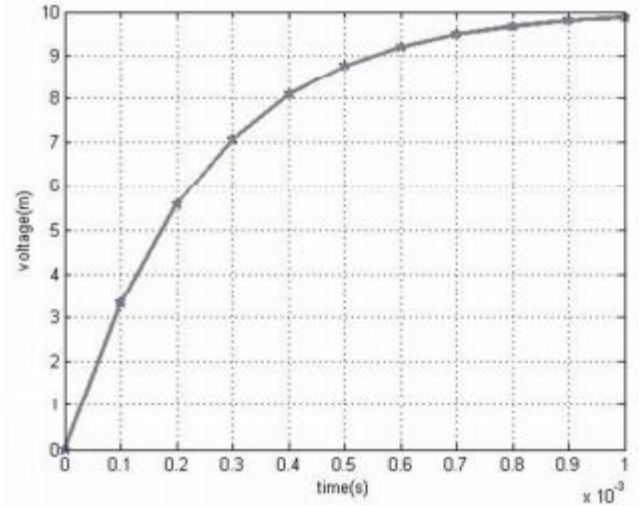
Figure 6. Voltage Vs time graph for over damped conditions

B. Critically Damped Conditions

let us take R=200Ω

then,

α=10000 and ζ=1.5

A plot for voltage developed across capacitor and time for a time interval of 1ms
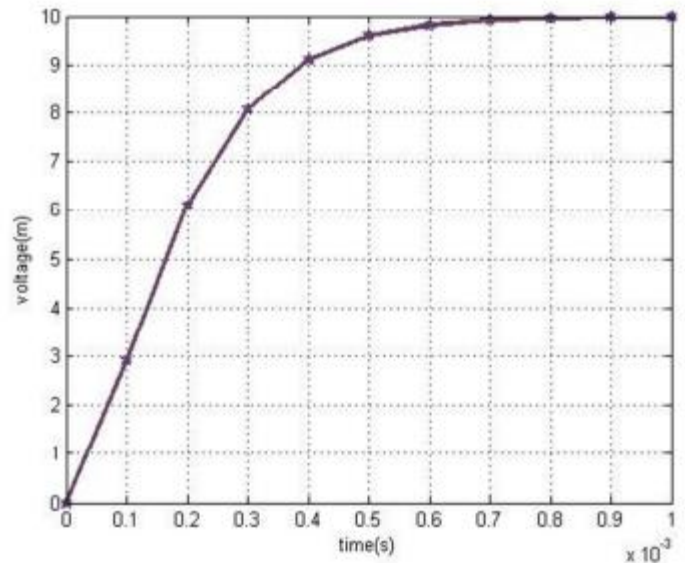
Figure 7. Voltage Vs time graph for critically damped

The voltage here varies parabolic ally with time but it reaches steady state much before 1 millisecond.

C. Under Damped Conditions

Let us take R=100Ω

Then,

α=5000 and, ζ=0.5

A plot for voltage developed across capacitor and time for a time interval of 1ms
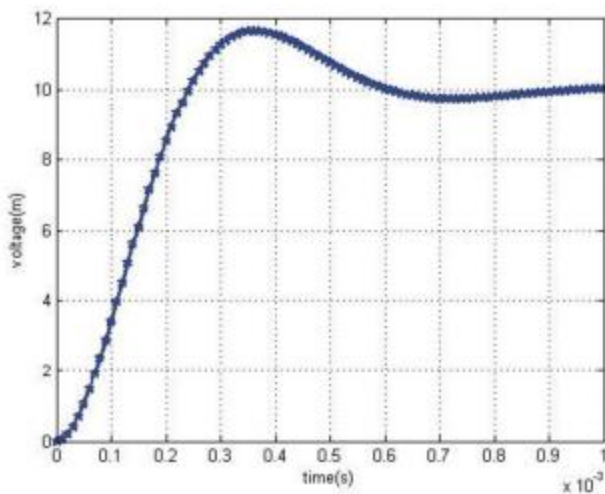
Figure 8. Voltage Vs time for under damped conditions

VI. MATLAB PROGRAMMING

```
clear all;

clc

t=0;

T=0.001;

h=0.0001;

x1=0;

x2=0;

i=1;
```

```
c=0.000001;

l= 0.01; r=300; Vin=10 ;

f=@(t,x1,x2) x2/c;

g= @(t,x1,x2)((Vin-x1-r*x2)/l);

fprintf('time\t\tvoltage\tcurrent\n');

for t=0:h:T

fprintf('%f\t%f\t%f\n',t,x1,x2);

X(i)=x1;

grid off Y(i)=x2;

f1=h*f(t,x1,x2);

g1=h*g(t,x1,x2);

f2=h*f((t+h/2),(x1+f1/2),(x2+g1/2));

g2=h*g((t+h/2),(x1+f1/2),(x2+g1/2));

f3=h*f((t+h/2),(x2+f2/2),(x2+g2/2));

g3=h*g((t+h/2),(x1+f2/2),(x2+g2/2));

f4=h*f((t+h),(x1+f3),(x2+g3));

g4=h*g((t+h),(x1+f3),(x2+g3));

x1=x1+((f1+f4)+2*(f2+f3))/6.0;

x2=x2+((g1+g4)+2*(g2+g3))/6.0;

i=i+1;

end

time=[0:h:T];

plot(time,X,'-p');

grid on;

xlabel('time(s)');

ylabel('voltage(m)');

hold on
```

VII. RESULT AND DISCUSSION

From the experiment conducted above, we obtained the following results for transient analysis:

.
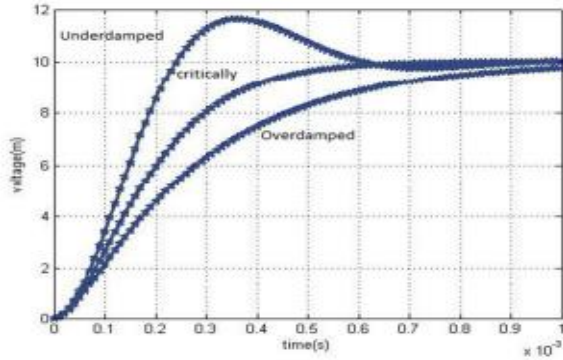
Figure 9. MATLAB Generated final result

This shows that the RK method is very efficient in solving second order differential equations. Thus, we can conclude that by carrying out the transient analysis of a system, we can find out the response of the system by changing the conditions from one steady state value to another. This response helps in designing a system which meets our requirements, and we can further optimize the time domain parameters of the system

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    .

AUTHORS

Anuj Suhag, B.Tech. Mechanical, VIT University, Email: anuj.suhag27@gmail.com.

Aggravation of Silent killer; Air pollution in the City of Colombo

L. Manawadu[*], Manjula Ranagalage[**]

[*] Professor of Geography, University of Colombo, Sri Lanka
[**] Lecturer, Department of Social Sciences, Rajarata University of Sri Lanka, Sri Lanka

Abstract- Air pollution has been identified as one of the silent killers in the present world as pollutants are taking lives of people without making any noise. Unlike other disasters, air pollution destroys human life gradually. People can see and people can predict when disasters occur. However, people cannot understand or cannot see when air pollution is taking place until people are seriously affected.

The road transport and traffic significantly contribute to degrade the quality of air in any region of the world. This study attempts to examine the spatial pattern of Sulfur dioxide and Nitrogen dioxide in the city of Colombo using the data collected by the National Building Research Organization (NBRO), Sri Lanka from January, 2003 to December, 2005. Some socio-economic data which are used as explanatory variables for the spatial pattern of air pollutants were collected from different government organizations.

GIS techniques such as spatial interpolation, spatial query and Geostatistical techniques were adopted to achieve the desired objectives. The main objective of this study is to understand the air pollution dynamics and explore the reasons for aggravating air pollutants in the city in recent past.

It has been identified that there is a very significant periodic changes of contamination of pollutants with the rainy seasons. However, human factors of the city contribute more than the physical factors in degradation of the air quality.

By using grid based regression analysis, traffic density was identified as the most significant explanatory variable among the selected socio-economic variables. Characteristics of traffic fleets are found to be highly responsible for the degradation of air quality in the city of Colombo.

Index Terms- Air pollution, Car journey travel time, Silent Killer, Sulfur dioxide

I. INTRODUCTION

The average contamination of Nitrogen dioxide (NO_2) and Sulfur dioxide (SO_2) in the city of Colombo shows fairly significant statistics when compared with the national air quality standards of the country (Table 01). However, someone can argue that the air quality of the city is not healthy or there is a high tendency to decrease the quality of air when look at the individual observations and occurrences of exceedances (Table 02). Both parameters, SO_2 and NO_2 indicate a high tendency to be increased during the period

Table 01: Average Contamination of Pollutants and National Control levels

Period	Average Contamination of Sulphur dioxide ($\mu g/m^3$)	Average Contamination of Nitrogen dioxide ($\mu g/m^3$)
Entire Period (2003 – 2005)	34.03	32.43
National Control Levels	80 (24 hr)*	100 (24 hr)*

* See appendix 01

from 2003 to 2005 where data have been collected by the National Building Research Organization (Figure 01 and 02).
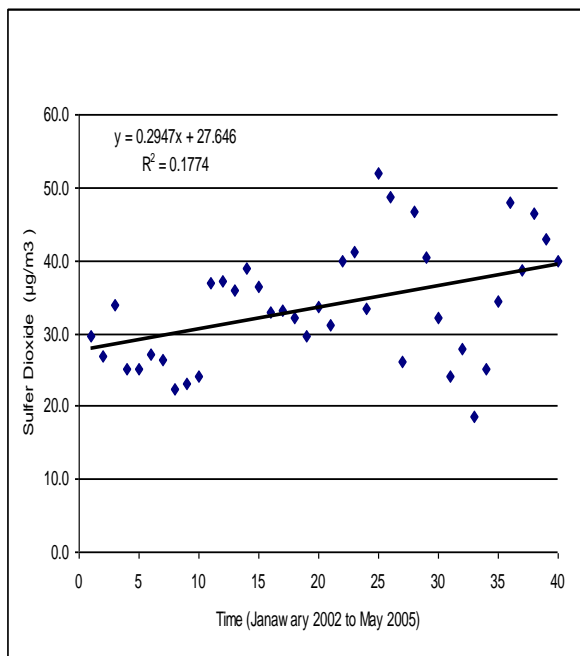
Figure 1: Trend line for Sulfur dioxide
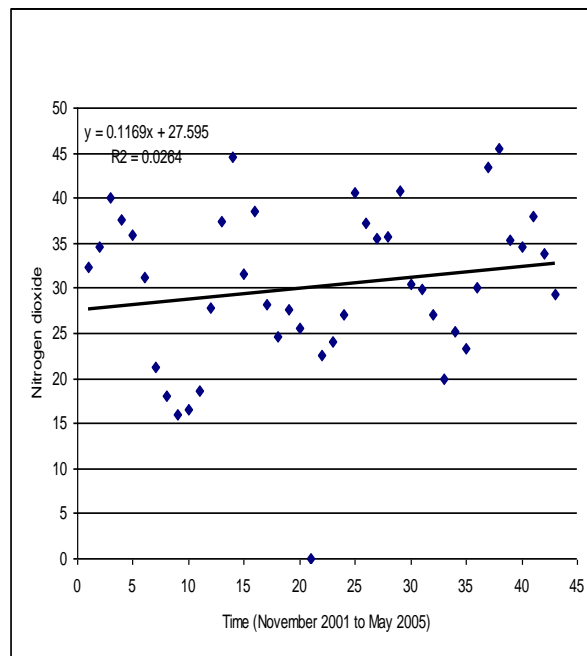
Figure 2: Trend line for Nitrogen dioxide

Many recent studies have indicated some negative impacts of air quality of the city. The Central Environment Authority indicated in their official website that there is a hazardous situation of some air quality parameters such as Sulfur dioxide, Nitrogen dioxide and Particulate matter except Carbon Monoxide in year 2005.

Except Carbon monoxide, the status of other three parameters is not favorable. Sulfur dioxide is identified as seriously unhealthy by the Central Environment Authority whilst Nitrogen dioxide and Particulate material are identified as moderately unhealthy.

Another example can be extracted from the joint report (Sustainable Transport Options for Sri Lanka, 2003) produced by

Energy Sector Management Assistance Programme of UNDP and Word Bank. The report has highlighted the degrading quality of the air of the city. This report highlighted the number of exceedances from the National standard of SO_2 from 1996 to 2000. In 1996, there were only 5 exceedances and in 2000 it has increased up to 82 (Table 01). All exceedances have happened in early and the latter parts of the year. Therefore, it can be noted that there is a seasonal variation of exceedances and it is more critical in the period from November to February where the north-east monsoons are active.

Table 02: Number of exceedances of national standard of SO_2 (1996 to 2000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1996												05	05
1997				03	02								05
1998			02								03	02	07
1999	03										01	01	05
2000	04	05	05	01						02	25	40	82

Source: Sustainable Transport Options for Sri Lanka UNDP/Word Bank – 2003

The highest contamination of Sulphur dioxide and Nitrogen dioxide are reported at the Fort and Maradana railway stations respectively which are very close to the Central Business District of the city. Also these two observatories indicated very high deviations from the average contamination of air pollutants in the city. Therefore Maradana and Fort observations can be considered as highly significant outliers and the nodal points among the observations. Between these two outliers, the most

noteworthy point is that Sulphur dioxide concentration is much higher than that of the average contamination of the Nitrogen dioxide at Fort railway station, amounting to $4.15\mu g/m^3$ of variation (Table 03).

Table 03: Average contamination of NO_2 and SO_2 and differences by observation points

Observation Point	Average NO_2 for whole period ($\mu g/m^3$) (1)	Average SO_2 for whole period ($\mu g/m^3$) (2)	Difference (2) – (1)
Railway Station, Fort	50.93	55.08	4.15
Kirulapona - II	30.67	33.39	2.72
Thimbirigasya	33.90	36.46	2.56
Kirulapona - I	24.51	26.91	2.40
Met Department	27.45	29.79	2.33
Elli House	24.50	26.76	2.26
Kotte	20.60	22.59	1.99
Police, Borella	36.00	37.49	1.49
CEA	22.90	24.28	1.38
Gangaramaya Temple	29.10	30.31	1.21
Railway Station, Maradana	52.02	53.01	0.99
Temple, Borella	30.97	31.38	0.42
Jethawana Temple	34.99	35.35	0.36
Kelaniya	31.82	31.80	-0.02
CMC	36.05	35.85	-0.20

Source: Prepared the by author, based on the data from the NBRO - 2009

Kirulapone II, Borella Temple, Borella Police station, Thimbirigasyaya, Jethawana temple and the Colombo Municipal Council observatories depict a moderate contamination of both pollutant types, whereas observatories such as Kotte, Central Environmental Authority, Elli House, Kirulapone I, location of the Department of Meteorology and the Gangarama temple exhibit a comparatively lower contamination of Sulphur dioxide and the Nitrogen dioxide. Therefore, five distinct areas can be identified as (i) very high contamination, (ii) high contamination, (iii) moderate contamination, (iv) low contamination and (iv) very low contamination in terms of the spatial concentration of both pollutant types . The very high and high concentrated areas of both pollutants are located in the central part of the city and low concentrated areas are located in the southern and the northern parts of the city. Very low concentrated areas such as Elli house, Kirula and the location of the Meteorology department are scattered. The five regions that have been identified show a marked difference from the average concentration of air pollutants.

II. OBJECTIVES

The primary objective of this study is to assess the spatial and temporal patterns of the air quality of the city of Colombo and to examine the socio-economic and physical factors influencing the degradation of air quality and their significance in the city of Colombo.

The specific objectives are:
1 Examine the spatial and temporal patterns of air quality of the city of Colombo

2 Examine the socio-economic and physical factors that influence degradation of air quality in the city of Colombo.

III. METHODOLOGY

As this analysis was prepared on the basis of literature available in different sources; facts and information produced by different research, this study can be considered as an investigation with secondary sources on Air quality of the city of Colombo. Therefore data has collected from different government organizations, libraries and relevent publications.

IV. RESULTS AND FINDINGS

Air pollutants come from a wide variety of sources, both mobile and stationary. Broadly those sources can be divided into two main categories: natural and man-made. On the other hand, the factors affecting the air quality in any region can be divided into two categories: contributing factors (air pollution sources); and negative factors (sinks). When considering atmospheric pollutants, it is important to identify the sources and sinks within the atmosphere. A source is a point or place from where the pollutants are released or emitted. An atmospheric sink is a place or location where the pollutants are removed from the atmosphere, either by chemical reaction or absorption into other parts of the climate system. Therefore, the factors affecting the air quality can be divided into several categories:

4.1 Socio-economic factors and air pollutants in the city of Colombo

Since the Industrial Revolution, atmospheric concentrations of many greenhouse gases have been increasing, primarily due to

human activities. During the last fifty years, there has been an additional input to the atmosphere of halocarbons such as CFCs, as well as depleting Ozone, also act as greenhouse gases. With more greenhouse gases in the atmosphere, the natural greenhouse effect is being enhanced artificially, and this could bring about global warming.

In this section, some of the selected man-made factors have been examined against the air quality of the city. The selected man made factors are: population density (population distribution), population density in underserved settlements, housing density, housing condition, building density, traffic density and land use and land cover. Statistical relationships between these parameters and air pollutants have been examined using different techniques available in Geographical Information Systems (GIS). Among the socio-economic parameters selected, traffic density can be considered as the highly contributing factor for degrading the air quality of the city (Table 04).

Socio-economic parameter	Sulfur dioxide	Nitrogen dioxide
Population density	0.2422	0.2810
Population density (Undeserved settlements)	0.1413	0.1416
Housing Density	0.1213	0.1222
Housing Density (Undeserved settlements)	0.1657	0.1534
Housing condition	0.0348	0.0247
Building density	0.1592	0.1865
Traffic density	0.5218	0.5220

4.2 Traffic density and Air pollution

Many documents and research papers indicate that traffic density degrades the quality of air in the city of Colombo. The "Male Declaration" has given concrete evidence that the transport sector is the most important factor that emits Sulfur dioxide rather than the industrial activities, domestic activities, power plants or any other fuel related activities in the city of Colombo (Table 05).

Table 04: Correlation coefficients between air pollutants and socio-economic parameters.

Table 05: SO$_2$ emissions inventory share, (Colombo) 1990 – 1997

Year	Industry	Domestic	Transport	Power	Fuel	SO$_2$ emissions
1990	9.92	16.89	32.53	34.40	6.26	26,118
1991	9.20	17.21	35.16	32.90	5.54	27,311
1992	8.05	18.71	36.80	32.05	4.38	28,029
1993	9.40	15.86	37.72	31.12	5.90	28,875
1994	9.84	15.58	38.48	30.06	6.05	29,892
1995	8.70	13.92	37.79	34.38	5.21	32,738
1996	8.47	12.03	42.90	31.31	5.29	35,944
1997	7.37	11.45	47.27	29.51	4.40	38,135

Source: Male Declaration, 2000

The emission inventory of the country shows that transport sector has been consistently increasing from 1990 to 1997 whilst all other sectors show decreasing trend during this period. SO$_2$ emissions have also increased by 50% from 1990 to 1997.

Thus, traffic density shows a very significant positive correlation with air pollutants unlike other socio-economic parameters considered in this study. This significant relationship between air pollutants and traffic density can be seen clearly in all four rainy seasons (Table 06).

Table 06: Relationship between traffic density and Air pollutants by different rainy seasons

Rainy season	Nitrogen dioxide (r)	Sulfur dioxide (r)
1st Inter Monsoon	0.5133	0.5032
South west Monsoon	0.4790	0.5244
2nd Inter Monsoon	0.5163	0.5031
North East Monsoon	0.4820	0.5052
Whole year	0.5220	0.5217

4.3 Identification of explanatory variables related to air pollution caused by traffic

Several causes have been identified to show the significant relationship between traffic density and air pollution in the city of Colombo. Basically, these causes can be classified into seven main streams as follows;

1. Increasing trend of vehicle fleet
2. Composition of vehicle population (Two stroke, Diesel, Petrol ratio)
3. Fuel consumption
4. Fuel quality of the country
5. Government policies
6. Vehicle inspection system
7. Traffic congestion
8. Road development pattern of the country

4.3.1 Augmentation of vehicle population in Sri Lanka

Number of vehicles operating in the city area has increased rapidly during the post economic liberalization period which commenced in 1977. This increment can be examined in three different ways;

1. Increasing trend of number of vehicles enter / operate in the city
2. Number of vehicles registered in Sri Lanka

3. Changing pattern of car journey speed

4.3.1.1 Increasing trend of number of vehicles enter the city

According o the statistics published by the Road Development Authority (RDA) in year 2000, almost 400,000 vehicles entered the city from main entry points in an average week day (Table 07).

Table 07: Number of vehicles entered the city of Colombo (in a week day)

Entry Points	1985	1995	2000
Negambo road	36,549	54,833	71,270
Kandy road	35,175	52,762	68,591
Kota road	19,391	29,086	37,812
Avissawella road	9,258	13,887	18,053
Kolonnawa road	10,811	16,216	21,081
Nawala road	12,949	19,423	25,250
High level road	25,541	36,811	47,854
Dutugemunu road	11,750	17,625	22,912
Galle road	42,183	63,199	82,159
Total	203,607	303,842	394,982

Source: Road Development Authority, 2003

The number of vehicles that enter the city has increased almost two times from 1985 to 2000. This two fold increase of the number of vehicles, is a general trend at all entry points of the city. However the entry points of from Galle road, Negambo road and Kandy road show that a significantly high number of vehicles have entered the city during week days.

In year 2000, approximately 400,000 vehicles entered the city in a week day. In addition to this it can be assumed that additional100,000 vehicles are positioned within the city limits. Therefore it can be estimated that the total vehicle fleet operating within the city area is almost 500,000 in a week day. This is approximately 1/6 of the total active vehicle fleet in the country (In year 2000, total active vehicle fleet in the country is 3 million).

Another estimation describes the number of vehicles entered to the city as follows.

"Commuting population uses various forms of transportation to enter the city. According to the estimates, approximately 27,215 buses, operated both by private and public sectors, transport 958,000 passengers daily to the city. Another 560,132 use about 243,459 private vehicles. The number of commuters who use the railway is estimated to be around 165,000. Both the number of vehicles and the commuters entering the city are increasing year by year. At the same time the residential population and the ownership of vehicles within the city limits will also experience an unprecedented growth. Vehicles that enter the City from 9 entry points on working days have been estimated to be around 275,000, and this is in addition to the contribution to the traffic floor by the use of vehicles of the residents in the city".

4.3.1.2 Increasing trend of number of vehicles registered in Sri Lanka

The registered number of motor vehicle has been increasing at around 6 per cent annually during the last two decades in Sri Lanka and over 60 per cent of all motor vehicles are registered in the Colombo Metropolitan Region (CMR).

Figure 01: Vehicle population in Sri Lanka
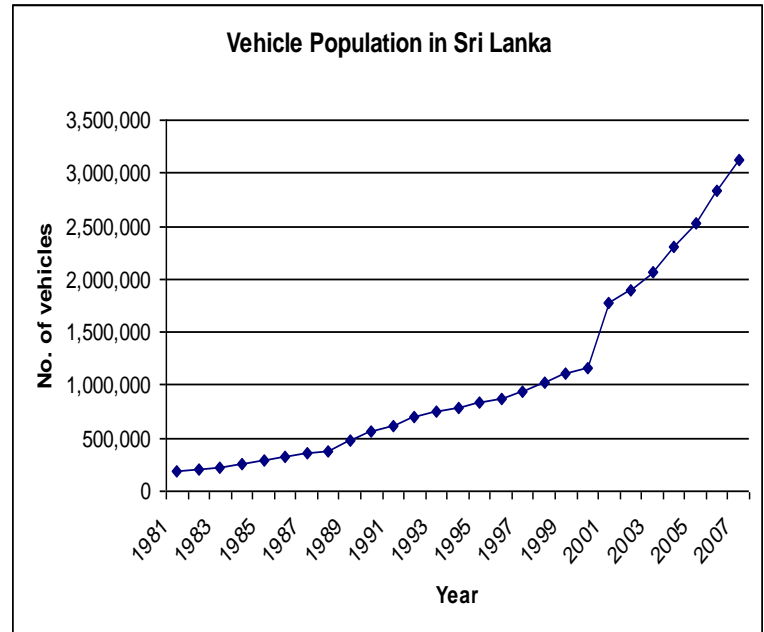
The vehicle population in Sri Lanka has significantly increased during the post-liberalization period which commenced in 1977. Especially after the year 2001, registered number of vehicles has increased sharply. In 1981, there were only 250,000 vehicles in Sri Lanka and at the end of 2007, this number has increased over than 3 million (Figure 01). In some years the number of vehicles has increased by 50 per cent annually (Table 08).

Table 08: Annual increase of vehicle population from 1981 to 2001

Period	Annual increment of vehicle population (%)
1981 - 1982	10.09
1982 - 1983	12.06
1983 – 1984	12.60
1984 - 1985	14.05
1985 – 1986	12.02
1986 – 1987	9.45
1987 – 1988	6.30
1988 – 1989	25.18
1989 – 1990	19.64
1990 - 1991	7.49
1991 – 1992	13.99
1992 – 1993	7.15
1993 – 1994	5.31
1994 – 1995	5.27
1995 – 1996	4.59

1996 – 1997	7.55
1997 – 1998	8.63
1998 – 1999	9.24
1999 – 2000	4.91
2000 – 2001	52.24
2001 – 2002	6.37
2002 – 2003	9.59
2003 – 2004	10.79
2004 - 2005	10.00
2005 - 2006	11.89
2006 - 2007	10.53
Average	11.82

Source: Prepared by the Author, 2008

Annually vehicle population of the country has increased by over 10 per cent from 1981 to 2006. However, there are some extreme cases during 1988 – 1989, 1989 – 1990 and 2000 – 2001. Due to the duty concession given in year 2000, large number of vehicles entered the local market during 2000-2001. Furthermore, this increasing trend of vehicle fleet in Sri Lanka describes by Jayaweera (2000) as follows:

"In 2000, the total active vehicle fleet in Sri Lanka was estimated to be 1.165 million, almost twice its size in 1991. In 2004, this further increased to 1.5 million. It is estimated that 60% of this fleet operate in the Colombo Metropolitan Region (Jayaweera, 2000).

In addition to the number, the average age of the vehicle fleet in Sri Lanka is another important factor pertaining to the air quality of the country. Average age of the active vehicle fleet is 6.2 years, which is relatively higher compared to international standards (Jayaweera, 2000).

4.3.1 3 Changing pattern of car journey speed

The changing pattern of car journey speed is a good indicator of the traffic congestion of any area. Car speed has been reduced drastically in the city of Colombo. The survey carried out by the Transport Studies Planning Center, Ministry of Transport in 2001 shows the decreasing trend of car journey speed of the 7 entry points of the city (Table 09). Galle road and High-level road indicate the highest decreasing trend of car journey speed. In 1997, car journey speed in the Galle road was 28 km per hour and in 2001 it has been reduced up to 8km per hour by 4 times. The situation in the high-level road is worse than the Galle road. In 1997 car journey speed in the high-level road was 32 km per hour and in 2001 it has been reduced up to 6 km per hour.

Table 09: Car journey time survey results (as average speeds, km/hour) Inward direction, morning peak

Road and junction	1997	1999	2001
Colombo-Galle (MalibanJunction to Dickman Road)	28	18	8
Colombo – Ratnapura (Maharagama to Kirulap)	32	16	6
Colombo - Kandy (Kadawatha to Orugodawatte)	23	22	11
Colombo - Puttalam (Mahabage to Kelani Bridge)	18	16	7
Jayawardanapura-Kollupitiya Battaramulla to Senanayake Junction	23	17	9
Colombo-Horana (Papiliyana to Vilasitha Nivasa Junc)	27	17	8
Wellampitiya - Kaduwela (Abatale to Wellampitiya)	28	18	9

Source: Transport Studies Planning Centre, Ministry of Transport, 2001

The reduction of car journey speed caused to burn fuel unnecessarily. For an instance, distance from Moratuwa to Colombo is 16 km. Assuming a car needs one liter of fuel to travel to Colombo in 1997, at present 4 liters of fuel are required to travel the same distance from Moratuwa to Colombo with low car journey speed. It appears 3 liters of extra fuel burn by each car approximately running from Moratuwa to Colombo. This simple arithmetic helps to estimate the total wastage of fuel due to the traffic congestion of the city of Colombo.

4.3.2 Composition of vehicle population

In the view of air pollution, the composition of vehicle fleet of the country can be examined in different angles.

When considered the composition of vehicle population in Sri Lanka, motor cycles are very prominent followed by motor tricycles, motor cars and lorries. The gap between the number of motor cycles and the other vehicles are always high throughout the whole period and tending to increase further more (Figure 02 and 03).

Figure 02: Vehicle population in Sri Lanka from 2001 to 2007
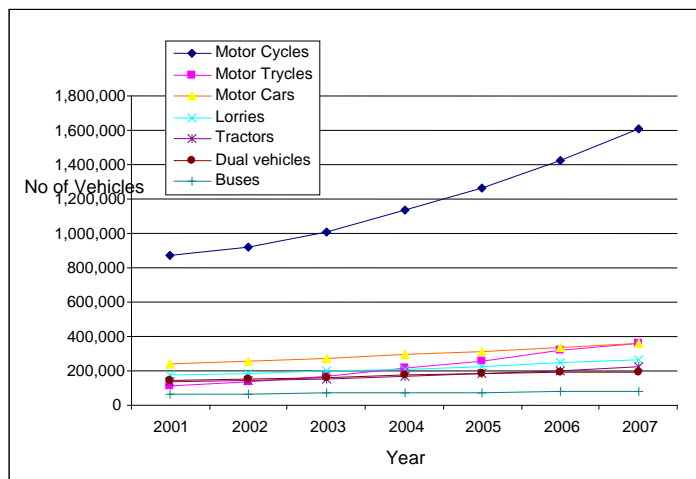
Source: Motor Registrar Department, Sri Lanka, 2008

Figure 03: Vehicle population (New registration from 2001 to 2007)
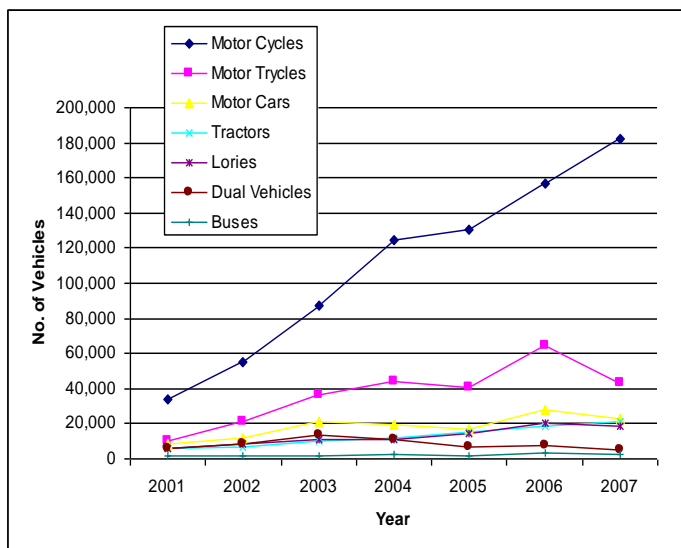
Source: Motor Registrar Department, Sri Lanka, 2008

This composition of vehicle population is one of the critical factors that cause air pollutants in Sri Lanka. Motor cycles and tricycles belong to the two stroke category. They generate more pollution when compare with four stroke vehicles due to the mechanical structure.

The share of petrol vehicles has remained high compared with diesel vehicles. This is mainly due to the high growth of motorcycle imports during the two decades commencing from 1980. For example, the relative share of motorcycles in the total vehicle number increased from 41 per cent in 1989 to 52 per cent in 1995. In the category of petrol vehicles, the relative share of motorcycles increased from 18 per cent in 1970 to 23 per cent in 1978 and from 61 per cent to 73 per cent in 1989 to 1996. This deserves special attention because of the high emission rates associated with motorcycles. Literature shows that motorcycles

contribute 50% more hydrocarbons per kilometer than passenger cars and an almost equal amount of particulate matter as buses and Lorries (Walsh, 1992).

"Combustion cycle for reciprocating Internal Combustion engines may be accomplished in either four strokes or two strokes. Two stroke engines have the advantage of higher power to weight ratio compared to four-stroke engines when both operate at the same speed. However, combustion can be better controlled in a four-stroke engine and excess air is not needed to purge the cylinder. Therefore four-stroke engines tend to be more efficient, and typically emit less pollutants than two-stroke engines (AirMAC, 2004).

4.3.3 Fuel consumption

Annual consumption of vehicle diesel has grown much faster than petrol consumption. The average annual growth of petrol and diesel consumption between 1986 and 1996 is 4.4 per cent and 6.6 per cent respectively. In 1997, the total consumption of leaded and unleaded petrol stood at 200,000 and 25,000 t, respectively, whereas the total diesel consumption was 1,100,000 t. Of this, locally manufactured de-sulphurised diesel accounted for about 500,000 t and direct imports for the remaining 600,000 t.

The diesel to petrol consumption ratio has changed significantly from 1.5 in 1970 to 4.8 in 1996. The rise can be attributed mainly to the high increase in diesel vehicles and high consumption rates of vehicle diesel. The joint effect of these factors has led to grater increase in vehicle emissions from diesel vehicles especially in the city of Colombo.

Diesel engines are substantially more fuel efficient than equivalent petrol engines. However, emission of some pollutants, especially those affecting urban air quality tends to be higher from diesel than petrol vehicles (Faiz, 1996).

Table 10: Percentage distribution of Vehicle types (Excluding Motorcycles) in Sri Lanka (1970 – 2005)

	1970	1978	1989	1996
Petrol	64.5	52.6	45.5	40.2
Diesel	35.5	47.4	54.5	59.8

Source: Chandrasiri, S (2006)

"The per capita petrol consumption has increased from 12.7 liters to 15.9 liters and that of diesel from 28.7 liters to 54.7 liters from 1991 to 2000. This shows that per capita diesel consumption has increased by 91% but per capita petrol consumption has increased only by 25%, indicating a sharp change in fleet mix. The major changes are the rapid increases of three wheelers (as well as two wheelers) and the small diesel vehicles (due to pricing policy of diesel vs petrol and vehicle

importation policies). These trends have aggravated the air pollution problems in the urban sector (AirMAC, 2004).

"Regarding the diesel fuel, the situation is remarkably different. The Sri Lankan market is clearly biased towards diesel fuel consumption and the market has more and more evolved in this direction over the last ten years, as shown by the petrol to diesel consumption ratios of table 11.

Table 11: Petrol to diesel ratio

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ratio	0.35	0.29	0.27	0.26	0.25	0.24	0.21	0.19	0.18	0.17	0.17

Source: AirMAC, 2004

4.3.4 Fuel quality of the country

Fuel quality is one of the most important factors affecting vehicles emission in Colombo. The Ceylon Petroleum Corporation (CPC), the sole supplier of vehicle fuel in Sri Lanka, imports 65 per cent of super diesel and 100 per cent of unleaded petrol. In addition, 35 per cent of normal diesel and 100 per cent of leaded petrol sold in the market are produced by CPC using import crude oil. However, the Sulphur content of the fuel available in Sri Lanka is relatively high when compared with countries in the region (Table 12). The Sulphur contain in the fuel in Sri Lanka is more than twice in the other countries in the region.

Table 12: Sulfur content in Diesel fuel (Percentages by weight)

Country	1998	1999	2000	2001	Future Plans
Brunei	0.25	0.25	0.25	0.25	
Cambodia					
Indonesia	0.5	0.5	0.5		
Laos					
Malaysia	0.5	0.5	0.3		
Myanmar	0.5	0.5	0.5		
Philippines	0.5	0.5	0.5	0.2	
Singapore	0.3	0.05	0.05	0.05	
Thailand	0.25	0.05	0.05	0.07	
Vietnam	0.5	0.5	0.5		
India					
Bangladesh					
China				0.2 – 1.0	0.2 (2002)
Pakistan				1.0	0.5 (2002)
Sri Lanka	1.1	1.1	1.1	1.1	0.5 (2002)

Source: Male Declaration

The import of diesel fuel increased by about 25 per cent over the period 1991-1995 while from 1995 to 1996 the increase has been a phenomenal 60 per cent. This is particularly due to the operation of new diesel power plants. Sri Lankan produced diesel has a higher concentration of Sulphur compared to other countries in the region. Nearly 99 per cent of vehicles use leaded gasoline which has the potential of causing health problems in the city (Male declaration).

4.3 5 Government Policies

The government policies which are favorable to increase the contamination of air pollutants in the city of Colombo can be classified into two main sections namely; Pricing policies and other government policies.

The high growth of diesel-powered vehicles and the high rate of auto-diesel consumption were clearly noticeable throughout the 1990s. This was attributed to the auto-fuel pricing policy (on petrol and diesel) and fiscal policy on vehicle imports. A distinctive feature of auto-fuel (petrol and diesel) pricing in Sri Lanka is the significant price differential between petrol and diesel. In fact, in the 1990s, Sri Lanka was the only country

which maintained the highest disparity between petrol and diesel prices. The discriminatory pricing policies adopted by successive governments over the past four decades have been highly favorable towards diesel users. Similarly, the fiscal policy on vehicle imports has also been discriminatory against certain categories of vehicles. Furthermore, the road user charge applicable to different categories of vehicles do not fully capture environment damage cost. These distortions have led to high growth of diesel-powered vehicles which use low quality diesel (i.e., 0.8 per cent of Sulphur). One of the major environmental problems associated with this development is the deterioration of ambient air quality.

Table 13: Retail selling prices in Petroleum products (Price in Rupees per liter)

	1998	1999	2000	2001	2002	2003	2004	2005
Super Petrol	50.00	50.00	50.00	50.00	49.00	53.00	70.00	80.00
Auto Diesel	13.20	13.20	24.50	26.50	30.00	32.00	44.00	50.00
Super Diesel	18.50	18.50	29.80	31.80	35.30	37.30	49.30	55.30
Ratio	3.79	3.70	2.04	1.89	1.63	1.66	1.59	1.60

Source: Annual Report, Ceylon Petroleum Corporation, 2005

Always there is a very high disparity in prices of the main fuel types in Sri Lanka. However there is a positive trend in decreasing the price gap between petrol and diesel which is positively contributed to reduce the air pollution in the country.

Table 14 : Sulfure Emissions kt/y

Year	Diesel Engines Emissions
1990	23.1
1995	31.4
2000	40.6
2005	52.0
2010	63.6
2015	79.3

Source: AirMac, 2004

The emissions of Sulphates are growing proportionately to the growth of the diesel vehicles fleet (AirMac, 2004).

4.3.6. Vehicle inspection system

The National Environmental Act (NEA) of 1980 as amended in 1988 prohibits any discharge of pollutants into the environment. Sections 23J and K prohibit emission of pollutants into the atmosphere. The National Environmental (Protection and quality) Regulations of 1990 prohibits the discharge of wastes into the environment. Discharge standards have been prescribed by the CEA for liquid wastes and the Sri Lanka Standards Institution (SLSI) has prescribed emission standards for Sulphuric acid plants. The CEA in December 1994 gazetted national ambient air quality standards for Sri Lanka. These regulations do not however address vehicular air pollution (Male declaration).

Though the NEA gives the CEA the mandate to regulate and control air pollution, enforcement has been rather slow due to the lack of specific mission standards and reliable data. While the Motor Traffic Act considered visible emission an offence, it is not rigorously enforced (Male declaration).

Diesel consumption has substantially increased in both in absolute and relative terms in the last decade. There are sound technical reasons that justify diesel-powered lorries and buses. The share of diesel cars with respect to the total number of cars has remained constant at roughly 10%. Temporary increases seem to be mainly due to concessionary import licenses. The main source of increase in diesel consumption has been the increases in both the share and the vehicle kilometers traveled (KVT) of vans, pickups and dual-purpose vehicles. The reasons behind this trend seem to be the following:

1. The final price of diesel has never been much more than half the final price of petrel until 2004.
2. A dual-purpose vehicle is a moderately close substitute for a car, depending on the price difference. The price of a diesel dual-purpose vehicle can be lower than the price of a car. The reason for this price difference is threefold;
   I. Imported cars cannot be older than three years, whereas imported vans cannot be older than five years. The import price net of taxes is therefore lower for vans, if anything, because they are older. The national base to compute import and excise duties is therefore lower.
   II. The excise duty rate is approximately 111% of the import price for diesel cars and 57% for diesel dual-purpose vehicles.
   III. The custom duty and the surcharge as percentage of customs duty rates are the same for both vehicle types. The cumulative effort of (II) and (III) results in that the average fuel tax paid on imported diesel cars is 146% of the import price net of taxes whereas the average fuel tax paid on imported diesel dual-purpose vehicles is 92% of the import price net of taxes.
3. The annual license fee is the same for both diesel cars and dual-purpose vehicles.
4. The registration charges are higher for diesel cars than for dual-purpose vehicles.

(AirMac, 2004)

…..and the import regime then favors diesel vans over petrol cars. The problem of pollution is therefore one of vehicle maintenance, possibly of fuel quality and the encouragement offered by the import regime towards older and more polluting vehicles AirMAC, 2004.

4.3.7 Traffic congestion

Traffic congestion is one of the prominent factors which attributed to aggravate the contamination of pollutants in the urban areas. The main reason for heavy traffic congestion of the city of Colombo is, although the traffic on the roads has increased a very high speed, the automobile and railway network dating back to the colonial days has remained almost unchanged except for marginal improvements.

The present transport crisis / impasse / breakdown in the Greater Colombo Area could be quite clearly seen in the traffic congestion along almost of all the major trunk roads leading to Colombo; Galle road congestion starts from Kalutara-Panadura, is intensified after Rathmalana, and leads to vehicles inching their way after Dehiwala. High level road congestion starts from Homagama-Kottawa area, is intensified after Maharagama and leads to vehicles inching their way after Nugegoda. Negombo-Katunayake road congestion starts from Ja-Ela- Kandana area and leads to vehicles inching their way their way after Wattala. Kandy-Colombo road congestion starts from Yakkalamulla – Kadawatha area makes another procession towards Colombo from Kiribathgoda. Hanwella low lying road congestion starts from Habarakada-Athurugiriya area and leads to vehicles inching their way after Malabe-Koswatta.

This traffic congestion starts from 6 a.m. almost on all the roads with fleets of school vehicles and continues until about 10 p.m. with returning evening workers with intermittent brief respites. In a congested hour it takes nearly two hours to reach Colombo from Panadura whereas train takes only 45 minutes.

The current traffic problem in the Colombo Metropolitan Region (CMR) emerged wasting thousands of productive man-hours on roads as well as generating more and more pollutants and burning thousands of barrels of fuel unnecessarily.

This high traffic congestion and generating of high pollutants clearly described the order given by the Supreme Court of Sri Lanka. The attorney General was instructed to prepare a new action plan in consultation with several government organizations to reduce air pollution and traffic congestion from 2010.

4.3.8 Road Development pattern of the city

The city of Colombo attracts about 1.5 Million floating population on any working day and with the addition of the resident population in the city, the total population in the city increases to more than 2 Million during the daytime. It is estimated that about 50% of the commuting population arrives in the city for employment or to engage in commercial activities and or to attend educational institutions. The rest comes to the city for various other purposes.

Traffic problem has been aggravated by the concentration of all forms of economic, commercial and administrative functions in the city. Furthermore, Colombo is the largest city in the country and, therefore, it attracts people because of its commercial and political significance and it offers better facilities in health, education, etc. than any other city in the country. The combination of all these aspects results in a greater attraction of the city for people from the rest of the country thus aggravating the transport problem in the city of Colombo. Transport problem that currently experienced by the city of Colombo is reflected in the increasing traffic congestion. A few years ago, the traffic congestion was largely limited to the CBD, but now it has spread to the entire core area lasting sometimes most of the peak period. The number of vehicles in the city is not the only factor that contributes to congestion. Shortage of parking areas, inadequate facilities for pedestrians, parking of heavy vehicles on busy highways during normal working hours and poor public transport facilities are also equally significant contributors to the congestion problem. As a consequence the average vehicle speed has reduced to around 10 kilometres per hour within most parts of the city during the day.

The main implication of traffic congestion is that it causes higher running costs to the owners of vehicles and results in a considerable loss to the national economy. This problem is likely to exacerbate in the immediate future since the road networks are severely inadequate to meet even the current demand given the projected growth in the demand for transport facilities in the coming decade, upgrading, modernizing and expanding the transport sector must receive urgent priority.

V. CONCLUSIONS

Different factors have contributed for the quality of air in the city of Colombo in different ways and in different magnitude. Some of them are physical factors and some of them are man-made factors. Except rainfall other physical factors are not very significant. The contamination of pollutants is not very high within the Southwest Monsoon period and the contamination of pollutants increased drastically in the Municipal area within the Northeast Monsoon period due to different climatic scenarios in different Monsoon periods.

Among the socio-economic factors, traffic density is the most contributing factor for degrading the quality of air in the city of Colombo. Some characteristics related to the vehicle fleet such as, Number of vehicles, Composition of the vehicle fleet and some government policies such as fuel quality of the country, pricing policy and vehicle inspection systems are directly contributed to degrade the quality of air in the city of Colombo.

The decision makers and the policy makers of the country should pay necessary attention to this matter and review the existing government policies related to the air quality and air quality monitoring system and make necessary arrangements to introduce viable government policies which can prevent the air quality of the city.

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AUTHORS

First Author – Prof. L.Manawadu, Ph.D,, Department of Geography, University of Colombo,Colombo, Sri Lanka
SecondAuthor –Manjula Ranagalage, Lecturer, MSc in Geoinformatics, Department of Social Sciences, Rajarata University of Sri Lanka, Mihintale, Sri Lanka,

Correspondence Author – Manjula Ranagalage, manjularanagalage@gmail.com, +94717953995

A Co-Operative Cluster Based Data Replication Technique for Improving Data Accessibility and Reducing Query Delay in MANET's

Ashokkumar.R*, Baskaran P**

*Assistant Professor, SNS College of Engineering, Coimbatore, TamilNadu, India,
**Assistant Professor, SNS College of Engineering, Coimbatore, TamilNadu, India

Abstract- MANETs are very popular because of its infrastructure less network. These mobile nodes serve as both hosts and routers so they can forward packets on behalf of each other. It has restricted computing resources and due to mobility of node there is much change in network topology. These restrictions raise several new challenges for data access applications with the respects of data availability and access delay. This result in lower data availability in mobile ad-hoc networks than in wired networks. One probable solution to avoid this problem is to take up replication techniques which increases data availability and decrease query response delay. The replication process duplicates and preserves the consistency of multiple copies of objects in different sites so that each client node can visit a local copy of an object instead of remote ones. In this way replication can considerably enhances a distributed system's availability, reliability and scalability. It replicates the recurrently used data that rely on neighbour's memory when the connection among them is secure. The experimental result depicts that higher degree of data accessibility enhances the query delay also. So the proposed work is to enhance the data availability and decrease the query delay in the MANET. The proposed system deals with a better replication management technique for MANETs known as cluster related data replication technique to make available the needed data items from the neighbours node and able to choose which data items can be replicated at a node. After that there should be an effective replica restore algorithm to change the old copy of data items when change is required in the original copy of the data item. The results proved that proposed approach is much more efficient than the existing techniques.

Index Terms- Mobile Ad-Hoc networks, data replication, cooperative, query delay, data availability, clusters.

I. INTRODUCTION

In mobile ad hoc networks (MANETs), mobile nodes are in motion freely, network split-up may occur, where nodes in one partition cannot access data held by nodes in other partitions. Mobile adhoc networks considerably decrease the performance of data access. To solve this problem here data replication techniques will be used .Data replication can decrease the query delay due to the mobile nodes can get the data from some nearby replicas.

Data replication solutions in both wired and wireless networks aim at either reducing the query delay or improving the data availability. But the both metrics are important to the mobile nodes. In a MANET mobile nodes collaboratively share data. Multiple nodes exist in the networks and they send query requests to other nodes for some particular data items. Each node makes replicas of the data items and maintains the replicas in its memory (or disk) space.

During data replication, there is no central server that determines the distribution of replicas, and mobile nodes determine the data allocation in a distributed manner. Replicating most data locally can reduce the query delay, but it reduces the data availability due to many nodes may end up replicating the same data locally while other data items are not replicated by anyone.

To increase the data accessibility, nodes should not replicate the data that neighbouring nodes already have it on its memory. Though, several mobile nodes only have restricted memory space, bandwidth, and power, and hence it is impracticable for one node to bring together and maintaining all the data considering these facts. Queries generated during network partition may fail because the requested data items are not available in the partition to which the client belongs. Each node preserves a few quantities of data locally and the node is called the original owner of the data. To improve the data accessibility, these data items may be replicated to other nodes. The new data replication techniques are used to trade off between the query delay and data availability in MANET.

This improves the data availability in the MANET using data replication. Data replication is the process of cooperating information between the mobile nodes and ensures the consistency between the resources.

In MANET sharing information is not easy task because all the nodes the data saved at other nodes may not be accessible. The new data replication technique increases the performance level and address the query delay problem.

II. COOPERATIVE DATA REPLICATION

In cooperative data replication, a node cooperates with each other and shares their memory space for replicating data for neighboring nodes. Among several nodes from a network one may send requests to other nodes for some specific data items. Here every node creates and maintains replica's in its memory.

In cooperative data replication one node my allocate memory space for replicating data of their neighboring nodes data. So this way the degree of cooperation among mobile nodes will be

maintained. Here each of the following approaches deals with increasing data access probability.

3.1 One to One Data Replication

In this approach each mobile node will cooperates at most one neighbor to decide data for replication. Among multiple available neighboring nodes it selects one node based on priority value for data replication.

Consider node N_1 and N_2 are neighboring nodes. a_{1d} and a_{2d} be the access frequency for data d from node N_1 and N2 respectively. Here each node computes cumulative access frequency to the data item d.

For N_1 to d $CAF_{12}^d = (a_{1d} + a_{2d} \times (1 - f_{12}) / s)$ --(1)

For N_2 to d $CAF_{21}^d = (a_{2d} + a_{1d} \times (1 - f_{12}) / s)$ –(2)

So the priority value for node as follows

$P_{12}^d = CAF_{12}^d \times f_{12}$ ......if replication is done at N_1

$P_{12}^d = CAF_{12}^d$ ......if replication is not done at N_1

Therefore here every node considers high priority value data for making replication process.

3.2 Reliable Neighbor Data Replication

In OTOO scheme, choice of choosing neighboring node is based access frequency while making replication. So it may reduce the degree of cooperation as such minimal. To increase the cooperation level, in reliable neighbor scheme node allocates more memory for replicating data for neighbors.

For the node N_1, N_2 to be a reliable neighbor

If $1 - f_{12} > \tilde{\imath}$ (threshold)   ---- (3)

For a each node the allocated memory for replicating neighboring nodes data

$C_{allocate} = C \times$ min (1, for all reliable neighbors $(1-f) / \alpha$) ------(4)

In this scheme, the node makes replication of its available data up to the C - $C_{allocate}$. Then priority value is calculated for the node to the data item. Here the allocated memory is reserved for the data item with high priority value.

3.3 Reliable Grouping Replication

Here the OTOO considers only one neighbor and reliable neighbor chooses all one hop neighbors. But here to add more cooperation in RG scheme, the replicas of data will be shared among large reliable groups. So we can preserve a perfect cooperation between nodes. Initially all nodes transmits their ids and access frequency to all data items.

Here set of bi-connected nodes considered to be linked if and only they have a consistent link i.e.

$$1 - f_{12} > \tilde{\imath} \text{ (threshold)}$$

Then each set will be put into a group to form a reliable group. The average access probability of all data item is calculated using the following

$$P_d = \frac{\sum aik}{no.of\ nodes \times Sk} \qquad ----(5)$$

The demand weighted access delay if replica of data d will be maintained at N_2,

$$T_{2d} = \sum a_i \times t_{12} \times s_d \qquad -------(6)$$

Select the node with high P_d to replicate the data in which node selection minimizes the delay access in the group.

i.e., T_{1d} = min $\{T_{nd}\}$ for all node $N_n \in$ group. So here the allocation process is repeated until the entire data item is replicated.

3.4 Replica Management Using Clusters

With all the nodes having the reliable links cluster is formed by using the LCC algorithm. When a node requires some data item it sends request to cluster head. When a node receives a data item it replicate the data item locally for future use.
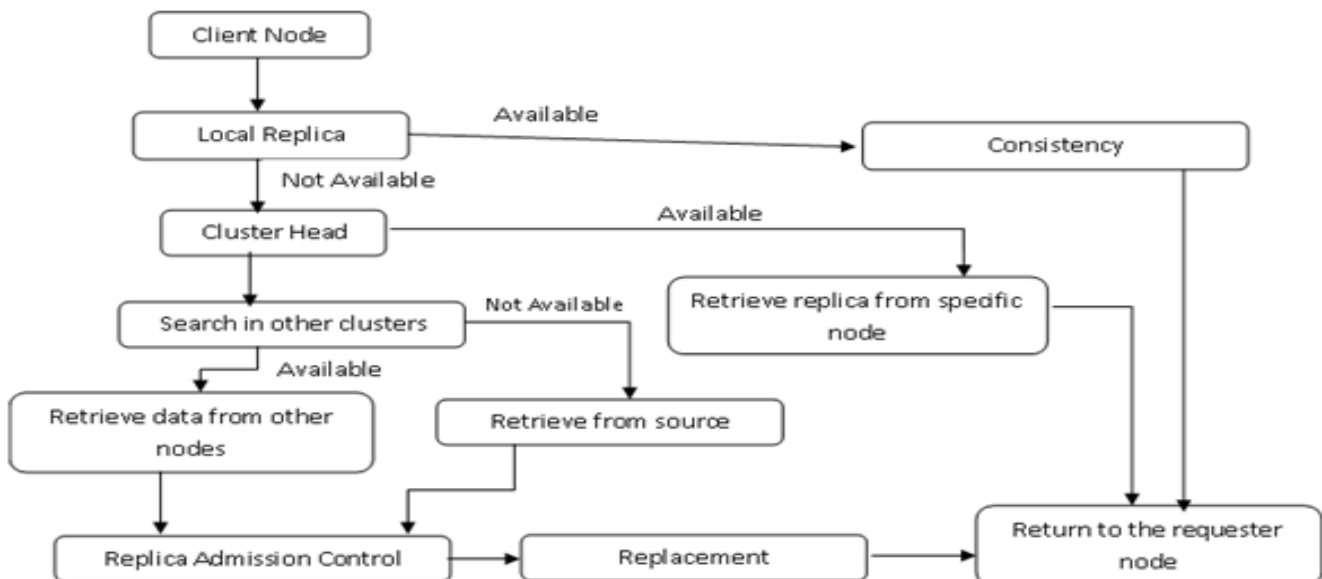
Fig.1 Replica Management Using Clustered Approach

Each mobile node is associated with a cluster and refers to the set of nodes that can be reached by the node within the given number of hops. Every cluster has its cluster head (CH). Each cluster head will maintain a table Replica Table (RT) and replica index (RI). This RT will contain the information about the replicas that are available with different node in that cluster. There will be 3 entries related to each node: node-id, item-id, space-available. The RI contains node id, data size and TTL value.

When a mobile node needs a new data item then first it will check whether the data item is locally available or not. If yes then data item is get back to the requester and if not the request forwarded to the CH. Now CH will check the item-id in RT to see whether the data item is available in the cluster. If any matched entry is found the request is redirected to that node pertaining to that item-id.

Otherwise CH will request that data item to other CHs if data is found then request forwarding is stopped and data is returned to the requester. When a node receives a data item then, it will make a replica of it for upcoming use. And an update message is send to its CH. In the process of returning the data item to the client node, a node in underlying path, if it is a CH, then it start replication process (RP).

In RP, initially cluster head will get the size of the data item whose replica needs to be created in that cluster. Now cluster head will check its RT and check for a node with free space available greater than the size of data item di. Now if CH gets a node with space-available greater than or equals to the size data item, then CH replicate the data item on that node.

After replicating data item on that node, node will send a message to the CH so that CH will update its entries related to that node in RT. Now if CH fails to get a node with space-available greater than or equals to the size data item, then CH will choose a node with maximum free space available. After selecting node CH redirect that node to call a procedure (MCR (NK, S)) to create enough space to replicate that data item on that node.

In this process the node will remove some data items. Decision of removing the data items at a node will be based upon the Replacement Policy. After successful creation of free space at that node, CH will replicating that data item on that node, node will send a message to the CH so that CH will update its entries related to that node in RT. After updating its RT, the CH will send this update that item is found then this update is discard otherwise CH will choose a mobile node where the replica of that item can be made. The node with maximum available free space will be selected.

IV. SIMULATION RESULTS

Here NS2 is used to stimulate the replica allocation and maintenance using clusters. The mobile adhoc network considered as an undirected graph G (V, E) in which it contains 30 mobile nodes for simulation using a random waypoint model. It contains n data items which are disseminated in the network. For simplicity all data items are in unit size. Here each mobile node can only replicate (C < number of nodes). Here the following figures represent data availability and query delay simulation results as a graph. The reliable link is fully resided on link failure probability. Finding link failure probability is quite difficult and for simplicity we assume that it is based on signal strength.

Fig.2 Data Availability

Fig.3 Query Delay

V. CONCLUSION
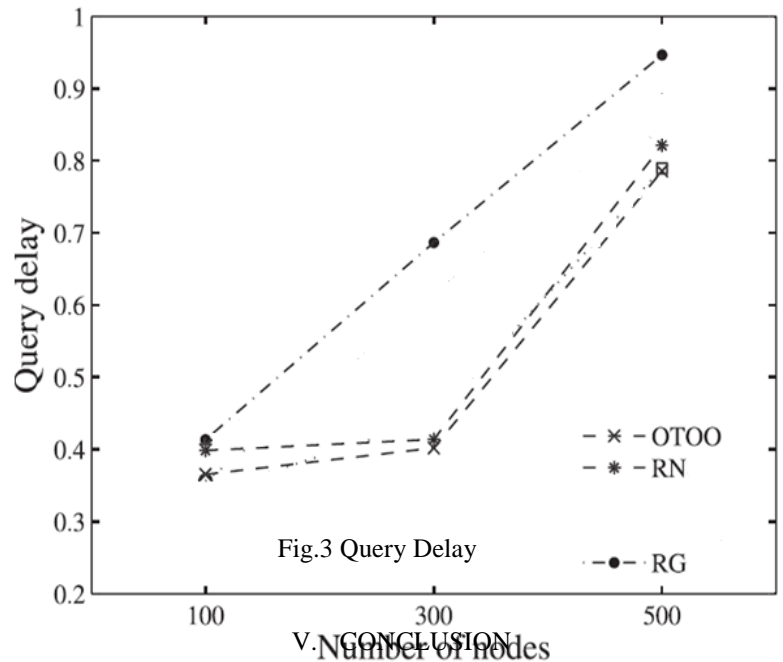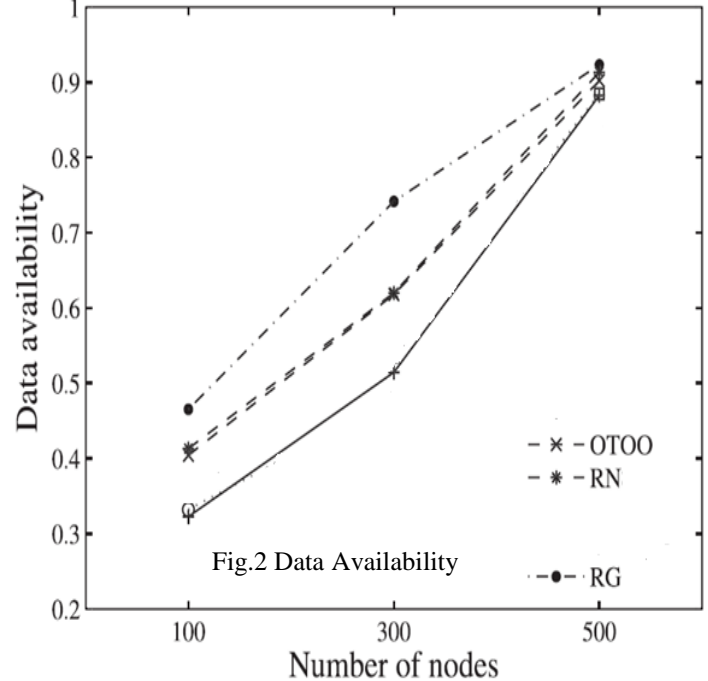
Network partitions are common due to link failure in MANETs. As a result data saved at other nodes may not be available. One way to improve data availability is through data replication. The proposed several data replication schemes improve the data availability and reduce the query delay. The perfect idea is to replicate the most frequently accessed data

locally and only rely on neighbour's memory when the communication link to them is reliable. The proposed replication management technique for MANETs proved efficient to deliver requested data items from the neighbours node and capable to decide which data items can be replicated at a node. Also using cluster based replica allocation of data will make an effective trade-off between query delay and data availability in MANET's.

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AUTHORS PROFILE

R.Ashokkumar received the Bachelor Degree in Computer science and engineering from Kumaraguru College of technology, Affiliated to Anna University Chennai, India in 2007, Master of Science degree in information systems from Monash University, Australia in 2010. Currently he is working as an assistant professor in Computer Science and Engineering department, SNS College of Engineering, Coimbatore, TamilNadu, India. His area of interest includes network security, wireless sensor networks and distributed database.

Baskaran.P received the Bachelor Degree in Computer science and Engineering from Selvam College of Technology, affiliated to Anna University Chennai, India in 2010, Masters degree in Software Engineering at the Anna University, Coimbatore in 2013. Currently he is working as an assistant professor in Computer Science and Engineering department, SNS College of Engineering, Coimbatore, TamilNadu, India. His area of interest includes network security, software engineering and mobile adhoc networks.

A STUDY ON THE DISTRIBUTION OF ORGANIC MATTER AND TOXIC METALS IN THE SEDIMENTS OF AMARAVATHI RIVER IN KARUR DISTRICT, TAMIL NADU

M.D. Saravanamoorthy[1] and R. Sivasankari[2]

[1]Asst. Prof. in Botany, Aringar Anna Govt. Arts College, Musiri, Tiruchirappalli
[2] Asst.Prof.in Microbiology, Srimathi Indra Gandhi College, Tiruchirappalli
Corresponding Author: meetmds@gmail.com

Abstract

The present study aims at examining the river bed sediments for the distribution of organic matter and toxic heavy metal in the Amaravathi River. Two sediment samples were collected at both the banks from 6 sampling stations. The samples were acid treated and the concentration of metals, like lead, copper and iron were recorded using atomic absorption spectrophotometer. The total organic matter and physico chemical parameters were analysed for all the samples. Most of the heavy metals have precipitated and settled into the river bed as carbonates, oxides and hydroxides. The pollutants are deposited in association with very fine particles of silt and clay. The silt and clay act as adsorbents along with the inorganic and organic mattes.

Index Terms- pollutants, metals organic matter, physico-chemical, river beds

I. INTRODUCTION

The modern civilization, industrialization, urbanization and increased population have led to fast degradation of our environments.   Water is indispensable and one of the precious natural resources of this planet. A ground water and natural water resource is an important source of water supply through out the world. Its use in irrigation, industries and domestic usage continues to increase where perennial surface water sources are absent the quality ground water used for all purposes is more important as the case of quality (Mariappan *et al*., 2005).   Discharge of textile effluent, sewage and industrial effluents into the river water with out any treatment causes alarming pollution. They cause damage histologically, physiologically and behaviorly to the human being and to the aquatic organisms. The river Amaravathi flows through the heart of the city Karur. It is being polluted by indiscriminate of textile, sewage and other industries wastes and a plethora of plants and human activity. They contain many toxic metals which have gained considerable importance because of their active participation in many metabolic reactions as well as their inhibitory role in the nutrient utilization by plants (Rajesh Kumar Sharma and Madhoolika Agrarwal, 2005; Wintz *et al*., 2002. The pollutants on their way settle on the banks of the river and degrade. The present study reports the distribution of organic matter and toxic metals in the sediments and the surface water of Amaravathi River.

II. MATERIAL AND METHOD

The samples were collected at both the banks of the Amaravathi River from 5 sampling stations during May 2003.   K. Paramathy, Vairucetty Polayam, Pasupathy palayam, Thirumanilayur and Sunga gate, this are the sampling spots around the 10 km. The samples were collected using one feet PVC pipes (1 x2.5). The samples were air dried in the help of hot air oven at over night 60

± 2° C and grind to fine powder. To 10 gm of each of the soil samples, were dissolved in triple acid till pale yellow colour appeared, it was cooled and 20 ml of con. HCl was added and heated to dissolve all the salts. It was cooled and filtered. The acid extract was diluted with deionised distilled water and analysed for heavy metals by atomic absorption spectrophotometer. The samples were preserved and analysed by adopting standard procedures (APHA, 1999) and Trivedy and Goel (1986).   The water following in the sediment collection points were also analysed and the values of the different parameters were compared.

III.   RESULT AND DISCUSSION

        The physical parameters, organic matter and metals concentrations of sediments are shown in the Table -1. In table -2 shown parameters are running water in the river of Amaravathi. The results reveal that the bed sediment of the river becomes rich in toxic metals. There are no uniform distributions or incremental increase while going from sample 1 to 5. This is due to the variation in the human activity and the industrial untreated effluent discharge in to the river basin. Since the opposite beds of the river has different activity and the discharges, the parameters values are not uniform for the sample collection areas of the river beds at any collection points.   The pH of the river water was slightly alkaline and the high in amount of electrical conductivity values suggest that the sediment and river water contains the organic constituents and metal ion in the form of oxides, hydroxides and carbonate (Dhanya *et al*., 2005), since the sediment is slightly alkaline in pH range from 8.12% to 8.78% the percentage of organic matter is high ranging from 4.6 to 5.98, electrical conductivity also vary from the sampling spot rang from 4.97 to 6.18 d.Sm^{-1}. The higher value may be attributed to the plant, animal and human activities in this stretch of the river and to be remains of the leaves and dead plants. Organic matter is highly beneficial in the soils and plants for retaining the nutrient and for aggregation (Bachewar and Metha, 2001**;** Mishra nd Bhattachraya, 2005; Saravanamoorthy and Ranjitha Kumari, 2007). The organic matter is adsorbed onto the soil with a monolayer formation (Kharttri and Singh, 1999) due to bioflocculation process. The sediments act as sinks for toxic metals. The deposition of heavy metals occurs in association with very fine particles of silt and clay. They decrease root respiration and nutrient uptake by the plants (Ali et al., 2000).   Heavy metals reduce enzymatic activity and the microbial and micro faunal population in soils, (Mishra nd Bhattachraya, 2005**;** Mariappan *et al.,* 2005 and Dhanya *el al*., 2005). They are environmentally stable, non degradable and induce toxic effects. The heavy metals accumulate in the sediment due to adsorption process. The ability to adsorb heavy metals in enhanced due to the present of organic particle and finer mineral grains are boost-up the soil nutrients values (Saravanamoorthy and Ranjitha Kumari, 2007 ;Uncles *et al*., 2002**;** Shangning Ji and Unger, 2001). The untreated soil containing organic matter has higher rate of adsorption than the organic matter free soil (Ali *et al*., 2000). The maximum of heavy metals in sediments is organic matter in (sample spot 2 and 3). Thus the heavy metal are adsorbed onto the organic matter and the concentration of metals in sediments are found to be higher than those obtained in rive water as was previously reported (Wade et al., 2002; Stolt *et al*., 2001). The heavy meals present in the running water interact with organic matter slowly and settle down resulting in high concentration of these in sediments.

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Table -1: Physico- chemical parameters of Amaravathi river sediments in Karur

(May -2003)

Sampling spot	Temp	pH	E.C	Total organic matter (%)	Metal concentration in µg/gm				
					Zn	Pb	Fe	Cu	Mn
K. Paramathy	31.8	8.25	5.73	4.8	227	298	65	47	12.96
	30.4	8.57	4.97	4.6	259	312	54	39	12.25
	31.8	8.18	5.28	5.2	268	342	59	52	13.12
Vairucetty Palayam	30.2	8.12	6.12	3.9	295	4.98	55	59	15.12
	30.7	8.54	5.98	4.45	324	4.97	62	58	17.05
	30.5	8.35	5.85	4.92	365	4.78	68	62	17.25
Pasupathy palayam	305	8.25	6.08	5.68	365	4.56	59	69	16.56
	30.7	8.56	5.95	6.54	3.54	4.28	78	72	17.89
	30.4	8.45	6.18	6.59	3.65	4.65	69	68	18.25
Thirumanilayur	30.8	8.56	5.36	5.98	3.69	3.18	49	59	16.25
	30.7	8.64	5.38	5.87	3.89	3.68	52	55	16.02
	30.6	8.45	5.39	5.85	3.87	4.12	55	59	16.89
Sunga gate	30.8	8.64	5.63	5.98	4.56	287	45	52	15.35
	30.6	8.78	5.59	6.02	4.58	295	43	49	15.89
	30.5	8.75	5.57	6.18	4.49	309	39	58	16.14

Table -2: Physico - chemical parameters of Amaravathi river water in Karur (May 2003)

Sampling spot	Temp	pH	E.C	Total organic matter (%)	Metal concentration in µg/gm				
					Zn	Pb	Fe	Cu	Mn
K. Paramathy	27.8	7.25	316	3.56	194	200.86	0.25	14	2.9
	27.6	7.15	326	3.28	189	198.56	0.28	10.59	2.8
	27.5	7.16	315	3.37	198	203.15	0.19	12.68	2.45
Vairucetty Polayam	27.2	7.12	312	4.12	200.12	212.19	Nd	15.86	1.95
	27.8	7.05	311	4.15	200.04	207.89	Nd	14.89	1.85
	27.4	7.15	322	3.98	19.78	208.36	0.15	15.12	2.08
Pasupathy palayam	27.6	7.18	321	3.95	199.85	201.20	0.18	14.28	2.12
	27.9	7.32	315	3.56	200.18	203.15	Nd	14.68	2.15
	28.2	7.19	315	3.87	200.09	200.65	Nd	14.89	2.10

	27.8	7.24	305	3.12	197.25	182.45	0.12	10.25	1.45
Thirumanilayur	27.5	7.12	309	3.16	195.35	169.56	0.08	11.09	1.35
	27.6	7.31	315	3.54	197.12	181.35	0.09	11.12	1.22
	27.2	7.28	312	2.98	165.08	156.68	0.09	9.15	1.12
Sunga gate	27.5	7.27	315	2.78	158.32	162.25	0.08	9.58	1.19
	27.6	7.28	309	3.09	149.65	169.58	0.06	9.65	1.54

Figur-1 Sampling spot and rout of Amaravathi River
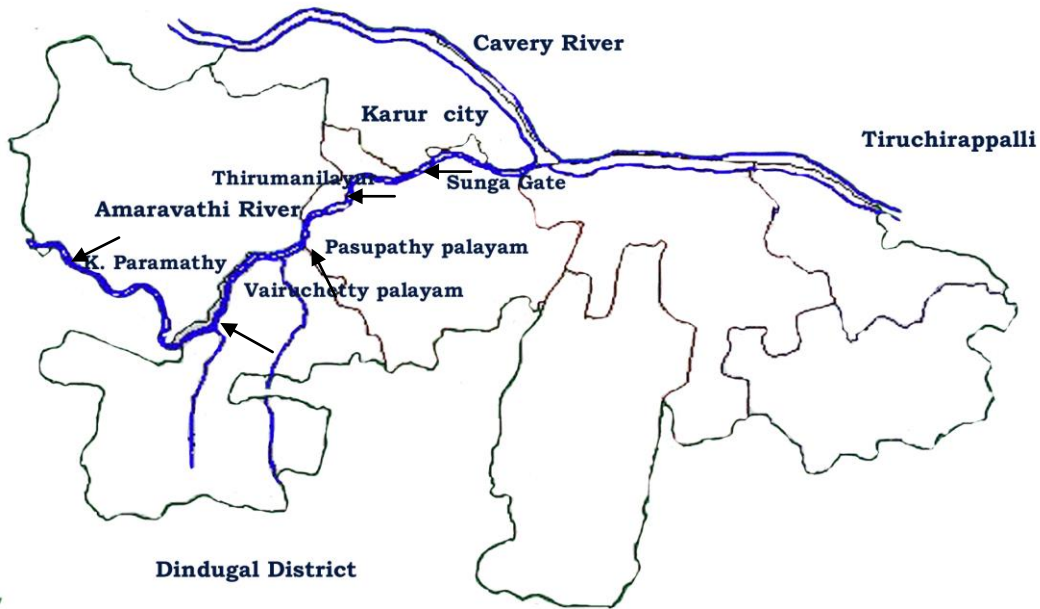
Word Sense Induction and Disambiguation Using Principal Component Analysis and Latent Semantic Indexing

Vibhor Gaur, Dr. Satbir Jain

Dept. of Computer Engineering , NSIT, New Delhi

Abstract- In this paper we present a statistical method using principal component analysis and latent semantic indexing to solve the problem of word sense induction and use the generated sense inventory to perform word sense disambiguation. We use standard co-occurrence graph algorithms and word dependency matrices (context words, dependency relations) and map them to a matrix. Then, we apply non-negative matrix factorization and principal component analysis on dimensions (latent factors) obtained from the training set. The intuition behind this is to merge dimensions that overlap in the semantic space (like computers and processors) and hence reinforcing their effect mutually to improve the disambiguation step. We work on the idea that each sense obtained in the induction process corresponds to a topical dimension. We extend this idea for each word to obtain a word's most dominant sense. The framework is tested on the standard SEM-EVAL 2010 for WSI/WSD on which it produces state of the art results.

Index Terms- word sense induction, word sense disambiguation, principal component analysis, latent semantic indexing, non negative matrix factorization

I. INTRODUCTION

Word sense induction is the task of automatically identifying senses or meanings for words in the test corpus. Constructing a sense inventory manually is a time-consuming job, and the results are not objective as they are highly dependent on the annotators perception of the domain. By applying an automatic procedure, we are able to extract the senses objectively and intrinsically present in a particular corpus. The intrinsic factor covers any new domain not defined in any of the reference senses to be easily embeded in the sense inventory. (For eg. A new car named apple is launched in the market)

Word disambiguation on the other side is a process of assigning a meaning to the word in context of it's occurrence in the corpus from a   sense inventory. Majority of the WSD algorithms use a supervised approach by using pre-defined sense dictionaries such as WordNet. The problems of domain and dynamic introduction of new senses become serious considerations while applying them in computational semantics. Also training these models by manual annotation requires a considerable effort.

The model presented in this paper takes an unsupervised approach to the problem by automatically inducing senses for words and using this sense inventory for unsupervised disambiguation of various occurrences of words (the same word) in different contexts. The induction step uses the standard co-occurrence graphs, word dependency relationships and principal component analysis along with non-negative matrix factorization. The induced senses are then mapped onto a semantic space with topical dimensions. In the disambiguation step we map the context in which the word(target word) occurs to the semantic space. The idea is that we combine the local approach of co-occurrence graphs along with the global approach of finding semantics in reference to the whole corpus which uses words, bag of words (context window) and dependency relations like synonymy for clustering senses. The intuition behind this is somewhat similar to topic modeling where the creation of each word is attributed to a topic. In a similar analogy, we consider a dominant dimension responsible for the creation of a word and similarly a distinct dimension inducing each of it's senses.

The layout of the paper is: Section 2 provides an overview of some previous work on word sense induction where we highlight on some of the key techniques that provide a framework for understanding .Section 3 presents the elaborate method of our model in a stage wise process and a working example to explain it's execution. Section 4 provides a comprehensive analysis of quantitative evaluation and comparison of our model with other algorithms in the framework of SEMEVAL-2010 WSI/WSD task. In, the last section we draw conclusions based on our results and throw some light on future work in this direction.

II. PREVIOUS WORK

A. Distributional Semantics

The main concept behind distributional similarity is that words that occur in similar contexts tend to be semantically more similar. As a result many algorithms have been proposed that utilize that this property by mapping documents and words to a semantic space through a vector model and compare their distribution.

A pioneering model in this respect is latent semantic analysis — LSA (Landauer and Dumais,1997; Landauer et al., 1998). In LSA, a term document matrix is created, which contains the frequency of each word in a particular document. This matrix is then factorised into three other matrices with a mathematical factorization technique singular value decomposition (SVD). The most important dimensions that come out of the SVD represent latent semantic dimensions, according to which nouns and documents can be represented more efficiently. Another work in this direction is by Van de Cruys & Marianna Apidianaki (2011) which uses non-negative matrix

factorization(NMF) instead of SVD. Our model also applies the same factorization technique but using it with Principal component analysis(PCA) and local co-occurence graphs which improves upon the dimensional considerations in his work by introducing a matrix based on graphical parameters and reducing the dimensionality(PCA) by merging senses that point nearly in the same direction in the semantic space.

Context is important in deciding the nature of semantic similarity. A broad context window yields broad topical similarity whereas a small window can help in obtaining tight synonym like similarity. As a result many researchers use dependency relations as the contextual features a particular word takes. An important approach in this regard is Lin (1998).

B. Word Sense Induction

The algorithms for word sense induction can be divided into two major categories local and global. Local WSI algorithms extract various senses of a word on a per-word basis, i.e. the different senses for each word are determined separately. They can be further subdivided into context-clustering algorithms and graph-based algorithms. In the context-clustering approach, context vectors are created for the different instances of a particular word, and those contexts are clustered, each representing a distinct sense of the word. The context vectors may be represented as first or second order co-occurrences (i.e. the contexts of the target word are similar if the words they in turn co-occur with are similar). First work done in this direction was by Sch¨utze (1998), and many researchers (Purandare and Pedersen, 2004) followed.

In the graph-based approach a co-occurrence graph is created, in which nodes are represent words, and edges connect words that appear in the same context (dependency relation or context window) representing co-occurences. The senses of a word are then discovered by using graph clustering techniques (Widdows and Dorow, 2002), or algorithms such as HyperLex (V´eronis, 2004) or Pagerank (Agirre et al., 2006) that find hubs in a graph. Bordag (2006) proposed an approach that uses word triplets to perform word sense induction.

Global algorithms,on the other hand try to find the different senses of a word by comparing them with the different senses of other words in a semantic word space model. The best known global approach is given by Pantel and Lin (2002). They present a global clustering algorithm – coined clustering by committee (CBC) – that automatically discovers word senses from text. The key idea is to initially find a set of unambiguous clusters, to which possibly ambiguous words can be assigned.After assigning a word to a cluster the features associated with that cluster are removed from the word vector,the remaining vector represents the other less known senses of the word and the process can continue iteratively.

Van de cruys & Marianna Apidianaki (2011) proposes a method for WSI based on latent semantic indexing using non negative matrix factorization , and later on extends it to do word sense disambiguation as well. The model proposed below incorporates the dependency features and broad contextual features with principal component analysis with local occurrence graphs (by mapping them to a matrix) and including them in the process of non-negative matrix factorization. We also use a different mapping model to map to semantic space, by using both local and global factors in our factorization to reduce effects of co-occurences that arise as a result of usage rather than any semantic relationships (like idioms).

III. METHODOLOGY

A. Local co-occurrence graphs

Initially we use various standard co-occurrence graphs ,to produce a matrix D of words cross classified by parameters that approximate a words' chances of being part of a component(sense) in the graph. We construct the graph for each word and augment the entry D_{ij} in the matrix by calculating parameter j for word i, this way we provide increased value to a word that occurs in similar context multiple times. Following are the steps as given by Navigli (1998)

1.For each word in the text corpus create a graph as follows
a.The nodes of the graph are all words obtained from context windows for each occurrence of word in the text corpus.
b.for each pair of words w and w_ in the graph calculate the dice coefficient Dice(w,w_)

$$Dice\ (w, w\_\ ) = \frac{2c\,(w, w\_)}{c(w) + c(w\_)}$$

where c(w),c(w_) are occurrences of words w and w_ and c(w, w_) represents co-occurences.

c.First order co-occurences

In the above graph,we retain only those nodes that satisfy

$$\frac{c(q, w)}{c(q)} \geq \delta$$

$Dice(q,w) \geq \delta'$ where δ and δ' are experimentally tuned thresholds

d.Second order co-occurences

We augment the nodes obtained in step d) with words that co-occur with words in step c. that is satisfy both equations of step c.

d. Creating the co-occurrence graph: For each pair of words (w,w_) ∈ V × V, we add the corresponding edge {w,w_} to E with weight Dice(w,w_) if the following condition is satisfied:

Dice(w,w_) ≥ θ(where θ is a confidence threshold for the co-occurrence relation. Note that we use a threshold δ _ to select which vertices to add to the graph and we use a potentially different threshold θ for the selection of which edges to add to the graph. Finally, we remove from V all the disconnected vertices (i.e., those with degree 0).

e. Now our graph is ready for calculating the parameters for each word w in the graph. The parameters are:

1.curv(w)=#triangles w participates in/#triangles w could participate in
Triangles : cycles of length 3

2.sqr(w)=#squares w participates in/#squares w could participate in

Squares: cycles of length 4

3. dia(w) =#diamonds w participates in/#diamonds w could participate in

Diamonds: squares with a diagonal edge

4.connect(w)=#number of edges incident on w/# total number of nodes in graph

These parameters represent the tendency of a word to fall into a sense for the word w' (whose graph is being constructed).So, a less curvature indicates that the word is a bridge between two senses and a higher value indicates that it conveys a sense for the word.

f. Augment entry D_{ij} for each node(word) i and each parameter j of matrix D with above values ,i.e

$D_{i1}=D_{i1}+curv(i)$ and so on for i=2,3 and 4

2.Go to step 1.

B. Non-negative matrix factorization

Non-negative matrix factorization (Lee and Sung,2000) factorises a matrice A into two matrices W and H such that

$A_{ij} \approx W_{ik} \times H_{kj}$

Matrices W and H are randomly initialized, and the rules in 2 and 3 are iteratively applied

– alternating between them. In each iteration, each vector is adequately normalized, so that all dimension values sum to 1.

$$H_{a\mu} \leftarrow H_{a\mu}*(\sum_I W_{ia}*A_{i\mu}/(WH)_{i\mu})/\sum_k W_{ka} \quad ..(2)$$

$$W_{ia} \leftarrow W_{ia}*(\sum_\mu H_{a\mu}*A_{i\mu}/(WH)_{i\mu})/\sum_v H_{av} \quad ..(3)$$

There are many advantages of using this in our context as we can represent the k latent dimensions (senses) in the semantic space with the help of W and H. It is better in comparison to the standard known techniques of SVD .NMF minimizes the Kulback-Liebler divergence which is again more suitable for language phenomena than the Euclidean distance that serves as a minimizing criterion for SVD. The non-negative property of NMF allows us to interpret the result probabilistically. But the problem of using this over SVD is that the dimensions obtained are not orthogonal and hence semantics of same dimensions (like apples and fruit) are mapped differently. We use principal component analysis to combat this. Elaborate analysis will be done only after the NMF step.

C. Latent Semantic Indexing (using NMF)

We use an extension of non-negative matrix factorization to induce latent factors for matrices capturing semantics in the document. We use 4 matrices instead of 3 as used by Van de Cruy, 2008. The first 3 matrices remain the same. The first matrix contains co-occurrence frequencies cross-classified by their (appearing in context window of the word).The fourth

matrix consists of words cross classified by their parameters obtained from the local co-occurrence graphs earlier. This fourth matrix helps us to incorporate the effects of various local senses that are better captured through graphs. Next we apply NMF on the 4 matrices and interleave the factorizations (initializing the matrix in the next factorization, which is same as that updated before with the results of the former factorization).This has been illustratred in the table below:

Abbreviations used:

Decomposed Matrix1/Decomposed Matrix 2:DCMP1/DCMP2

Matrix generated from previous step/Matrix generating this matrix: MGPS/MGTS

Matrix updated in this step/Equation Used: MUTS/EU

Words/Dependency Relations/Dimensions/Context words/parameters: W/DR/D/CW/P

Matrix	DCMP1	DCMP2	MGPS/MGTS	MUTS/EU
A (W × DR)	L (W × D)	M (D × DR)	M/Q	L/3
B (W× CW)	N(W × D)	O (D × CW)	N/L	O/2
C (CW× DR)	P (CW × D)	Q (D × DR)	P/O	Q/2
D (W×P)	R (W × D)	S (D × P)	R/L	S/2

Formally the process can be described as: we consider the 4 matrices to be A, B,C and D and their factorizations to be L,M; N,O; P,Q; R,S. Initially matrices L, M,O, Q are initialized randomly. Now, we carry out the first iteration in which we compute the update of L using M(equation 3).This matrix is copied into matrices N and R. Next we compute the update of O using N (equation 2) and the update of matrix S using R(equation 2). Next we copy the matrix O into matrix P. Finally, we compute the update of matrix Q using matrix P (equation 2).The iteration is then repeated and we continue to iterate until a specific number of iterations have been performed.

When the factorization is complete the 4 different modes(words, context words, dependency relations, parameters) are all represented by latent factors. But the process is incomplete in the sense that these latent factors are correlated which does not provide us with discrete senses but senses that overlap in the semantic space. As a result, the semantic space is still diffused and cannot be used for mapping words and senses to the semantic space. To address this concern we use principal component analysis of the latent factors as described in the next sub-section.

D. Principal Component Analysis

Principal component analysis (PCA) is a mathematical procedure that uses orthogonal transformation to convert a set of

observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components. The number of principal components is less than or equal to the number of original variables. This transformation is defined in such a way that the first principal component has the largest possible variance (that is, accounts for as much of the variability in the data as possible), and each succeeding component in turn has the highest variance possible under the constraint that it be orthogonal to (i.e., uncorrelated with) the preceding components.

In our case the correlated variables are the latent dimensions induced in the NMF step. We apply the PCA process to each of the 8 matrices obtained in the NMF factorization step, the method however remains the same. In this way we reduce the dimensionality of each matrice from k to k' where k' are the reduced number of linearly uncorrelated variables(latent dimensions) obtained after the application of PCA.

Let us consider one of the matrices and demonstrate application of PCA. Let the matrix be matrix L which is words cross classified by latent dimensions and is W × K (W:number of words, k:number of dimensions).Our aim is to convert this to a matrix L' of dimensionality W × K' where k' will be chosen as guided by the algorithm. Following is the standard covariance method to compute the PCA (WIKIPEDIA).

Calculate the empirical mean
- Find the empirical mean along each dimension $j = 1, ..., k$.
- Place the calculated mean values into an empirical mean vector **u** of dimensions k × 1.

$$u[j] = \frac{1}{w} \sum_{i=1}^{w} L[i,j]$$

Calculate the deviations from the mean

Mean subtraction is an integral part of the solution towards finding a principal component basis that minimizes the mean square error of approximating the data.Hence we proceed by centering the data as follows:
- Subtract the empirical mean vector u from each row of the data matrix X.
- Store mean-subtracted data in the $w \times k$ matrix B.

B=X-hμ^T

where h is an $w \times 1$ column vector of all 1s:

h[i]=1   for i=1….w

Find the covariance matrix

Find the $k \times k$ empirical covariance matrix C from the outer product of matrix B with itself:

$$C = \frac{B*.B}{w-1}$$

where

∗is the conjugate transpose operator. Note that if B consists entirely of real numbers, which is the case in many applications, the "conjugate transpose" is the same as the regular transpose
- Please note that outer products apply to vectors. For tensor cases we should apply tensor products, but the covariance matrix in PCA is a sum of outer products between its sample vectors; indeed, it could be represented as B∗.B. See the covariance matrix sections on the discussion page for more information.

- The reasoning behind using W-1 instead of W to calculate the covariance is Bessels' Correction

Find the eigenvectors and eigenvalues of the covariance matrix
- Compute the matrix **V** of eigenvectors which diagonalizes the covariance matrix **C**:

$$\mathbf{V}^{-1}\mathbf{C}\mathbf{V} = \mathbf{D}$$

where **D** is the orthogonal matrix of eigenvalues of **C**. This step will typically involve the use of a computer-based algorithm for computing eigenvectors and eigenvalues . These algorithms are readily available as sub-components of most matrix algebra systems, such as R, MATLAB,Mathematica,Scipy ,IDL (Interactive Data Language), or, GNU Octave as well as OpenCV.
- Matrix D will take the form of an $M \times M$ diagonal matrix, where

$$D[k,l] = \lambda_k \qquad \text{for } k = l = j$$

is the jth eigenvalue of the covariance matrix C, and

$$D[k,l] = 0 \qquad \text{for } k \neq l.$$

- Matrix **V**, also of dimension $p \times p$, contains p column vectors, each of length p, which represent the p eigenvectors of the covariance matrix C.
- The eigenvalues and eigenvectors are ordered and paired. The jth eigenvalue corresponds to the jth eigenvector.

Rearrange the eigenvectors and eigenvalues
- Sort the columns of the eigenvector matrix **V** and eigenvalue matrix **D** in order of *decreasing* eigenvalue.
- Make sure to maintain the correct pairings between the columns in each matrix.

Compute the cumulative energy content for each eigenvector
- The eigenvalues represent the distribution of the source data's energy among each of the eigenvectors, where the eigenvectors form a basis for the data. The cumulative energy content g for the jth eigenvector is the sum of the energy content across all of the eigenvalues from 1 through j:

g[m] = $\sum_{k=1}^{j} D[k,k]$ for j=1….k

Select a subset of the eigenvectors as basis vectors
- Save the first k' columns of V as the w × k' matrix L':
- L'[r,l] = V[r,l]   for   r=1…..w   l=1…..k'

Where
1≤L≤k

- Use the vector g as a guide in choosing an appropriate value for *L*. The goal is to choose a value of *L* as small as possible while achieving a reasonably high value of g on a percentage basis. For example, you may want to choose *L* so that the cumulative energy g is above a certain threshold, like 90 percent. In this case, choose the smallest value of *L* such that

$$\frac{g[k']}{g[k]} \geq 0.9$$

E. Word Sense Induction-Generating the sense inventory

Now that we have induces latent factors over our matrices (representing semantic relationships) and reduced their dimensionality using PCA to obtain broader senses to which words can be assigned, our task is to create a sense inventory by clustering words using their vectors in this reduces dimensional space. The word vectors are obtained from rows of matrice L' (dimensionally reduced form of L words*dimension).

We use k-means clustering as PCA automatically projects to the subspace where the global solution of K-means clustering lies, and thus facilitates K-means clustering to find near-optimal solutions. K-means yields a hard clustering in which every noun will be assigned to one dominant cluster. In order to assign this noun to different clusters we subtract the salient dimensions(vector) of the centroid of the cluster(which is presently being considered in an iterative loop) from the word vector of this noun and check if it can be assigned to a the next cluster. The salient dimensions of the centroid are computed by averaging word vectors of all the elements in the cluster except the element which we want to reassign.This word vector is then fed again to the clustering algorithm. If no reassignment takes place it means all senses for the word have been discovered and it has been assigned to all clusters that convey one of it's senses. By subtracting the centroid from the word vector we strip of it's dominant senses to discover it's other less discovered senses.

We use the liberal approach of assigning the word vector to a new cluster. In this approach, the next best cluster(candidate sense) is selected for the target noun untill a certain threshold similarity is reached. We use the cosine similarity as a criterion for measuring the similarity. After performing these steps we have obtained a sense inventory of candidate senses, each represented by a cluster and characterized by the centroid of the cluster. This sense inventory will facilitate our process of word sense disambiguation in which we assign a sense to a word depending on it's context.In the next section we carry out the process of WSD and illustrate it with an example.

F. Word Sense Disambiguation

In order to find the sense of a given word in context of it's occurrence in the document we need to create the context vector v for this word (using it's context window). We then need to map the senses(clusters) obtained in the previous step to the semantic space. We then follow the same procedure and map the context vector v of the target noun to the same semantic space and obtain v'. Finally, we compare the mapping of v with the mapping of each cluster obtained earlier using kulback leibler divergence. The target word is assigned to the cluster giving minimum divergence. Now, to assign the final sense, we find the most dominant dimension in this cluster and assign it to the word.

We consider two separate mappings, viz; global and local. For mapping to the global semantic space we use matrix M (dimensions*dependency relations) and for mapping to the local semantic space we use the matrix S(dimensions*parameters).Let us first consider mapping for each of the clusters C_i. In order to map the cluster to the semantic space we use it's vectors C_{i1} and C_{i2}.C_{i1} is a row vector and is equal to the average of all the dependency relation vectors (rows of matrix A, words*dependency relations) of all the words in the cluster.C_{i2} is also a row vector and is equal to average of all the parameter

vectors (rows of matrix D, words*parameters).The two mappings for the cluster are represented as M_1C_i and M_2C_i

$$M_1C_i = C_{i1}*M^T$$
$$M_2C_i = C_{i2}*S^T$$

Now we need to map the target noun (whose sense is to be found).For global mapping of the context we use the matrix O(dimensions*context words) and for local mapping we use the same matrix S as used for clusters. Again now we need to construct two matrices W_1 and W_2.W_1 is a row vector representing the context of the word. It is calculated by counting the number of occurrences of each context word(same as in matrix O) in the context window of the target word.W_2 is also a row vector representing the parameters of the target word. We will need to calculate it by applying the graph algorithm as given in 3.1.The reason that we need to recalculate it even when we can find it directly from the matrix D is that matrix D will have the parameter vector for this word that had been calculated and augmented after each iteration(of all words) whereas we are considering target word in it's own context to determine which sense it conveys in that context-window. The two mappings are represented as M_1W and M_2W

$$M_1W = W_1*O^T$$
$$M_2W = W_2*S^T$$

Now in order to compare semantics of the target word with that of a cluster C_i we calculate Kulback-liebler divergence between M_1C_i and M_1W and between M_2C_i and M_2W.Let us say the first is D_1 and D_2.The net divergence for cluster C_i is D_i

$$D_i = a.D_1 + b.D_2$$

Where a and b are normalizing constants calculated experimentally and a+b=1;

Finally we assign cluster C_i to the target word W such that D_i is minimum.

Now to extract the correct dimension from this cluster we follow a two step procedure. First we consider the largest dimension of the vector C_{i1}.Let this dimension be X. Now this dimension will not represent a single sense but a mixture of senses(as we reduced dimensionality of original set and hence combining some senses in the original training set into a single dimension). So,in the second step consider the row vector in the matrix M'(reduced dimensions(k')*dependency relations) with row labeled as X. Now take dot product of this row vector with each row vector of the matrix M(original dimensions(k)*dependency relations).Since each row of M represents a sense from the original training set, the row giving the highest value of dot product is assigned as the sense to the target word.

G. WORKING EXAMPLE

Let us illustrate the process with a working example for the noun apple. The sense induction algorithm finds the following candidate senses:

1. tree, doctor, sweet, leaves, health,cancer,sweet

2. company, officials, mobile, iphone, portfolio,apps,games,macintosh,sales,profits,manufacture

3. iphone, galaxy, apps, internet, ios, mobile, games, processor, sales ,manufacturer

Each of these senses is associated with a centroid (average frequency vector of the cluster members) that is mapped to the semantic dimensions, i.e. yields a probability distribution over the semantic dimensions. If we consider each of three senses we can see that the 'fruit' dimension is the most dominant in the first sense. In the second sense the 'corporate' sense is most dominant. Similarly in the third sense the dimension phone is dominant.

Let us now see, a particular instance of the noun apple

Many doctors have come up with results that show excessive use of mobiles is not good for health. They say that although people playing games , using apps and internet on these phones find sweet pleasure in doing these activities they are at high risk of getting cancer. This has led to a slight decline in the sales of iphone coming as a surprise for **apple** and has further triggered a delay in the declaration of their portfolio.

Now, a context vector is created for the noun apple and is folded into the semantic space as we had done for the senses. By selecting the lowest weighted kulback leibler divergence the algorithm is able to assign the sense corporate to apple. If we take a closer look the sense fruit also could have been assigned with almost equal probability. What prevented this from happening is our dimensionality reduction due to which the dimension corporate was merged with a significant weight from the dimension mobile and acquired many dependency relations from it(which is intuitive as mobiles are produced by corporate), this helped the algorithm give more weight to the corporate sense and recognize it correctly. Hence, this form of transitive relationship between senses is introduced by using principal component analysis and hence improves results.

IV. EVALUATION

A. Dataset

Our word sense induction and disambiguation model is trained and tested on the dataset of the SEMEVAL-2010 WSI/WSD task (Manandhar et al.,2010).We do this to maintain consistency of dataset as used by Van de Cruy(2011) and show improved results by introducing PCA and local co-occurrence graphs in the NMF, latent semantic indexing model given by him. The SEMEVAL-2010 WSI/WSD task is based on a dataset of 100 target words, 50 nouns and 50 verbs. For each target word, a training set is provided from which the senses of the word have to be induced without using any other resources. The training set for a target word consists of a set of target word instances in context (sentences or paragraphs).The complete training set contains 879,807 instances, viz. 716,945 noun and 162,862 verb instances.

The senses obtained during the training phase are used for disambiguation in the testing phase. In which the system is provided with a test set that consists of unseen instances of the target words. The test set contains a total of 8,915 instances , of which 5,285 nouns and 3,630 verbs. The instances in the test set are tagged with OntoNotes senses (Hovy et al.,2006). The system needs to disambiguate these instances using the senses acquired during training.

B. Implementation details

The SEMEVAL training set has been part of speech tagged and lemmatized with the Stanford Part-Of-Speech Tagger (Toutanova and Manning, 2000;Toutanova et al., 2003) and parsed with Malt-Parser (Nivre et al., 2006), trained on sections 2-21 of the Wall Street Journal section of the Penn Treebank extended with about 4000 questions from the QuestionBank6 in order to extract dependency triples. The SEMEVAL test set has only been tagged and lemmatized, as our disambiguation model does not use dependency triples as features (contrary to the induction model). We constructed different models one each for nouns and verbs. For each model, the matrices needed for our interleaved NMF factorization are extracted from the corpus. The noun model was built using 5K nouns, 80K dependency relations, and 2K context words (excluding stop words) with highest frequency in the training set, which yields matrices of 5K nouns × 80K dependency relations, 5K nouns × 2K context words, and 80K dependency relations × 2K context words. The parameter matrix is constructed by building local co-occurrence graphs and obtaining the parameter matrix 5k nouns*4 parameters. The model for verbs was constructed in a similar vein, using 3K verbs, and the same number of dependency relations and context words. For the initial k-means clustering, we set k = 500 for nouns, and k = 350 for verbs. To use the NMF model, we used 50 iterations, and factored the model to 50 dimensions. We then used the standard software mathematica to perform principal component analysis of the factored matrices and reduced dimensionality to 35.

C. Evaluation measures

The results of the systems participating in the SEMEVAL-2010 WSI/WSD task are evaluated using supervised and unsupervised techniques. The supervised evaluation in the SEMEVAL-2010 WSI/WSD task follows the sane scheme as SEMEVAL-2007 WSI task (Agirre and Soroa, 2007), with slight modifications. First step of the test set is used as a mapping corpus, to map the automatically induced clusters to gold standard senses; the second step acts as an evaluation corpus. The mapping between clusters and gold standard senses is used to tag the evaluation corpus with gold standard tags. The systems are then evaluated as in a standard WSD task, using recall. In the unsupervised evaluation, the induced senses are evaluated as clusters of instances that are compared to the sets of instances tagged with the gold standard senses (corresponding to classes).Hence, two groupings are created over the test set for a target word: a set of automatically generated clusters and a set of gold standard classes. A number of these instances will be members of both one gold standard class and one cluster. Therefore, the quality of the proposed clustering solution is evaluated by comparing the two groupings and measuring their similarity. There are two evaluation metrics in the unsupervised evaluation to estimate the quality of the clustering solutions, the V-Measure (Rosenberg and Hirschberg, 2007) and the paired F-1481 Score (Artiles et al., 2009). V-Measure measures the quality of a clustering by calculating its homogeneity (h) and its completeness (c). Homogeneity is defined as the degree that each cluster consists of data points primarily belonging to a single gold standard class, while completeness refers to the degree that

each gold standard class consists of data points assigned to a single cluster. V-Measure is the harmonic mean of h and c.

$$VM = \frac{2.h.c}{h+c} ..(7)$$

In the paired F-Score (Artiles et al., 2009) evaluation, the clustering problem is treated as a classification problem (Manandhar et al., 2010). A set of instance pairs is generated from the automatically induced clusters, which consists of pairs of the instances found in each cluster. Similarly, a set of instance pairs is created from the gold standard classes, containing pairs of the instances found in each class. Precision is then defined as the number of common instance pairs between the two sets to the total number of pairs in the clustering solution (cf. formula 8). Recall is defined as the number of common instance pairs between the two sets to the total number of pairs in the gold standard (cf. formula 9). Precision and recall combined together produce the harmonic mean (cf. formula 10)

$$P = \frac{|F(K) \cap F(S)|}{|F(K)|} ..(8)$$

$$R = \frac{|F(K) \cap F(S)|}{|F(S)|} ..(9)$$

$$FS = \frac{2.P.R}{P+R} ..(10)$$

The obtained results are also compared to two baselines. The most frequent sense (MFS) baseline groups all testing instances of a target word into one cluster. The Random baseline randomly assigns an instance to one of the clusters.7 This baseline is executed five times and the results are averaged.
7The number of clusters in Random was chosen to be
roughly equal to the average number of senses in the gold standard

D. Results

a. Unsupervised Evaluation

In the table shown below the v-measures of some of the top ranked systems in the semeval 2010 WSI/WSD task, for nouns ,verbs as well as the complete data set separately.The fourth column shows the average number of clusters induced in the test set by the respective algorithm.V-measure of MFS baseline is 0 as by definition it's completeness is 1 and it's homogeneity is 0.

Our algorithm labeled PCNMA with overall score of 11.3 does better than the NMF_{con} and just slightly less than the NMF_{lib} ,overall it performs fairly well inducing 4.5 clusters nearly the same as NMF_{lib} and others like Duluth-WSI.

VM(%)	all	noun	verb	#cl
Hermit	16.2	16.7	15.6	10.78
UoY	15.7	20.6	8.5	11.54
KSU KDD	15.7	18.0	12.4	17.50
NMF_{lib}	11.8	13.5	9.4	4.80
PCNMA	11.34	12.4	9.5	4.5
Duluth-	9.0	11.4	5.7	4.15

WSI				
Random	4.4	4.2	4.6	4.00
NMF_{con}	3.9	3.9	3.9	1.58
MFS	0.0	0.0	0.0	1.00

Next we evaluate our system on the more reliable measure F-scores which penalizes systems when they produce a higher number of clusters (low recall) or a lower number of clusters (low precision) than the gold standard number of senses. We again compare our results with the scores of the best ranked systems in the SEMEVAL-2010 WSI/WSD.

FS (%)	all	noun	verb	cl
MFS	63.5	57.0	72.7	1.00
Duluth-WSI-SVD-Gap	63.3	57.0	72.4	1.02
NMF_{con}	60.2	54.6	68.4	1.58
PCNMA	55.8	50.9	61.8	4.13
NMF_{lib}	45.3	42.2	49.8	5.42
Duluth-WSI	41.1	37.1	46.7	4.15
Random	31.9	30.4	34.1	4.00

PCNMA achieves a score of 55.8 and induces a similar number of clusters as produced by other algorithms achieving similar results.This time our algorithm does better than NMF_{lib} while still inducing a significant numer of clusters which is not the case with NMF_{con} that does slightly better than our algorithm.

b. Supervised Evaluation

In the supervised evaluation the dataset is partitioned into two sets, the mapping set and the evaluation set. The automatically induced clusters are mapped to the gold standard senses
using the mapping corpus. The obtained mappings are then used to tag the evaluation set with these gold standard tags.

Table 3 shows the recall of our algorithm in the supervised evaluation in comparison with the other best performing systems in the SEMEVAL- 2010 WSI/WSD task.

Table 3: Supervised recall for SEMEVAL testset, 80% mapping, 20% evaluation

SR(%)	all	noun	verb	#S
PCNMA	63.3	59.4	71.7	1.93
NMF_{lib}	62.6	57.3	70.2	1.82
UoY	62.4	59.4	66.8	1.51
Duluth-WSI	60.5	54.7	68.9	1.66
NMF_{con}	60.3	54.5	68.8	1.21
MFS	58.7	53.2	66.6	1.00
Random	57.3	51.5	65.7	1.53

PCNMA outperforms both the NMF techniques and overall achieves the highest result in the supervised evaluation. The

overall accuracy obtained is 63.3 and again the number of induced clusters come out to be nearly same as other algorithms performing similarly.

V. CONCLUSIONS AND FUTURE WORK

In this paper we present a model based on latent semantics and principal component analysis that is able to perform word sense induction as well word sense disambiguation. We combine the local and global approaches of word sense induction by introducing a new parameter matrix in the latent semantic induction step where we use it in non-negative matrix factorization (Van De Cruy,2008).The central focus of the paper is though the step of principal component analysis where we reduce dimensionality by merging similar senses together. This helps in combining the effect of transitve senses and providing better performance in the induction and disambiguation step. This is evident from the results where our model reaches state of the art performance as compared to other systems in the SEMEVAL word sense induction and disambiguation task .The evaluation set consists of many contexts for only a small amount of target words. In this regard, the global aspect of our approach performs well to extract the various senses scattered in the corpus and the local aspect strengthens the disambiguation step where the local context is more important. Hence, we think that the model presented in this paper provides a strong and holistic solution to the problem at hand.

Before we conclude we would like to throw some light on issues for future work.Although we use a new method for mapping to semantic space we would like to further train the model (in an unsupervised manner) to recognize wild senses that occur as a result of mere usage rather than semantics(like idioms).This can help improve accuracy in the unsupervised evaluation stage.Second, we would like to perform disambiguation in a hierarchical process where a noun is assigned first to it's broadest sense and then further senses down the hierarchy. Like a chip can be first assigned to a broad sense computer and then to the finer sense processor. It would require some modification in the PCA process and some vector techniques to recognize weather the dimensions are proper subsets of each other. We would also like to include grammatical dependencies in our disambiguation step to enrich our set of dependency relations.

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AUTHORS

First Author – Vibhor Gaur , NSIT, New Delhi, vibhor1510@gmail.com

Second Author – Dr.Satbir Jain ,Astt. Professor ,NSIT sjain.satbir@gmail.com

Effect of Drying Temperature and Microwave Power on the Physico-Chemical Characteristics of Osmo-Dehydrated Carrot Slices

Gousia Gani[1], Avanish Kumar[2]

[1] M. Tech. (Ag. Process & Food Engg.), Department of Food Process Engineering.,
SHIATS, Allahabad, U.P., (211 007), India.
[2] Assistant Professor, Department of Food Process Engineering.,
SHIATS, Allahabad, U.P., (211 007), India.

ABSTRACT

Osmotic dehydration of carrot slices in sugar solutions at different solution concentrations, temperatures and process duration of 120min. was analyzed for moisture content (% w.b.), ash content, pH and beta-carotene. The beta-carotene content increased with increase of syrup concentration and temperature, and the ash, pH and moisture content (% w.b.) decreased with increase of syrup concentration and temperature. The osmotically pretreated carrot slices were further dehydrated in a cabinet dryer at 65^0C for 4h and microwave oven at an input power of 20W for 22min. The optimum conditions of various process parameters were $30\text{-}50^0B$ sugar concentration, 30^0C and 40^0C osmotic solution temperature and process duration of 120 min.

INTRODUCTION

Carrot (*Daucus carota* L.) is one of the important root vegetable crops and is highly nutritious as it contains appreciable amounts of vitamins B_1, B_2, B_6 and B_{12} aside from being rich in beta-carotene. It also contains many important minerals. Beta-Carotene is a precursor of vitamin A and is reported to prevent cancer. Beta-carotene is one of the common carotenoid hydrocarbons that contain specific end groups or two beta rings and it acts as provitamin A, which is converted by humans to vitamin A. However, in the food industry, carrots must generally be processed prior to their use and drying is one of the most frequently used processes. Its maximum retention is of utmost importance for the preservation of the attractive appearance and dietary value of the product. Carrots have a moisture content of 80–90% (wet basis) at the time of harvest. They are seasonal in nature and highly susceptible to moisture loss leading to wilting and loss of fresh appeal.

Osmotic dehydration is a non-thermal treatment, the aim of which is to modify the composition of food material by partially removing water and impregnating it with solutes, without affecting the material's structural integrity. Osmotic dehydration (OD), a technique used to produce high or intermediate moisture products, involves immersing pieces of food in a hypertonic solution. Such processes allow the adjustment of the physical-chemical properties of food by reducing water content and simultaneously incorporating ingredients or additives with antioxidant or other preservative properties into the food (Torreggiani 2001). Although the

osmotic dewatering consists of a mild process to partially dehydrate fruits and vegetables, its application can cause changes in cellular tissues, influencing the rheological behavior of the material.

Osmotic dehydration is a water removal process involving soaking foods, mostly fruits and vegetables, in a hypertonic solution such as concentrated sugar syrup. If the solutes are correctly chosen, and the ratio of water removal to solute impregnation is controlled, the natural flavour of fruit products and colour retention can be enhanced. Osmotic dehydration is now considered a valuable tool in minimal processing of foods. It can be applied either an as autonomous process or as a processing step in alternative processing schemes leading to a variety of end products (Lazarides et al. 1995). During osmotic dehydration, a product is continuously immersed in the osmotic solution, making the process oxygen free. There is, therefore, no need to use sulphur dioxide and/or blanching for protection against oxidative and enzymatic discoloration. Osmotic dehydration is one of the effective ways to reduce overall energy requirements in dehydration. Osmotic dehydration is one of the simple and inexpensive processes, which offers a way to make available the low cost, highly perishable and valuable crop available for the regions away from production zones and also during off season. The objective of the research was to determine the physico-chemical characteristics of osmodehydrated carrot slices using tray and microwave drying.

MATERIALS AND METHODS

Sample preparation

Good quality carrots were procured for this investigation from the local market Allahabad on daily basis prior to each set of experiment. Undamaged carrots without any defect on visual inspection were selected. The carrots were thoroughly washed and cut into 3mm slices. Sucrose was used as an osmotic agent and was purchased from the local market. Initial moisture content of carrot slices was 86.7%.

Osmotic solutions

Osmosis solutions of different concentrations (30-50^0B) were prepared by dissolving the desired solutes on a w/w basis with distilled water. A magnetic stirrer was used to dissolve the contents. Sucrose was weighed on an electronic balance. Fresh osmotic solution was prepared for every run.

Experimental Procedure

The experiments were conducted in the laboratories of the Department of Food Process Engineering, SHIATS, Allahabad (India). Fresh, well-graded carrots were procured from the local market of Allahabad, and the experiments were conducted on the same day. After washing, peeling was accomplished manually by stainless steel hand peeler. The green parts of carrots were removed to retain the final quality of the product. A vegetable

dicer was used to prepare carrot slices of 3mm. The carrot slices were washed with fresh water to remove the carrot fines adhered to the surface of the carrot slices. The leftover material of carrot slices was separated manually. No blanching was conducted prior to osmosis as it has been reported to be detrimental to osmotic dehydration processes as a result of the loss of semi-permeability of the cell membranes (Ponting 1973) and reduction of beta-carotene (Sharma *et al*. 2000; Reyes *et al*. 2002). Sugar solution was chosen for osmosis, as it is an excellent osmotic agent, retarding oxidative and non-enzymatic browning (Arya *et al*. 1979). For each experiment, known weights of carrot slices (51 g) were put in stainless steel containers containing calculated volumes of osmotic solutions of different concentrations (30-50^0B) preset at the specified temperature (30-40^0C) in a hot water bath under shaking conditions. The sample to solution ratio in osmotic dehydration process was kept as 1:10. The carrot slices were removed from the osmotic solutions after 120min. and rinsed with water to remove the surplus solvent adhering to the surfaces. These osmotically dehydrated slices were then spread on the absorbent paper to remove the free water present on the surface. The slices were dehydrated to final moisture of 8-13% (wet basis) using a hot air drier preset at an air temperature of 65^0C and 9-14% (w.b.) using microwave oven preset at an input power of 20W. The moisture content of fresh carrots was 86.7% (wet basis). The dried samples were cooled in a desiccator containing silica gel for 1 h, packed in low-density polyethylene bags and kept at ambient temperature (28–35C) for quality analysis. The analysis was completed within 2 days. The stored samples were analyzed at intervals of 15 days for moisture (AOAC, 1990), ash (AOAC, 1984), pH and ß-carotnene (Rangana1986).

Statistical analysis

The experiments were conducted by adopting completely randomized design of the data recoded. During the course of investigation, product of different formulations were analysed statistically by the 'Analysis of Variance' (ANOVA). The significant effect of treatment is judged with the help of 'F' (Variance Ratio). F values were compared with the table value of F at 5% level of significance. If calculated value exceeds the table value, the affect is considered to be significant. The significance is tested at 5% level.

RESULTS AND DISCUSSIONS

The prepared osmotic dehydrated carrot slices were evaluated for various physico-chemical, characteristics. The changes in various physico-chemical parameters of the dehydrated carrot slices stored in ambient temperature are presented in Figs. 4.1 – 4.8.

Moisture content (%w.b.)

The moisture content varied from sample to sample. Fig. 4.1 shows the effect of storage period on percent moisture content of osmo-tray dehydrated samples (T_1, T_2, T_3, T_4, T_5 and T_6) at 15 days interval during storage.

T_1, T_3 and T_5 were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_2, T_4 and T_6 were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. Fig. 4.2 shows the effect of storage period on percent moisture content of osmo-microwave dehydrated samples (T_7, T_8, T_9, T_{10}, T_{11} and T_{12}) at 15 days interval during storage. T_7, T_9 and T_{11} were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_8, T_{10} and T_{12} were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. The moisture content of osmo-tray dehydrated samples was in the range of 8.9% to12.2% on the 0th day and the moisture content of osmo-microwave dehydrated samples was in the range of 9.9% to13.6% on the 0th day. **Rahman et al. (2010)** reported the moisture content of 7.05% in solar dried carrot and **Kumar et al. (2008)** reported the moisture content of 9.0% in osmo-vac dehydrated mango slices. On evaluation of result, it was found that there was a decrease in moisture content in the samples with increasing the concentration of sugar solution from 30-50^0B and syrup temperature 30-40^0C, which was obvious and is presented in Fig. 4.1 and 4.2. Increased solution concentration resulted in increase in the osmotic pressure gradients and higher moisture loss**.** It might be noted that the moisture content of products on storage is an important determinant of their keeping quality. There was some amount of moisture ingress in samples during storage and it was increased as the duration of storage increased and the increase in moisture content was observed due to temperature fluctuations or storage conditions that may have caused migration of water into the pouch, as the samples were stored at ambient temperature. This hypothesis was verified by **Manzano et al. (1997)** that storage temperature affects the moisture content of fruits during storage. Similar results were also reported by **Kumar et al. (2008), Rahman et al. (2010) and Mizanur et al. (2012).** ANOVA at 5% significance show significant results.
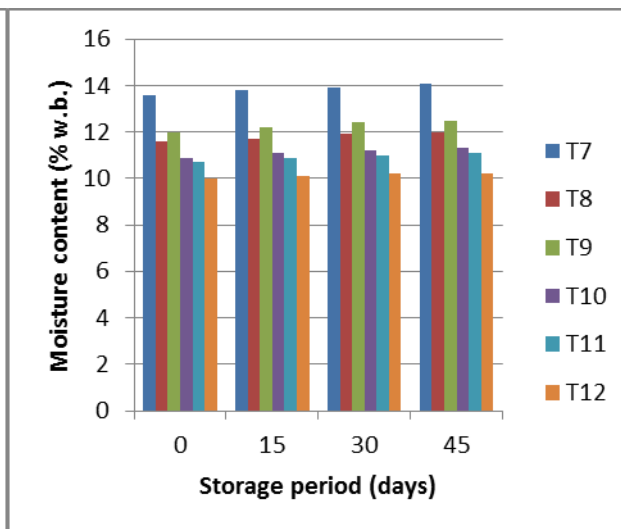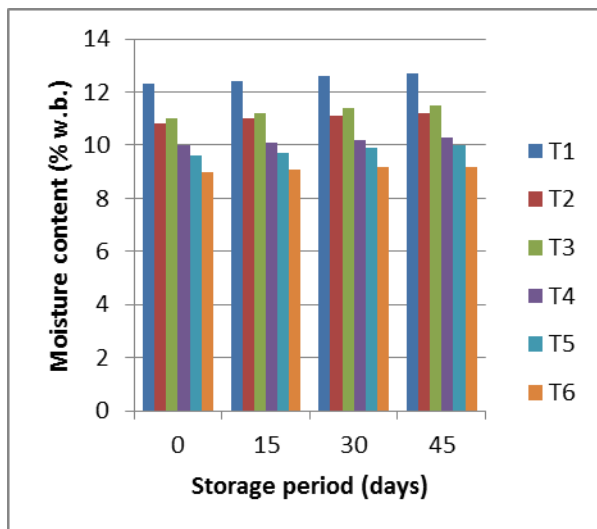
Fig. 4.1. Effect of storage period on m.c. (%w.b.)   Fig. 2. Effect of storage period on m.c. (%w.b.) of osmo- tray dehydrated carrot slices   of osmo- microwave dehydrated carrot slices.

Ash content (%)

The ash content varied from sample to sample. Fig. 4.3 shows the effect of storage period on ash content of osmo-tray dehydrated samples (T_1, T_2, T_3, T_4, T_5 and T_6) at 15 days interval during storage. T_1, T_3 and T_5 were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_2, T_4 and T_6 were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. Fig. 4.4 shows the effect of storage period on ash content of osmo-microwave dehydrated samples (T_7, T_8, T_9, T_{10}, T_{11} and T_{12}) at 15 days interval during storage. T_7, T_9 and T_{11} were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_8, T_{10} and T_{12} were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. The ash content of osmo-tray and osmo-microwave dehydrated samples was in the range of 0.49% to 0.50% on the 0th day**. Abd El-Hamid et al. (1986)** reported the ash content of 0.51% in Zebda variety (mango) and this was in agreement with the results obtained by **Abd El-Baki *et al*., (1981). Shahnawz et al. (2010)** reported the ash content of 0.16% in mango sample.

On evaluation of result, it was found that there was a decrease in ash content in the samples with increasing the concentration of sugar solution from 30-50^0B and syrup temperature 30-40^0C, which was obvious and is presented in Fig. 4.3 and 4.4. The decrease in ash content may be due to leaching of some minerals from carrot slices during osmotic step. Similar results were also reported by **Abd El-Hamid *et al*., (1986).** On critical evaluation of the result during storage, it was clear that the ash content of carrot slices packed in LDPE decreased slightly with increase in the storage period. According to **Jain et al. (1992),** ash is the inorganic residue remaining after the water and organic matter and could not be decreased during storage. Similar results were also reported by **Nielsen, (1998).** ANOVA at 5% significance show significant results.
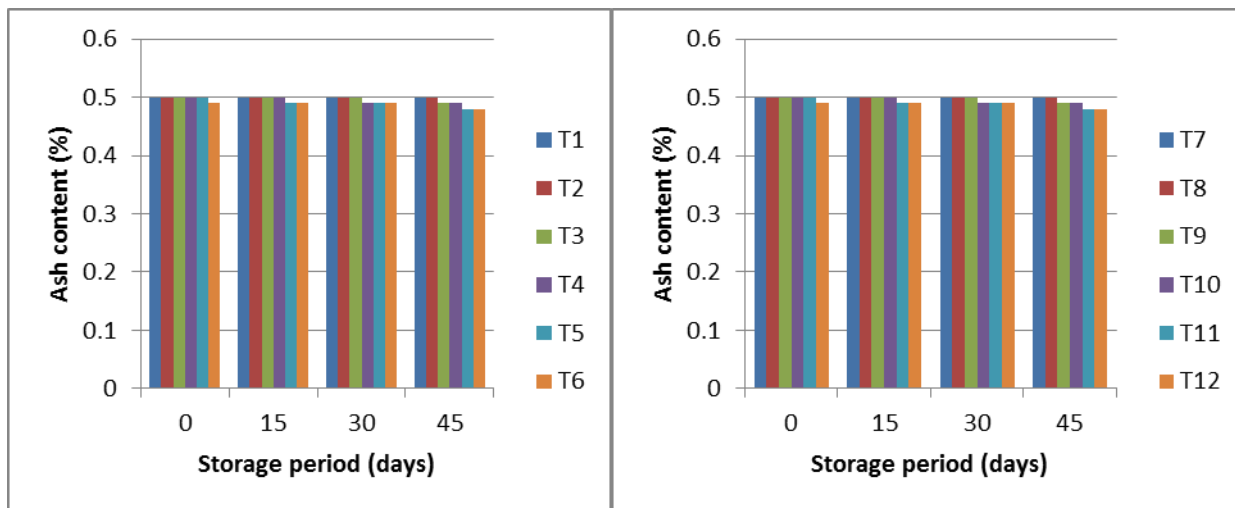
Fig. 4.3. Effect of storage period on ash content of osmo-tray dehydrated carrot slices   **Fig. 4.4. Effect of storage period on ash content (%) of osmo-microwave dehydrated carrot slices.**

pH

The pH varied from sample to sample. Fig. 4.5 shows the effect of storage period on pH of osmo-tray dehydrated (T_1, T_2, T_3, T_4, T_5 and T_6) at 15 days interval during storage. T_1, T_3 and T_5 were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_2, T_4 and T_6 were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. Fig. 4.6 shows the effect of storage period on pH of osmo-microwave dehydrated samples (T_7, T_8, T_9, T_{10}, T_{11} and T_{12}) at 15 days interval during storage. T_7, T_9 and T_{11} were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_8, T_{10} and T_{12} were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. The pH of osmo-tray dehydrated samples was in the range of 4.94 to 4.75 on the 0th day and the pH of osmo-microwave dehydrated samples was in the range of 4.96 to 4.78 on the 0th day. On evaluation of result, it was found that there was a decrease in pH of the samples with increasing the concentration of sugar solution from 30-50^0B and syrup temperature 30-40^0C, which was obvious and is presented in Fig. 4.5 and 4.6. The decrease in pH was attributed to the loss of moisture during osmotic step. According to the **Hussain et al. (2004)** the pH values of osmodehydrated banana slices at different syrup concentrations were in the range of 5.06-4.86. **Abd El-Hamid et al. (1986)** reported pH of 3.6 in the Zebda mango fruit.
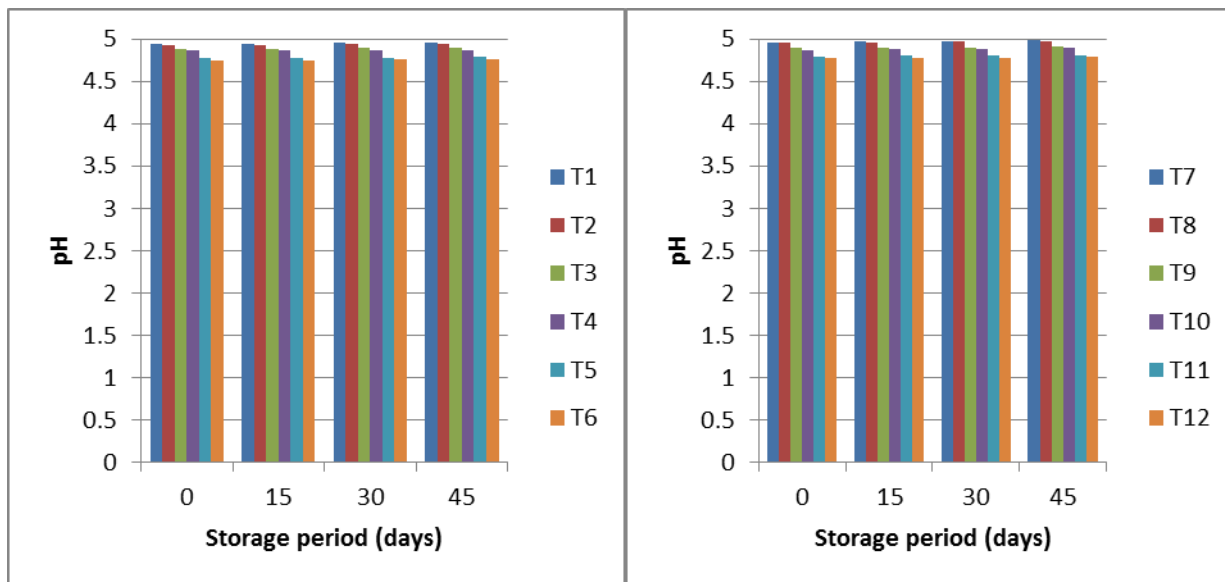
Fig. 4.5. Effect of storage period on pH of tray dehydrated carrot slices

Fig. 4.6. Effect of storage period on pH of osmo-osmo-microwave - dehydrated carrot slices.

From the Figs. it was obvious that the pH followed a slight increasing trend as the storage period was increased. It was observed that as the moisture content was increased during storage, the pH also showed a slight increasing trend. Similar results were also reported by **Abd El-Hamid et al. (1986)** in dehydrated mango where pH ranged from 3.5 to 4.2 during storage. Similar results were also reported by **A.C.C. Rodrigues et al. (2006) and Shahnwaz et al. (2012).** According to the **Kudachikar et al. (2001)** the pH values decreased from 4.2 to 3.0 in Neelum mango during storage. ANOVA at 5% significance show significant results.

Beta-carotene content (mg/100g)

The beta-carotene content varied from sample to sample. Fig. 4.7 shows the effect of storage period on beta-carotene content of osmo-tray dehydrated samples (T_1, T_2, T_3, T_4, T_5 and T_6) at 15 days interval during storage. T_1, T_3 and T_5 were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_2, T_4 and T_6 were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. Fig. 4.8 shows the effect of storage period on beta-carotene content of osmo-microwave dehydrated samples (T_7, T_8, T_9, T_{10}, T_{11} and T_{12}) at 15 days interval during storage. T_7, T_9 and T_{11} were treated with 30, 40 and 50^0B respectively and syrup temperature was 30^0C and T_8, T_{10} and T_{12} were treated with 30, 40 and 50^0B respectively and syrup temperature was 40^0C. The beta-carotene content of osmo-tray dehydrated samples was in the range of 10.98mg/100g to 14.28mg/100g on the 0th day and the beta-carotene content of osmo-microwave dehydrated samples was in the range of 9.85mg/100g to 13.98mg/100g on the 0th day. According to the **Abd El-Baki *et al*. (1981)** the total carotenoid content determined in Zebda variety (mango) was 8mg/100g**. Abd El-Hamid *et al*. (1986)** reported that the osmo-air dehydrated mango bar contained higher total carotenoid (5mg/100g) than air dehydrated one (3mg/100g). On evaluation of result, it was found that there was an increase in beta-carotene content in the samples with increasing the concentration of sugar solution from 30-50^0B and syrup temperature 30-40^0C, which was obvious and is presented in Fig. 4.7 and 4.8.
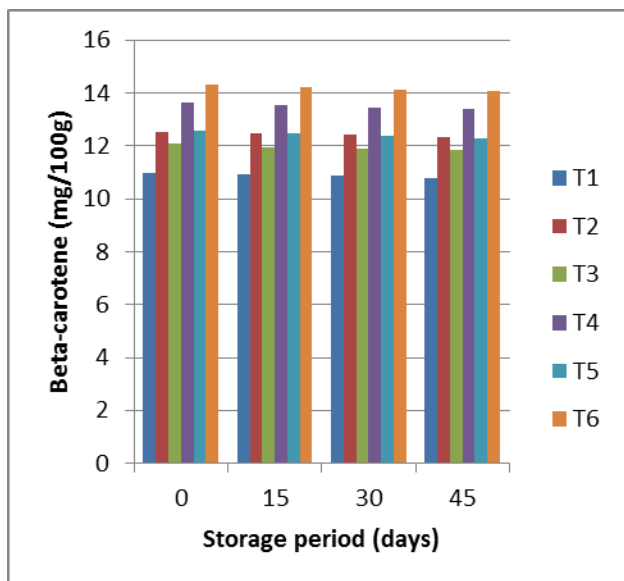
Fig. 4.7.Effect of storage period on beta-carotene (mg/100g) of osmo-tray dehydrated carrot carrot slices.
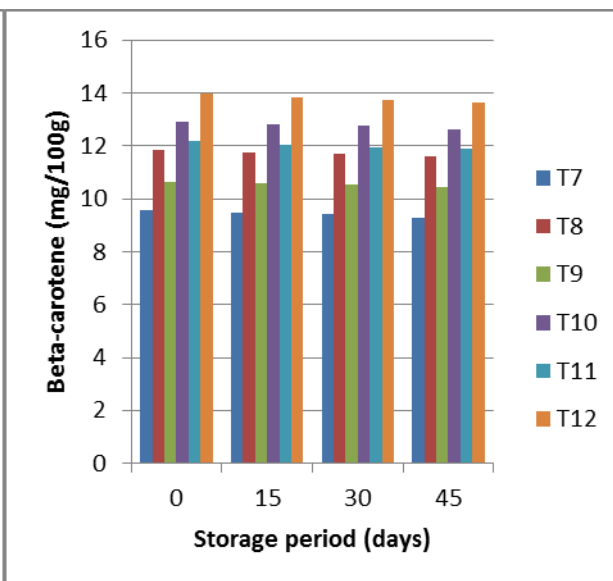
Fig.4.8. Effect of storage period on beta-carotene (mg/100g) of osmo- microwave dehydrated slices.

On critical evaluation of the result during storage, it was clear that the beta-carotene content of carrot slices packed in LDPE showed a decreased trend with increase in the storage period. The decline in beta-carotene content was attributed to the temperature and light effect on pigments. Similar results were also reported by **Rahman et al. (2010)** in case of solar dried carrot. **Howard (1998)** working with jalapeño peppers, evaluated the beta-carotene retention after 12 days of storage at 4.4^0C followed by 3 days at 13^0C under modified atmosphere using polyethylene films. **Cui et al. (2004)** reported beta-carotene reduction of about 70% during drying of carrots at $60-65^0C$ in a cabinet laboratory dryer. **Kumar et al. (2008)** reported that the main cause of carotenoid degradation is oxidation and further stimulation by presence of light, enzymes and co-oxidation of carotene. ANOVA at 5% significance show significant results.

CONCLUSION

Osmotic pretreatement was used to improve physico-chemical properties of carrot slices. Drying of the carrot using tray drying and microwave drying yeilded samples with low water activity. The tray dried carrot slices contained the highest β-carotene content as compared to the microwave dried samples and moisture content as well as pH were found less in tray dried samples compared to microwave dried samples. There was no change in ash content of tray and microwave dried samples. Results obtained evident that the effect of application of the osmotic dehydration pretreatment was significant on the initial moisture content of the carrot slices, thus allowing a drying time reduction, which may lead to decrease in energy consumption. The carrot dehydration was more appreciable at 50^0B solution concentration and $40°C$ osmosis temperature followed by $65°C$ hot air drying temperature on the basis of quality attributes, and also beta-carotene content was found highest under these conditions, compared to microwave drying.

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Chronic Fungal Rhinosinusitis Aspergillus Versicolor - A Rare Human Pathogen

Balaji C R K, Purushothaman P K, Anandhi Lakshmanan

Department of ENT, Head and Neck Surgery, SRM Medical College Hospital and Research Centre, SRM nagar, Potheri-603203, Kancheepuram District, Tamil Nadu, India.

Abstract- Fungal rhinosinusitis is an increasingly recognized entity in both immunocompromised as well as immunocompetent patients. *Aspergillus* spp. is commonest of all causative fungi. A case of chronic fungal rhinosinusitis in a16-year-old immunocompetent female is reported. Presenting symptoms were bilateral nasal block, discharge, and change of voice. Initially, it was diagnosed as nasal polyposis. Microscopy and culture established the diagnosis of chronic fungal rhinosinusitis due to *Aspergillus* versicolor.

Index Terms- *Aspergillus* versicolor, fungal rhinosinusitis, immunocompetent host

I. INTRODUCTION

Fungal rhinosinusitis refers to a spectrum of disease ranging from benign colonization of the nose and sinuses by pathogenic fungi to acute invasive and fatal inflammation extending to the orbit and brain. The disease causes high morbidity and high mortality if misdiagnosed. Most common fungi causing fungal rhinosinusitis are *Aspergillus* fumigates, *Aspergillus* flavus & mucormycosis [1] A. versicolor is rarely encountered as a human pathogen. An association of nasal polyposis and *Aspergillus* rhinosinusitis has been noted. Here, a rare case of *Aspergillus* versicolor rhinosinusitis in an immunocompetent patient is reported.

II. CASE REPORT

A 16-year-old student presented with history of nasal block, nasal discharge, and sneezing, associated with change of voice, since 5–6 months. She had complaints of repeated episodes of nasal obstruction for the past 1 year with intermittent regression of symptoms. Onset was insidious, starting on the left side, which gradually progressed to bilateral nasal block. She complained of scanty, greenish, odorless nasal discharge.There was no history of trauma to nose, bleeding, headache, or facial pain. No history of diabetes mellitus, asthma, use of corticosteroids, and prolonged antibiotic therapy.

On general examination, vital parameters were within normal range. No facial disfigurement or swelling was observed. Anterior rhinoscopy revealed bilateral sinonasal polyps. Scanty greenish discharge was seen. There was no abnormal finding on posterior rhinoscopy. Laboratory investigations like hemoglobin and blood sugar levels were within normal range. Eosinophil count was 9% and Absolute eosinophil 600. The patient tested negative for HIV. CT scan of paranasal sinuses showed opacity in left and right maxillary sinus. Evidence of polypoidal sinusitis of left maxillary, ethmoid, sphenoid, and frontal sinuses was reported.

The patient was posted for functional endoscopic sinus surgery (FESS). Cheesy, greenish black dirty tissue was removed. Tissue material from the left nostril was received for fungal culture. KOH (10%) mount showed pus cells with hyaline, septate hyphae with acute-angled branching.

The specimen was inoculated on Sabouraud dextrose agar (SDA) with and without antibiotics and incubated at 37°C. On 8th day of incubation, obverse showed small pink-to-flesh—colored velvety colonies. On successive days of incubation, colony colour changed from orange-yellow to green, and reverse of equally variable colour [Figure 1].

Figure 1 – SDA Varied colour velvety colonies

In lacto phenol cotton blue (LPCB) tease mount of colonies, septate and hyaline hyphae with acute-angled branching were seen. Small conidial heads, consisting of an ovoid vesicle bearing metulae below the layer of phialides, were seen. Reduced conidial structures resembling those of *Penicillium* species were present. These features were suggestive of A. versicolor [Figure 2].

Histopathological examination of tissue showed fungal hyphae with granulomatous inflammation. The patient was started on antifungal therapy.

Figure 2- LPCB –A.Versicolor

III. DISCUSSION

Fungal rhinosinusitis, once considered a rare disorder, is now being reported with increasing frequency worldwide. Now in India, this disease is not only prevalent in northern regions, but also is reported from other parts of the country. [2] In Indian subcontinent, Sudan and other tropical areas, cases of *Aspergillus* invasive disease of paranasal sinuses in immunocompetent patients have frequently been reported. [3] The patient was presented with bilateral nasal stuffiness. Alrajhi *et al.,* in their study reported nasal obstruction as the most common presenting symptom (87%). Patients with anatomic abnormalities of the paranasal sinuses that impair drainage, like nasal polyps, are vulnerable to fungal colonization. [3] Examination showed bilateral sinonasal polyps. Telmesani reported 12.1% (11/91) incidence of allergic fungal sinusitis among patients with nasal polyps.[4]

CT scan of the patient showed multiple sinus involvement with marked opacity in left and right maxillary sinus. In study by Alrajhi *et al.,* abnormalities of paranasal sinuses were noted on CT scan in all patients; all sinuses were involved in 61% of patients.[3] At FESS, cheesy, greenish black dirty tissue was removed, which is a common finding in fungal rhinosinusitis cases.[5] *Aspergillus* spp. are commonly isolated from fungal paranasal sinusitis cases. Other causes include several phaeoid mycelia fungi, zygomycetes.[1] Demonstration of *Aspergillus* spp. by both culture and microscopy provides the most firm diagnosis.[6] In the present study, findings of KOH mount, variable colour changes of colony on SDA, and characteristic structure on LPCB was suggestive of *Aspergillus* versicolor.[7]

Although *Aspergillus* versicolor is not a common cause of invasive aspergillosis, there are case studies in which *Aspergillus* versicolor is reported as causal agent of cerebral abscess [8] and endogenous endophthalmitis in immunocompetent patient. [9]

Hedayati *et al.,* in a study of chronic fungal rhinosinusitis demonstrated that using a standard mycology laboratory protocol, which is relatively inexpensive and readily available, fungus can be isolated from a majority of patients undergoing sinus surgery. [6]

IV. CONCLUSION

In our case, *Aspergillus* versicolor was isolated, which is an infrequent human pathogen. As it is a rare cause, further study and identification at the molecular level is necessary. By reporting this case, we want to suggest that diagnosis of aspergillosis of the paranasal sinuses requires a high index of suspicion, which should be present, particularly in patients with nasal polyposis. Early diagnosis is necessary in order to avoid destructive disease and to start early treatment before irreversible condition arises.

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AUTHORS

First Author – Balaji C.R.K, MS (ENT), Assistant professor, SRM medical college hospital and research centre, crk_balaji@yahoo.co.in

Second Author – Purushothaman P.K, MS (ENT), Associate professor, SRM medical college hospital and research centre, entpurush@gmail.com

Third Author – Anandhi Lakshmanan, MD(Microbiology) Assistant professor, SRM medical college hospital and research centre, anandhilakshmanan67@gmail.com

Correspondence Author – Balaji C.R.K, MS(ENT), Assistant professor, SRM medical college hospital and research Centre, crk_balaji@yahoo.co.in, phone no – 9445900200, 9884187257

INHIBITIVE ACTION OF THIOLS ON THE CORROSION OF ZINC IN ACID SOLUTIONS

A.Pasupathy*, S.Nirmala, M.Raja

Department of Chemistry, Urumu Dhanalakshmi College, Tiruchirappalli 620019,
Tamil Nadu, India
*Corresponding author: Tel.: +919003427375
E-mail address: pasupathyudc@gmail.com (A.Pasupathy)

Abstract- The inhibitive effect of a few thiols were examined as corrosion inhibitors for the corrosion of zinc in 1N HCl and 1N H_2SO_4 by conventional weight loss and gasometric methods. Results obtained show that all the thiols exhibited high inhibition efficiencies. The inhibition efficiency was found to increase with increase in the inhibitor concentration. The adsorption of the inhibitors obeyed Temkin adsorption isotherm.

Key words: Thiols, acidic solutions, zinc corrosion, hydrogen evolution.

Introduction

Zinc is a metal which finds application in various industries and used for different purposes under different environmental conditions. At the same time it is highly prone to corrosion by many acidic solutions. Prevention of corrosion is vital for extending the lifetime of metals. One of the methods employed to prevent the corrosion of metals is the use of corrosion inhibitors. It is well known that several organic compounds containing heteroatoms like nitrogen, sulphur and oxygen in their molecular structure exhibited good corrosion inhibiting property towards zinc metal in acidic solutions[1-10]. These compounds bring down the corrosion rate of the metals by getting adsorbed on the metal surface thereby blocking the active sites of the metal.

In the present work we have evaluated three organic sulphur compounds namely1- butanethiol,1- pentanethiol and 1- hexanethiol as inhibitors for the corrosion of zinc metal in hydrochloric acid and sulphuric acid solutions.

Experimental

(i) Material

The zinc metal specimens used in this work has the following composition: lead 1.03%, cadmium 0.04%, iron 0.001% and the remainder being zinc. Zinc metal specimens were pretreated before the experiments by polishing with a series of emery papers of various grades from 400- 1200, degreased with absolute ethanol and air dried. For weight loss and gasometric experiments zinc metal specimens of size 4cm*2cm* 0.08cm with a small hole of approximately 3mm near the end of the specimen were used. 1-Butanethiol,1- pentanethiol and 1- hexanethiol used as inhibitors were imported Alfa Aesar samples. The corrosion medium was 1N HCl and 1N H_2SO_4 prepared from A.R grade HCl and H_2SO_4 and deionised water. The zinc metal specimens were exposed to 1N HCl and 1N H_2SO_4 containing the inhibitors of various concentrations.

(ii) Weight loss experiments

In the weight loss experiments, the pre-weighed zinc metal specimens were suspended in a 200ml beaker containing 100ml of acidic solutions for two hours. Then the metal specimens are removed from the acid solution, washed with deionised water, cleaned, dried and reweighed . From this the metal weight loss was determined as the difference between the initial weight and weight after 2 hours immersion in acid solutions. The experiments were repeated with both acids in the absence and in the presence inhibitors of different concentrations. Each experiment was repeated thrice and the average of the three values was taken as the final value.

The % inhibition efficiency (I.E) and the degree of surface coverage (θ) were calculated by using the following equations.

$$I.E = \frac{W_o - W_i}{W_o} \, X \, 100$$

$$\theta = \frac{Wo - Wi}{Wo}$$

Where W_o and W_i are the weight loss in the absence and presence of the inhibitors respectively.

The corrosion rate (C.R) of the metal was calculated by using the following equation.

$$C.R(mmy) = \frac{87.6\,W}{A\,t\,D}$$

Where W is the weight loss of the zinc metal (mg), A is the surface area of the metal specimen(cm^2), t is the exposure time (h) and D is the density of the metal (g/cm^3).

(iii) Gasometry experiments

The procedure for gasometry method for evaluation of inhibition efficiency of the inhibitors of various concentrations is described elsewhere[11]. The inhibition efficiency is calculated by using the following equation.

$$I.E = \frac{Vo - Vi}{Vo} \times 100$$

Where V_o and V_i are the volume of hydrogen gas evolved in the absence and presence of the inhibitors respectively.

Results and discussion

Weight loss and gasometry studies were carried out at four different concentrations and the inhibition efficiency values were calculated. Values of inhibition efficiency obtained from the weight loss and gasometry experiments for the inhibitors for the corrosion of zinc in 1N HCl and 1N H_2SO_4 in the presence of different concentrations of these compounds are presented in the tables 1 and 2 respectively.

Table 1 Values of inhibition efficiency obtained from the weight loss experiments for the corrosion of zinc in 1N HCl and 1N H_2SO_4 in the presence of different concentrations of the inhibitors

Inhibitors used	1N HCl medium				1N H_2SO_4 medium			
	Values of I.E(%) for different concentrations (mM) of the inhibitors				Values of I.E(%) for different concentrations(mM) of the inhibitors			
	5	10	50	100	5	10	50	100
1-Butanethiol	51.5	59.7	77.9	85.4	52.0	60.2	78.4	85.9
1-Pentanethiol	59.4	67.8	84.7	92.5	59.9	68.5	85.3	93.2
1-Hexanethiol	66.1	74.3	91.4	98.4	66.9	74.8	92.4	98.9

Table 2 Values of inhibition efficiency obtained from the gasometry experiments for the corrosion of zinc in 1N HCl and 1N H_2SO_4 in the presence of different concentrations of the inhibitors

Inhibitors used	1N HCl medium				1N H_2SO_4 medium			
	Values of I.E(%) for different concentrations (mM) of the inhibitors				Values of I.E(%) for different concentrations(mM) of the inhibitors			
	5	10	50	100	5	10	50	100
1-Butanethiol	51.7	60.1	77.1	84.2	51.9	60.9	77.8	85.6
1-Pentanethiol	60.2	68.4	84.6	91.6	61.0	69.1	85.2	92.6
1-Hexanethiol	65.2	74.9	90.4	97.1	65.9	75.7	91.5	97.8

It can be observed from the tables 1 and 2 that there is very good agreement between the values of inhibition efficiency obtained from both weight loss and gasometric methods. The results presented in the tables1 and 2 shows that the inhibition efficiencies increases with increase in the inhibitors concentration.

It can also be seen from these tables that all these compounds perform better in 1N H_2SO_4 than in 1N HCl. A similar observation has already been made by several authors[12-17]. Among the thiols used in this study 1-hexanethiol shows maximum inhibition efficiency in both the acids. It is found to perform better than 1-

butanethiol and 1-pentanethiol. This can be attributed to the greater electron releasing tendency of the hexyl group in1- hexanethiol(+I effect) which leads to increased electron density on the sulphur atom which in turn leads to greater adsorption on the metal surface than the other two thiols, through bonding between zinc and electron rich sulphur atom in the molecule[18,19]. Infrared spectrum confirm that a metal sulphur bond may exist between the sulphur atom and the metal[20]. Next to 1- hexanethiol, 1-pentanethiol shows better performance. This can be attributed to the presence of pentyl group which is less electron releasing than the hexyl group. The same reason can be attributed to explain the performance of 1-butanethiol. The dependence of inhibition efficiency of the inhibitors on their concentration is shown in figure 1.
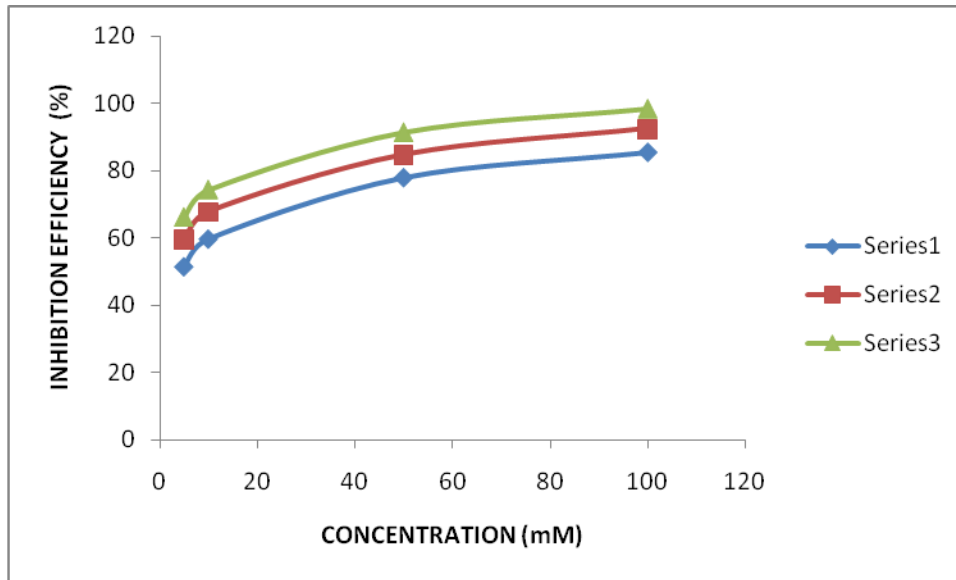
Figure 1   Variation of inhibition efficiency with concentration of the inhibitors
 for zinc in 1N HCl .   Series 1: 1-Butanethiol, Series 2: 1-Pentanethiol, Series 3: 1-Hexanethiol

Values of corrosion rates(mm/year) obtained from the weight loss experiments for the inhibition for the corrosion of zinc in 1N HCl and 1N H_2SO_4 in the presence of different concentrations of these compounds are presented in the table3.

Table 3 Values of corrosion rates(mm/year) from the weight loss experiments for the inhibitors for the corrosion of zinc in 1N HCl and 1N H_2SO_4 in the presence of different concentrations of the inhibitors

Inhibitors used	1N HCl medium				1N H_2SO_4 medium			
	concentration (mM) of the inhibitors				concentration (mM) of the inhibitors			
	5	10	50	100	5	10	50	100
1-Butanethiol	67.90	56.42	30.94	20.44	49.44	41.00	22.24	14.52
1-Pentanethiol	56.84	45.08	21.42	10.50	41.30	32.44	15.14	07.00
1-Hexanethiol	47.46	35.98	12.04	02.24	34.09	25.95	07.82	01.13

From the table 3 it can be observed that the corrosion rates for the corrosion of zinc in in 1N HCl and 1N H_2SO_4 decreases with increasing concentration of the inhibitors. The effect of inhibitor concentration on the corrosion rates is shown in figure 2.
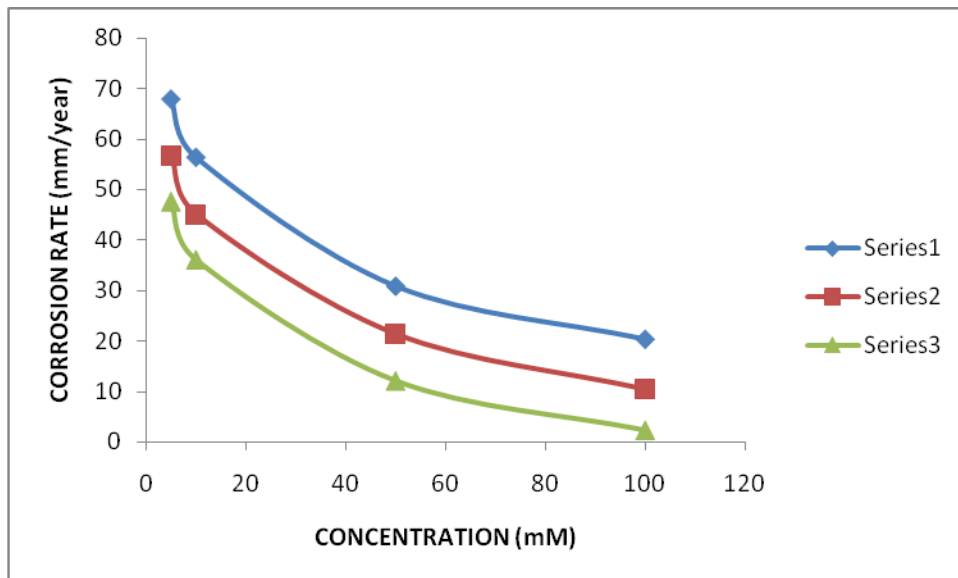
Figure 2   Variation of corrosion rates with concentration of the inhibitors for zinc in 1N HCl. Series 1: 1-Butanethiol, Series 2: 1-Pentanethiol, Series 3: 1- Hexanethiol

Adsorption isotherms

Adsorption isotherms are crucial to understand the mechanism of inhibition of corrosion of metals. From the weight loss values the degree of surface coverage (θ) for various concentration of the studied inhibitors were determined. These values were plotted against log C for different concentrations of the inhibitors and a straight line resulted. This indicates that the adsorption of the thiols on the zinc surface follows Temkin adsorption isotherm. Figure 3 shows the Temkin adsorption isotherm.
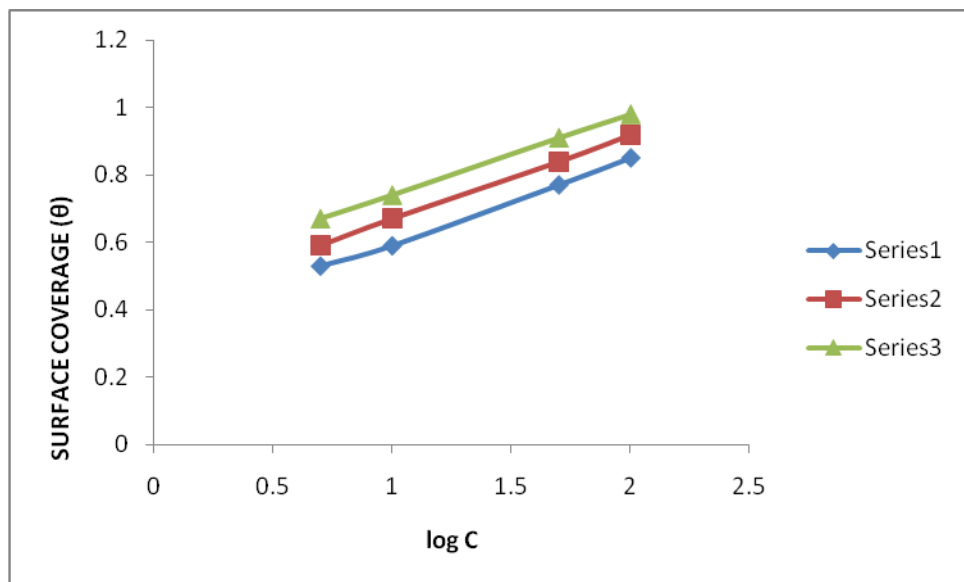
Figure-3 Temkin adsorption isotherm plot for corrosion of zinc in 1N HCl containing different concentrations of inhibitors**.**

Conclusions

All the examined thiols act a good corrosion inhibitor for zinc in 1N HCl and 1N H_2SO_4.
The weight loss and gasometric measurements confirm the inhibitive nature of the examined inhibitors. Among the inhibitors studied 1-hexanethiol performed well and exhibited maximum inhibition efficiency of 98.4% and 98.9% in 1N HCl and 1N H_2SO_4 respectively. The adsorption of the inhibitor compounds on zinc surface obeyed Temkin adsorption isotherm.

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Influence of Celebrity Endorsement on the Consumer's Purchase Decision

G.Radha[*], Jija.P[**]

[*] HOD, School of Communication, G.R. Damodaran College of Science, Coimbatore
[**] Ast. Professor, School Of Communication, G.R. Damodaran College Of Science, Coimbatore

Abstract- This study aims to analyse the influence of celebrity endorsement on the consumers purchase decision. The research focuses on the consumers who have shown a very different yet interesting way of recognising celebrities and stars. In a place like India where stars and cricketers are idolised and looked up to, marketers can see this opportunity promote their products and create a wider consumer base.

Index Terms- Advertising, Celebrity's, Customer Attitude, Endorser's Attractiveness, Endorser's Credibility

I. INTRODUCTION

India is one country which has always idolized the species of the celluloid world. Over three million television commercials are made each year in India.80% people forget information in just 24 hours. However, it is the increasing rate of such endorsements, which forms a huge part of the advertisement industry today. Whether celebrities create credibility for companies or risk the identity of brands is a concern that will continue to baffle advertisers. On the other siderite also continues to impact the audience with the monotony of their presence and their ability to make a difference to customer's opinions. The society that we live in can not only be called secular or democratic, it should be more appropriately termed as over-communicated these days.

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BITS AND PIECES TOGETHER

II. RESEARCH METHODOLODY

Research Methodology is defined as "a systematic effort to gain knowledge". It is the way of systematically solving the research problem. It may be understood as a science of studying how research is done scientifically. My research will focus on investigation influence of celebrity endorsement on the consumer's purchase decision. Research methodology is an important phase in research study.

III. NATURE OF STUDY

The study is a quantitative one which has used structured questionnaire to collect details from respondents in the age group of 17-26. The study describes the Impact of celebrity on a brand, Attitude towards celebrity endorsement, Value while purchasing product, by nature it becomes a descriptive study.

IV. RESEARCH DESIGN

Research design is a logical and systematically plan prepared for directing a research study. A research design is a arrangement of condition for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It is the program that guides the investigator in the process of collecting, analyzing and interpreting data. It is used to find the opinion about celebrity endorsement. Descriptive research design is adopted in this design.

V. POPULATION

The population selected are college going students in the age group of 17 to 26. The research was carried out in Coimbatore.

SAMPLE SIZE

The sample size selected for this research is 200 respondents

SAMPLING TECHNIQUE

The research was conducted by administering questionnaire which investigated the influence of celebrity endorsement on the consumer's purchase decision. A total of 200 questionnaires were distributed to college going students and the data was collected. There was no systematic pattern of selecting samples involved in this study. Convenience sampling technique is adopted in this study.

STUDY PERIOD

The study was conducted for a period of three months.(February 2013 to April 2013)

DATA COLLECTION METHODS

In this research two methods are adopted for collecting the data. They are primary and secondary data.

PRIMARY DATA

Primary data was collected with an aid of a Questionnaire. The Questionnaire contains a series of questions arranged in a proper order. The data collection was done using a questionnaire of 18 questions, which consisted of closed and open ended questions. The questionnaire was designed to collect data about the influence of celebrity endorsement on the consumer's purchase decision

SECONDARY DATA

Secondary data was collected from the internet, articles from scholarly journals and books.

INDEPENDENT VARIABLE

The independent variables used in the study are
- Age
- Gender
- Income
- Qualification

DEPENDENT VARIABLE

The dependent variables used in the study are

- Impact of celebrity on brand recognition
- Attitude towards celebrity endorsement
- Value while purchasing product
- Image of celebrity endorsement

VI. RESEARCH QUESTIONS

1) How far celebrity advertising is more attractive than non-celebrity advertising?

2) Is Celebrity's attractiveness going to have a direct impact on the product?

3) How far celebrity endorsement have an impact on the purchase decision?

USE OF SIMULATION SOFTWARE
ANALYSIS TOOL

Data analysis was done through the statistical package for social science software. The package used was SPSS 17 for the analysis of data.

Table 1

Table representing cross tabulation of age and factors considered when purchasing a product
N=200

		PURCHASING				
		price of the product	celebrity endorsement	quality of the product	value of the money	Total
AGE	17-20	14	3	42	1	60
	21-24	53	4	50	4	111
	25 and above	14	5	10	0	29
Total		81	12	102	5	200

From the above table, it can be interpreted that the respondents in the age group 17-20 consider quality of the product as an important factor when purchasing a product while respondents in the age group 21-24 consider price of the product whereas the age group 25 and above consider price of the product as an important factor when purchasing a product.

Graph 1
Pictorial representation of cross tabulation of age and factors considered when purchasing a product

Bar Chart
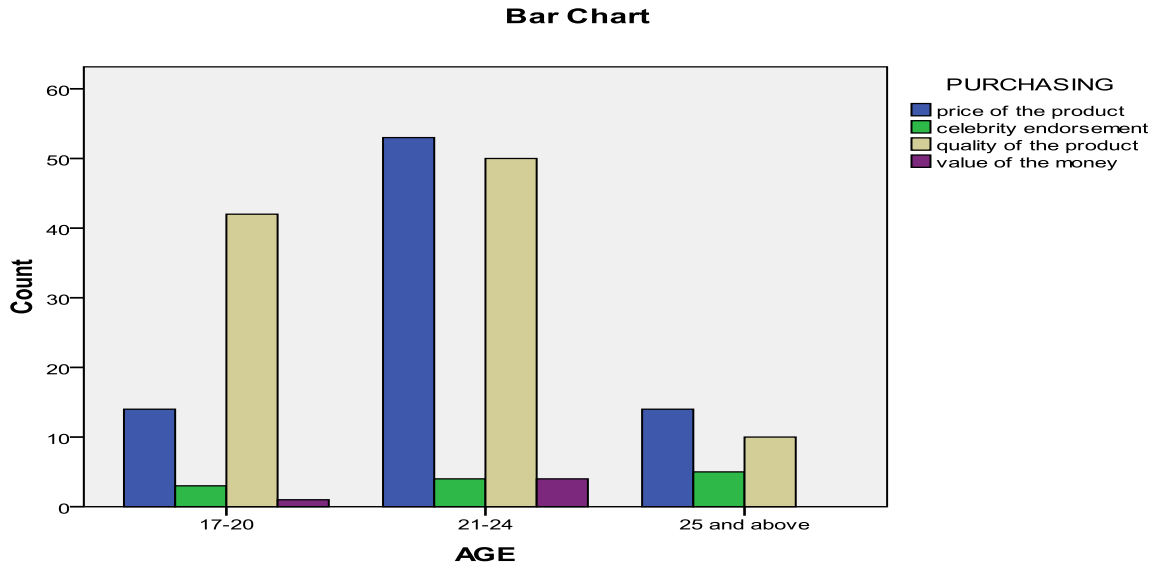
Table 2

Table representing cross tabulation of gender and factors considered when purchasing a product
N=200

		PURCHASING				
		price of the product	celebrity endorsement	quality of the product	value of the money	Total
GENDER	male	58	7	32	3	100
	female	23	5	70	2	100
Total		81	12	102	5	200

From the above table, it can be interpreted that the male respondents consider price of the product as an important factor when purchasing a product while the female respondents consider quality of the product as an important factor when purchasing a product.

Graph 2
Pictorial representation of cross tabulation of gender and factors considered when purchasing a product

Bar Chart
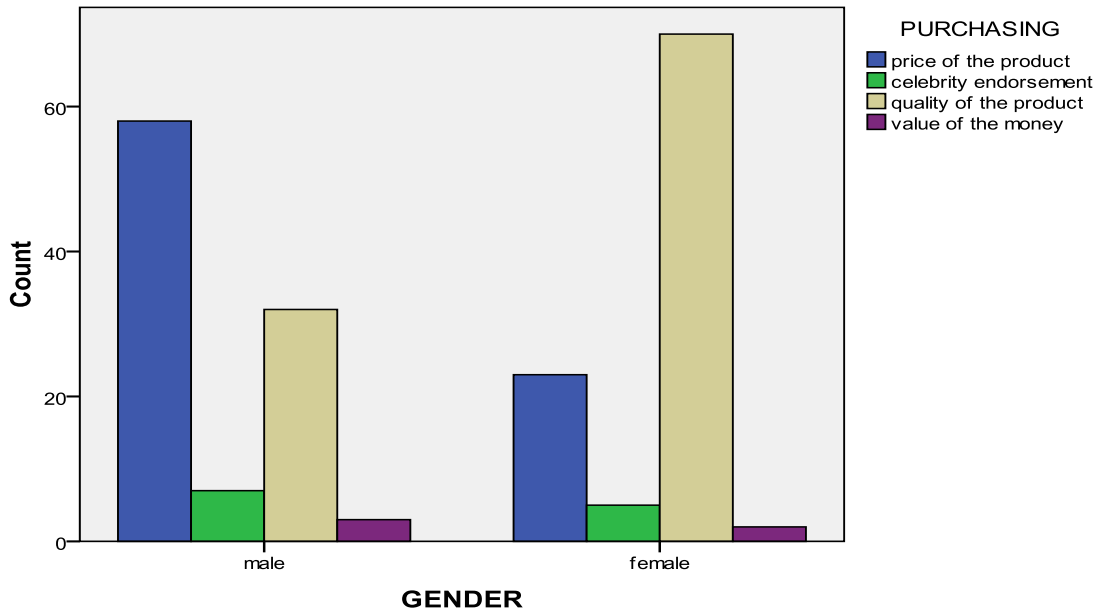
Table 3
Table representing cross tabulation of qualification and factors considered when purchasing a product
N=200

		PURCHASING				
		price of the product	celebrity endorsement	quality of the product	value of the money	Total
QUALIFICATION	ug	29	5	53	1	88
	pg	39	6	39	4	88
	others	13	1	10	0	24
Total		81	12	102	5	200

From the above table, it can be interpreted that the UG respondents consider quality of the product as an important factor when purchasing a product while the PG respondents consider both quality of the product and price of the product at the same level, but others considers price of the product as an important factor when purchasing a product.

Graph 3
Pictorial representation of cross tabulation of qualification and factors considered when purchasing a product

Bar Chart
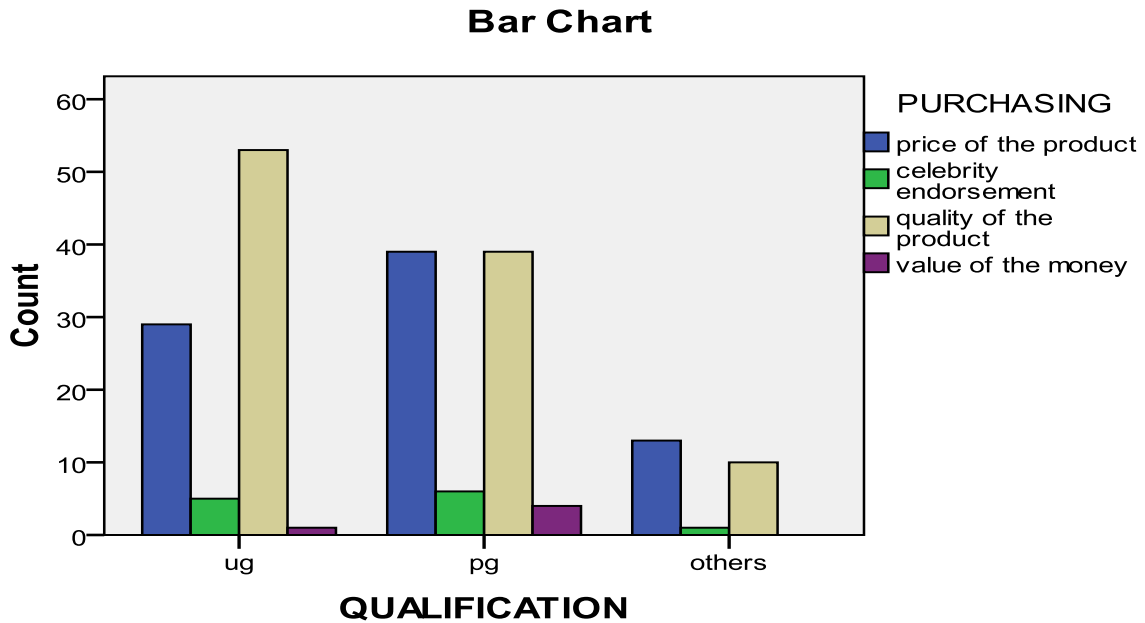
Table 4
Table representing cross tabulation of income and factors considered when purchasing a product

N==200

		PURCHASING				
		price of the product	celebrity endorsement	quality of the product	value of the money	Total
INCOME	below 30000	20	1	47	2	70
	30001-40000	7	1	9	1	18
	40001and above	54	10	46	2	112
Total		81	12	102	5	200

From the above table, it can be interpreted that the income below 30000 and income 30001-40000 consider quality of the product as an important factor when purchasing a product while income above 40001 considers price of the product as an important factor when purchasing a product.

Graph 4
Pictorial representation of cross tabulation of income and factors considered when purchasing a product

Bar Chart
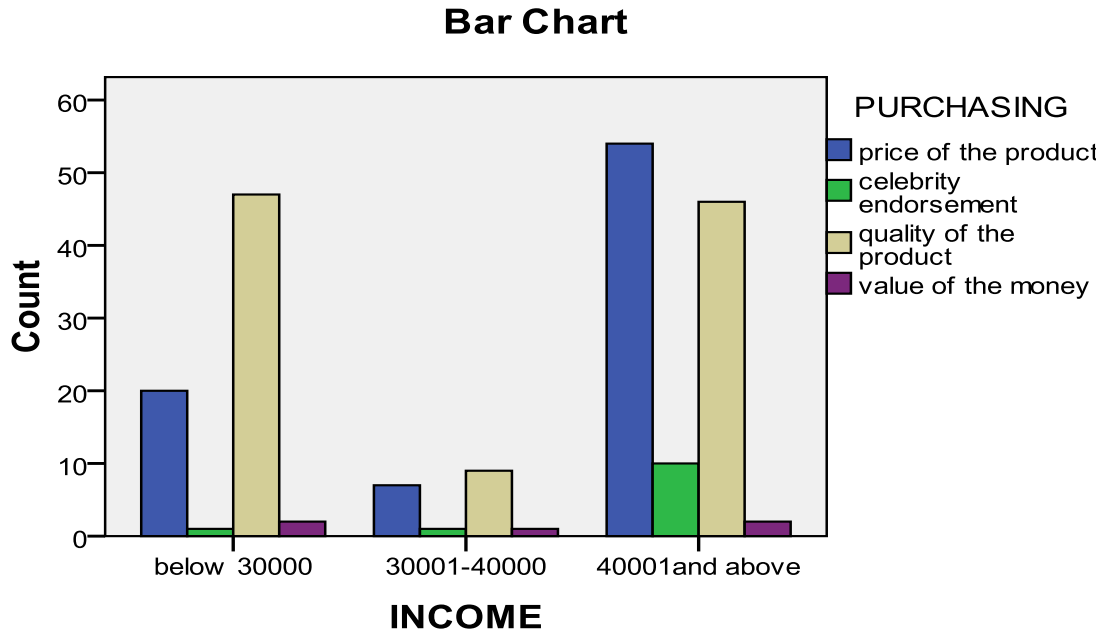
Table 5
Table representing cross tabulation of age and celebrities' impact on remembering a brand
N=200

		REMEMBER					
		strongly agree	agree	neutral	disagree	strongly disagree	Total
AGE	17-20	4	21	12	11	12	60
	21-24	12	50	14	16	19	111
	25 and above	2	20	1	3	3	29
Total		18	91	27	30	34	200

From the above table, it can be interpreted that all the respondents agree that celebrities play an important role in remembering a brand.

Graph 5
Pictorial representation of cross tabulation of age and celebrities' impact on remembering a brand

Bar Chart
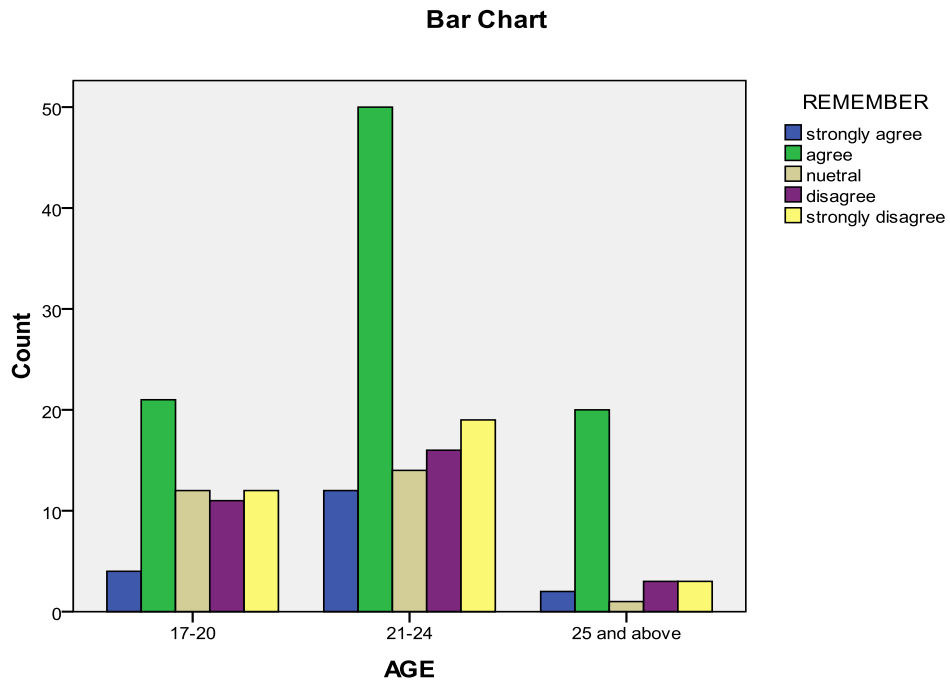
Table 6

Table representing cross tabulation of gender and celebrities' impact on remembering a brand

N=200

		REMEMBER					
		strongly agree	agree	neutral	disagree	strongly disagree	Total
GENDER	male	10	54	11	16	9	100
	female	8	37	16	14	25	100
Total		18	91	27	30	34	200

From the above table, it can be interpreted that both male and female respondents agree that celebrities play an important role in remembering a brand.

Graph 6
Pictorial representation of cross tabulation of gender and celebrities' impact on remembering a brand

Bar Chart
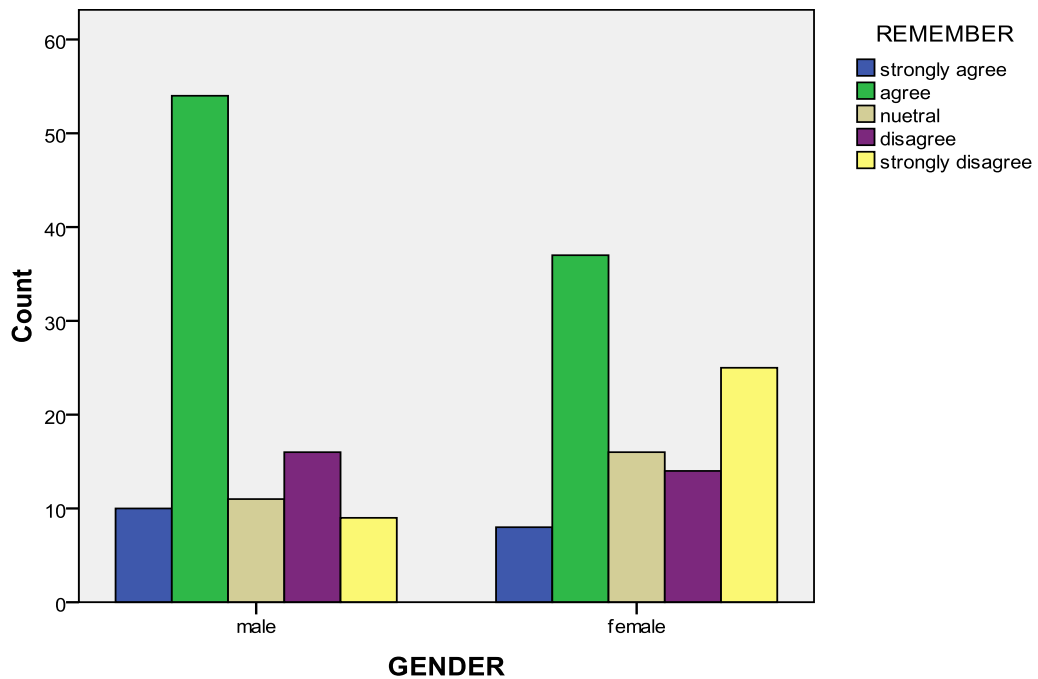
Table 7
Table representing cross tabulation of qualification and celebrities' impact on remembering a brand
N=200

		REMEMBER					
		strongly agree	agree	nuetral	disagree	strongly disagree	Total
QUALIFICATION	ug	6	33	14	16	19	88
	pg	9	45	11	11	12	88
	others	3	13	2	3	3	24
Total		18	91	27	30	34	200

From the above table, it can be interpreted in all level of qualifications respondents agree that celebrities play an important role in remembering a brand.

Graph 7
Pictorial representation of cross tabulation of qualification and celebrities' impact on remembering a brand

Bar Chart
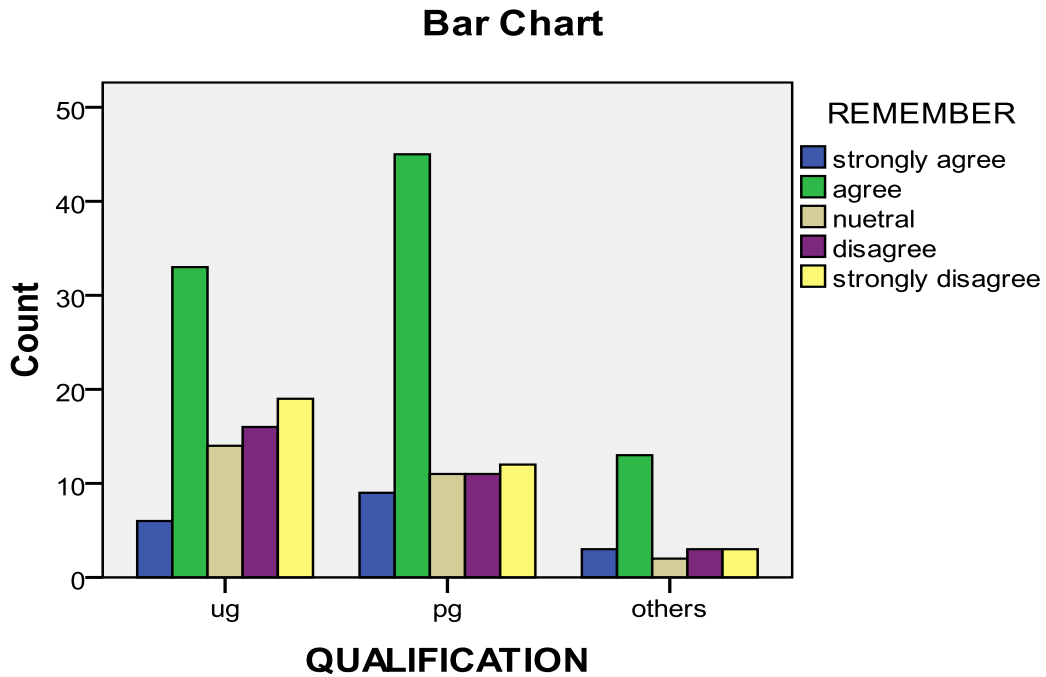
Table 8
Table representing cross tabulation of income and celebrities' impact on remembering a brand
N=200

		REMEMBER					
		strongly agree	agree	nuetral	disagree	strongly disagree	Total
INCOME	below 30000	4	31	10	13	12	70
	30001-40000	1	9	4	2	2	18
	40001and above	13	51	13	15	20	112
Total		18	91	27	30	34	200

From the above table, it can be interpreted that in all level of income agrees to the statement that they recollect a brand just because the celebrities are endorsing it.

Graph 8
Pictorial representation of cross tabulation of income and celebrities' impact on remembering a brand

Bar Chart
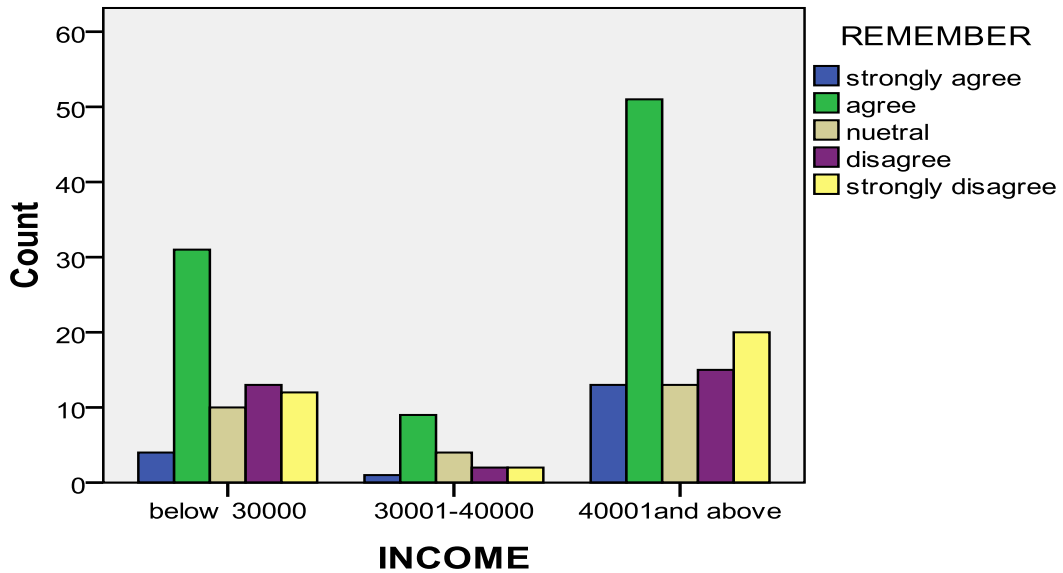
Table 9

Table representing cross tabulation of age and attitude towards celebrity endorsement
N=200

		POSITIVE IMAGE					
		strongly agree	agree	neutral	disagree	disagree	Total
AGE	17-20	12	15	24	4	5	60
	21-24	25	33	37	3	13	111
	25 and above	9	10	6	3	1	29
Total		46	58	67	10	19	200

From the above table, it can be interpreted that respondents in the age group of 17 to 20 and 21 to 24 are neutral to the idea of a celebrity giving a positive image to the endorsed brand while respondents in the age group of 25 and above agree to this.

Graph9

Pictorial representation of cross tabulation of age and attitude towards celebrity endorsement

Bar Chart
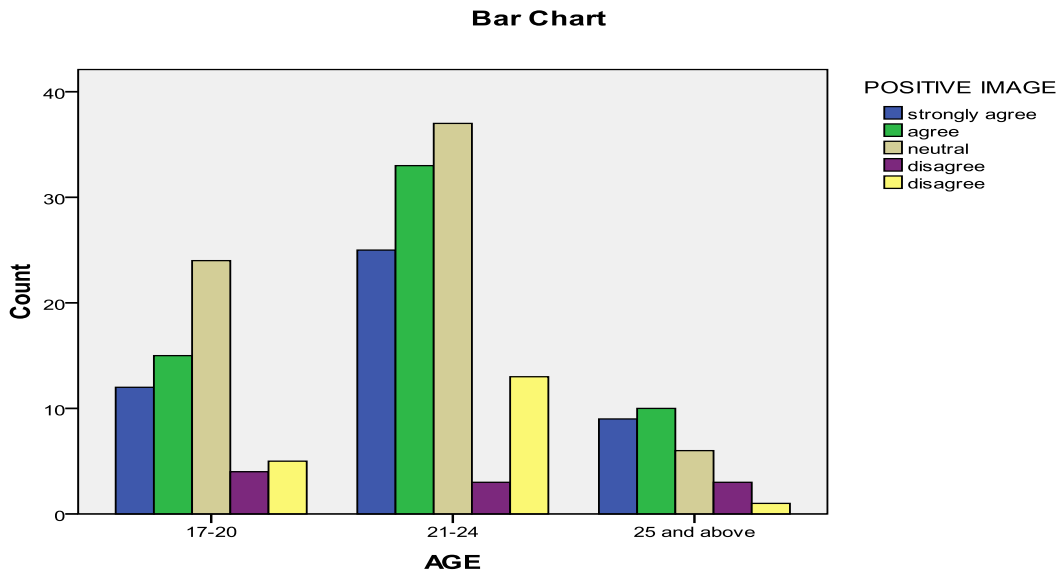
Table \10
Table representing cross tabulation of gender and attitude towards celebrity endorsement.

		POSITIVE IMAGE					
		strongly agree	agree	neutral	disagree	disagree	Total
GENDER	male	33	26	33	3	5	100
	female	13	32	34	7	14	100
Total		46	58	67	10	19	200

From the above table, it can be interpreted that male strongly agree to the idea of a celebrity giving a positive image to the endorsed brand while female are neutral to this.

Graph \10

Pictorial representation of cross tabulation of gender and attitude towards celebrity endorsement

Bar Chart
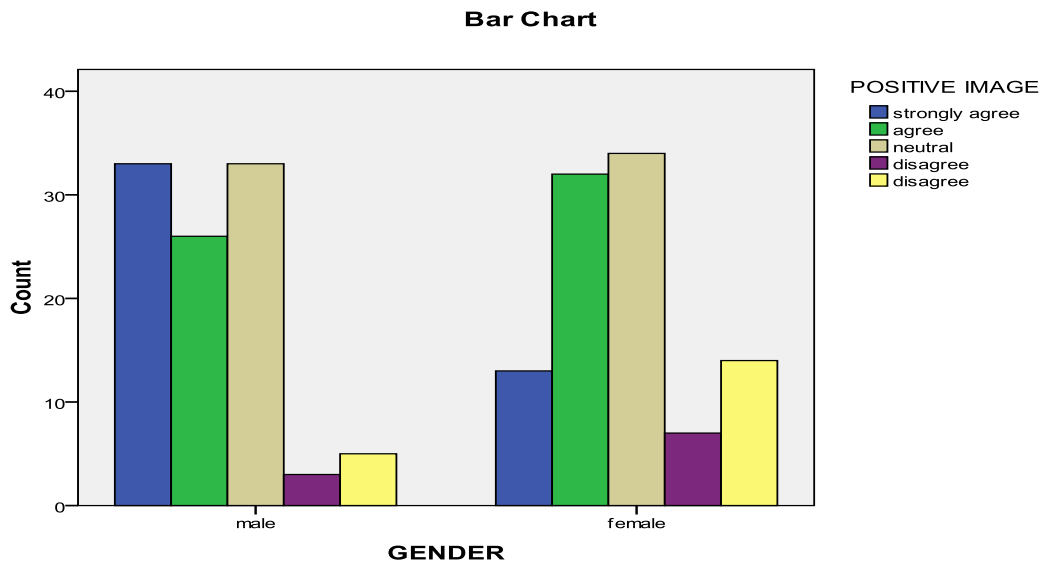
Table 11
Table representing cross tabulation of qualification and attitude towards celebrity endorsement.

N=200

		POSITIVE IMAGE					
		strongly agree	agree	neutral	disagree	disagree	Total
QUALIFICATION	ug	20	24	33	6	5	88
	pg	21	28	23	3	13	88
	others	5	6	11	1	1	24
Total		46	58	67	10	19	200

From the above table, it can be interpreted that respondents from UG and others neutrally agrees to the idea of a celebrity giving a positive image to the endorsed brand while PG respondents agrees to the statement.

Graph 11

Pictorial representation of cross tabulation of qualification and attitude towards celebrity endorsement
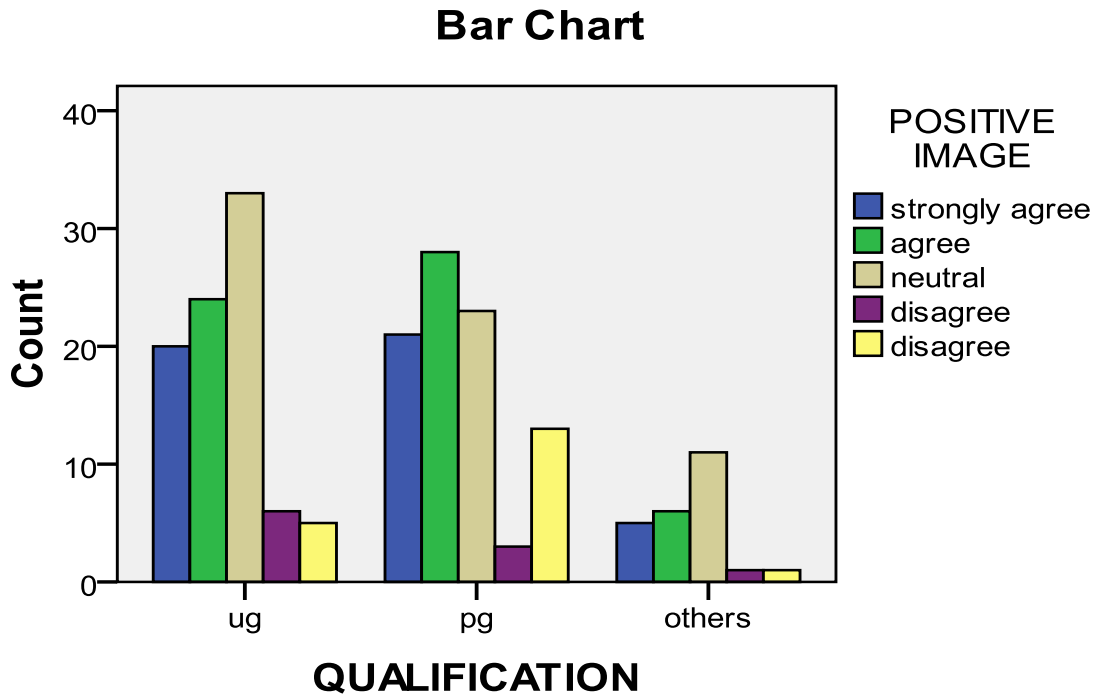
Table 12
Table representing cross tabulation of income and attitude towards celebrity endorsement
N=200

		POSITIVE IMAGE					
		strongly agree	agree	neutral	disagree	disagree	Total
INCOME	below 30000	11	27	21	5	6	70
	30001-40000	3	5	8	1	1	18
	40001and above	32	26	38	4	12	112
Total		46	58	67	10	19	200

   From the above table, it can be interpreted that income between 30001-40000 and above 40000 neutrally agrees that they will get a positive image, while income below 30000 agrees they will get a positive image if their favourite celebrity is endorsing a brand.

Graph 12

Pictorial representation of cross tabulation of income and attitude towards celebrity endorsement
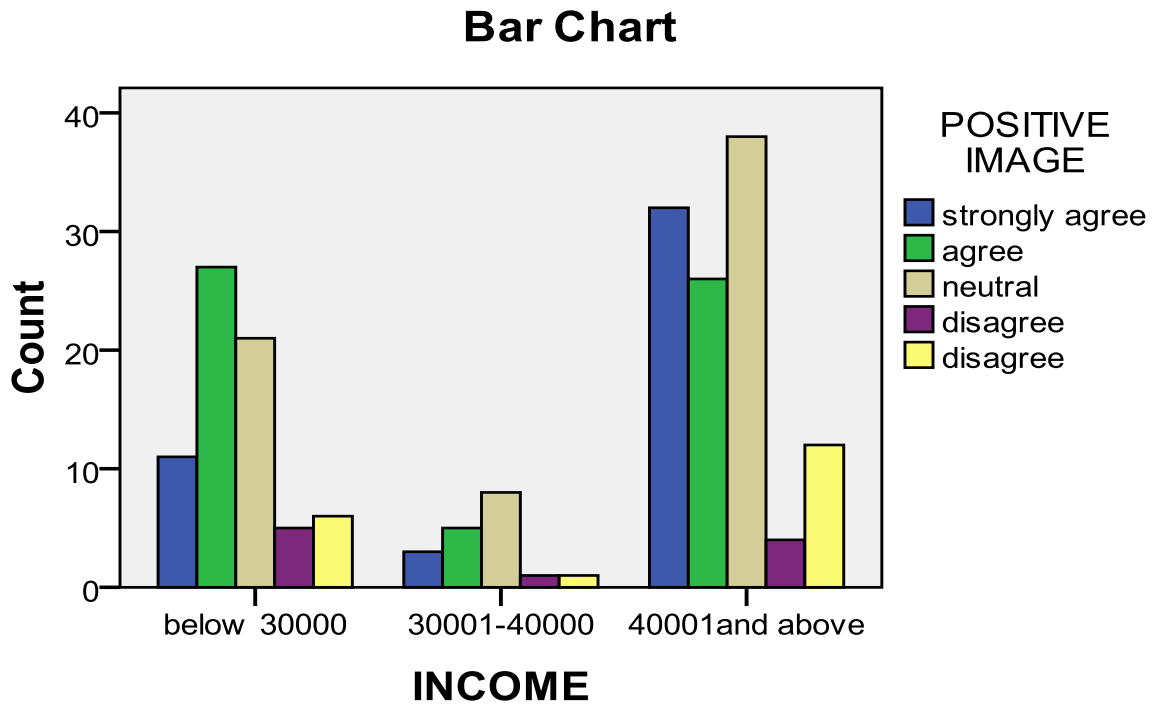
Table 13

Table representing cross tabulation of age and promotion of products by means of celebrity endorsement
N=200

		REASON				
		easy recognition of product	cannot generate new ideas	to be able to increase sales and profits	to compete strongly	Total
AGE	17-20	29	5	20	6	60
	21-24	60	14	30	7	111
	25 and above	17	2	7	3	29
Total		106	21	57	16	200

   From the above table, it can be interpreted that all respondents think use of celebrity in endorsing a product leads to easy recognition of the product.

Graph 13

Pictorial representation of cross tabulation of age and promotion of products by means of celebrity endorsement
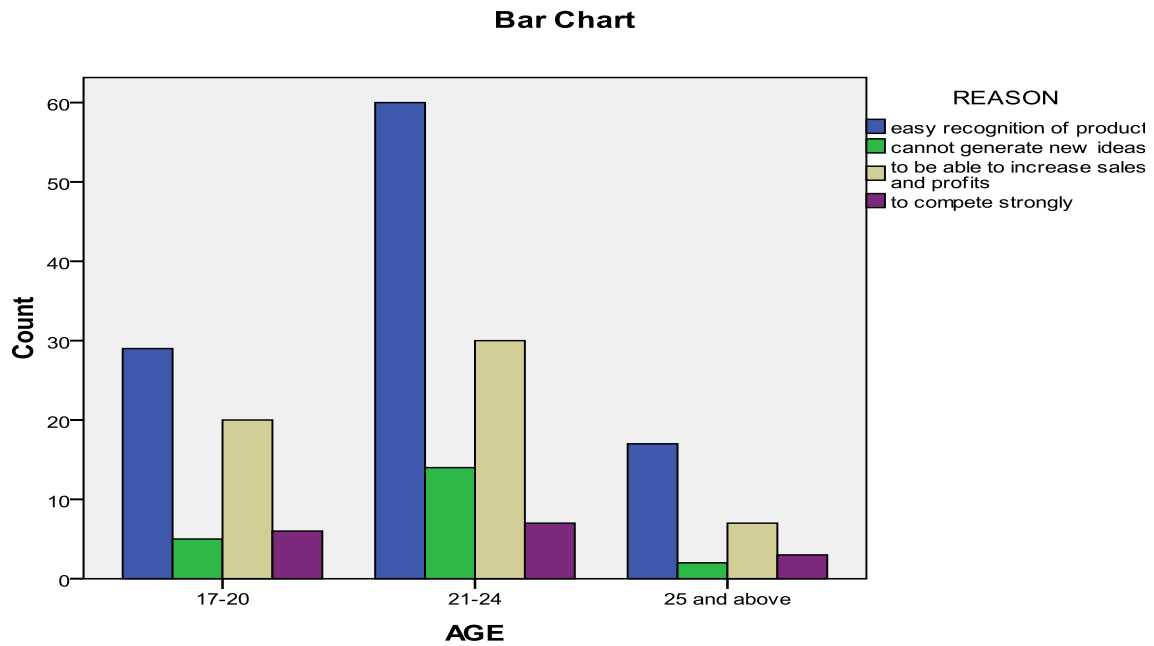
Table 14

Table representing cross tabulation of gender and promotion of products by means of celebrity endorsement
N=200

		REASON				
		easy recognition of product	cannot generate new ideas	to be able to increase sales and profits	to compete strongly	Total
GENDER	male	54	13	27	6	100
	female	52	8	30	10	100
Total		106	21	57	16	200

From the above table, it can be interpreted that both male and female respondents think use of celebrity in endorsing a product leads to easy recognition of the product.

Graph 14
Pictorial representation of cross tabulation of gender and promotion of products by means of celebrity endorsement
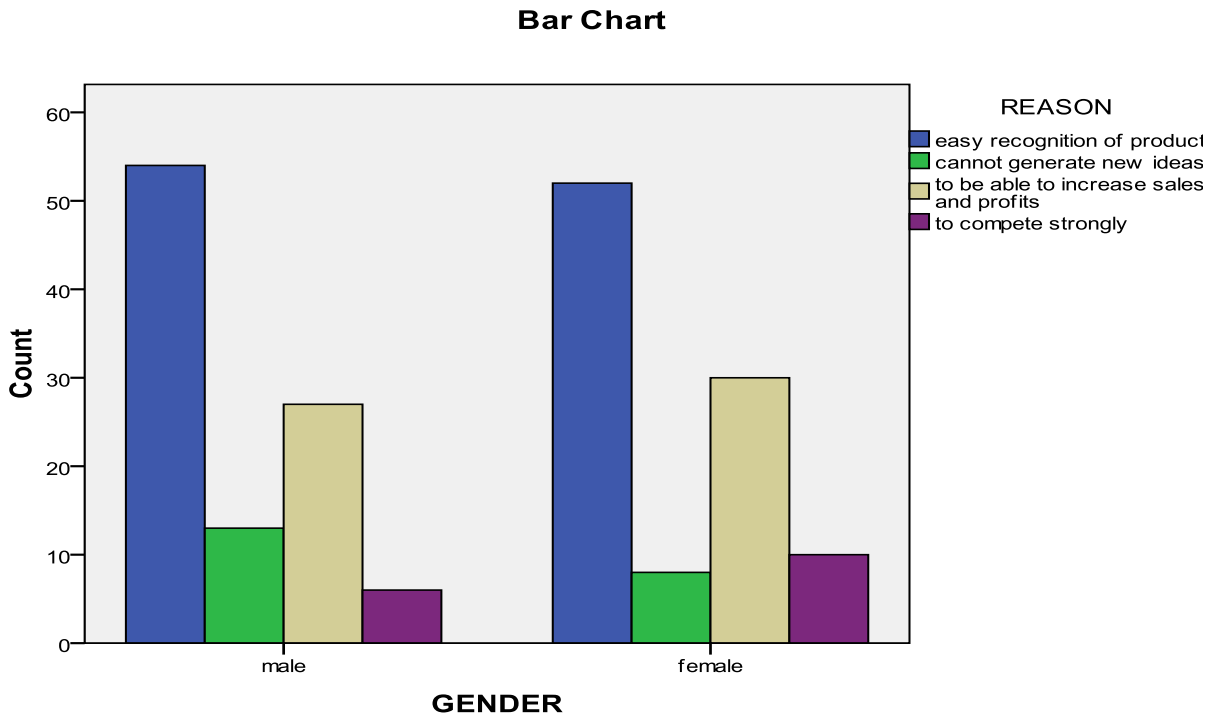
Table 15

Table representing cross tabulation of qualification and promotion of products by means of celebrity endorsement

N=200

		REASON				
		easy recognition of product	cannot generate new ideas	to be able to increase sales and profits	to compete strongly	Total
QUALIFICATION	ug	47	7	26	8	88
	pg	44	14	25	5	88
	others	15	0	6	3	24
Total		106	21	57	16	200

From the above table, it can be interpreted from all level of qualification states celebrity endorsement helps them to recognise a product easily.

Graph 15

Pictorial representation of cross tabulation of qualification and promotion of products by means of celebrity   endorsement
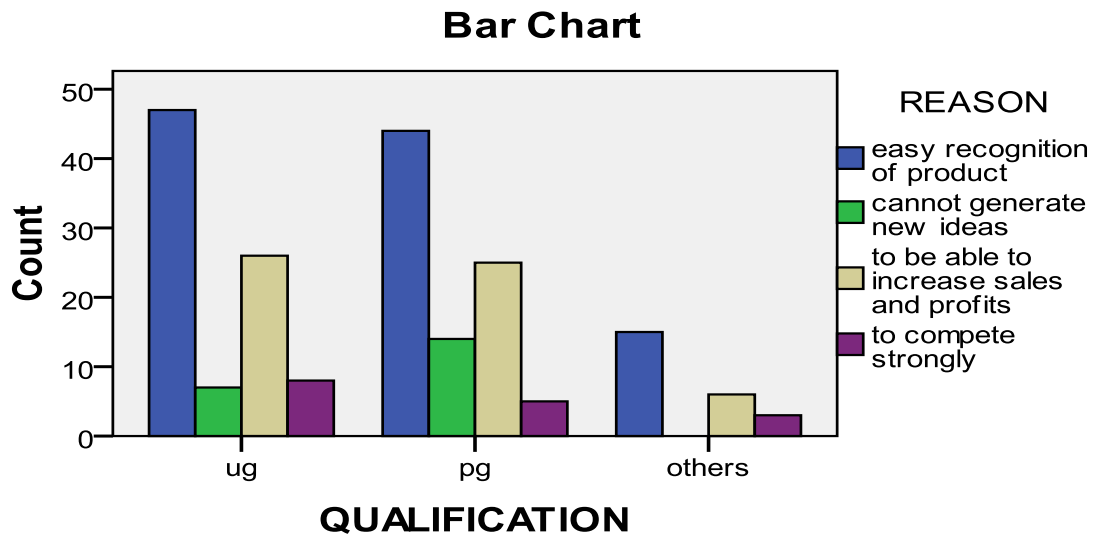
Table 16

Table representing cross tabulation of income and promotion of products by means of celebrity endorsement

N=200

		REASON				
		easy recognition of product	cannot generate new ideas	to be able to increase sales and profits	to compete strongly	Total
INCOME	below 30000	35	6	19	10	70
	30001-40000	9	2	6	1	18
	40001and above	62	13	32	5	112
Total		106	21	57	16	200

From the above table, it can be interpreted that in all level of income agrees to the statement that celebrity endorsement helps them to recognise a product easily.

Graph 16
Pictorial representation of cross tabulation of income and promotion of products by means of celebrity endorsement
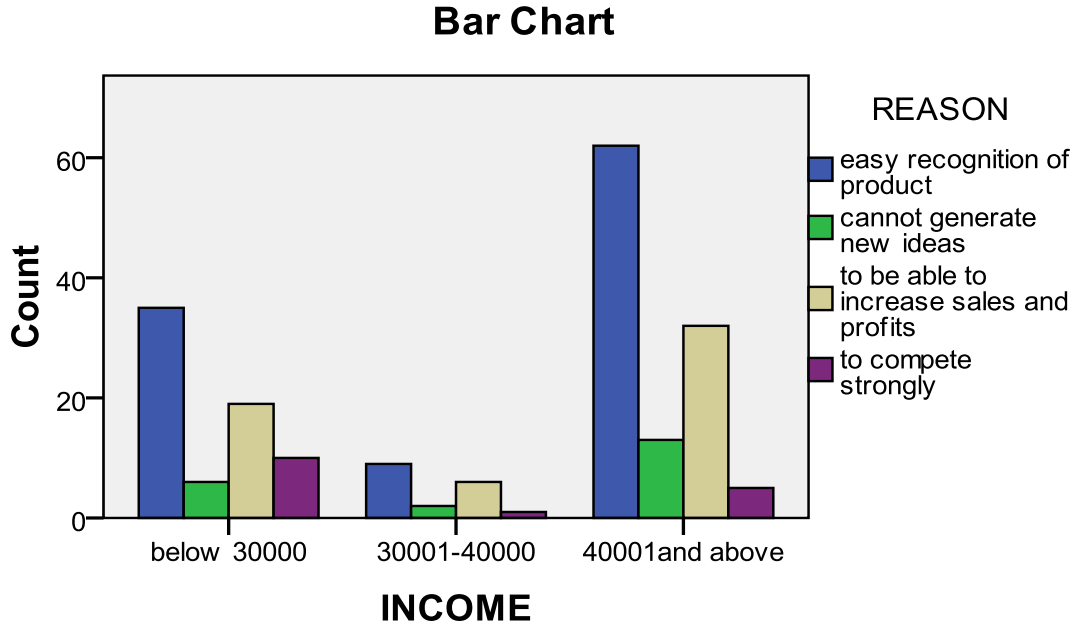
Table 17
Table representing type of endorsement persuades the respondents personally to purchase products.

	Frequency	Percent	Valid Percent	Cumulative Percent
film star	102	51.0	51.0	51.0
famous personalities	33	16.5	16.5	67.5
Cricketer	30	15.0	15.0	82.5
common man as a brand ambassadors	35	17.5	17.5	100.0
Total	200	100.0	100.0	

From the above table, it can be interpreted that 51% of the respondents personally purchase products because of film stars endorsement, while 17.5% purchase through common man as a brand ambassadors, 16.5% of people purchase through famous personalities endorsement and only 15% of respondents purchase their products through cricketer's endorsements.

Graph 17
Pictorial representation of type of endorsement persuades the respondents personally to purchase products.
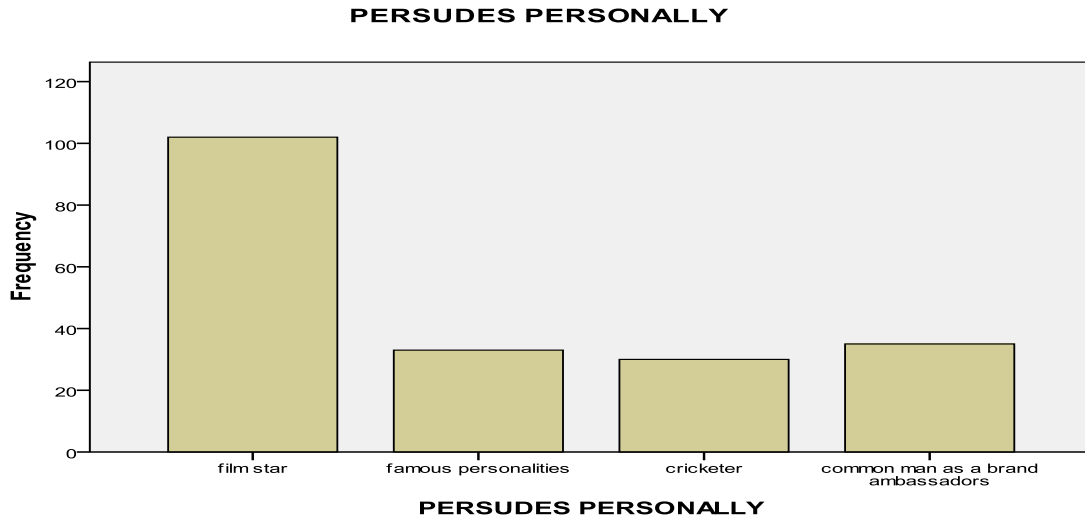
Table 18
Table representing respondent's favourite celebrities with the product and the service they endorse.
FAVORITE CELEBRITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sachin -boost	79	39.5	39.5	39.5
	Priyanka-pleasure	40	20.0	20.0	59.5
	Virat kohli-toyota liva	39	19.5	19.5	79.0
	Others	42	21.0	21.0	100.0
	Total	200	100.0	100.0	

From the above table, it can be interpreted that 39.5% of the respondents agrees that Sachin Tendulkar is the best endorser, while 20% of the respondents states that Priyanka Chopra is their favourite endorser. Virat kohli is the best endorser for Toyota liva with 19.5%,rest of the celebrities share a percentage of 21.0.

Table 19
Table representing the means of advertisement persuading the respondents the most to purchase a product

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	television	138	69.0	69.0	69.0
	newspaper	16	8.0	8.0	77.0
	magazine	12	6.0	6.0	83.0
	Internet	34	17.0	17.0	100.0
	Total	200	100.0	100.0	

From the above table, it can be interpreted that 69% of the respondents are persuaded to buy a product by means of television while 17% by the internet and 8% by newspaper whereas only 6% of the respondents are persuaded to buy a product by means of magazines.

Table 20

Table representing the type of endorsement persuading the respondents the most to purchase a product

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Filmstar	102	51.0	51.0	51.0
	famous personalities	33	16.5	16.5	67.5
	Cricketer	30	15.0	15.0	82.5
	common man as a brand ambassador	35	17.5	17.5	100.0
	Total	200	100.0	100.0	

From the above table, it can be interpreted that 51% of the respondents are persuaded to buy a product when endorsed by film stars while 17.5% by the common man and 16.5% by famous celebrities whereas 15% of the respondents are persuaded to buy a product when endorsed by cricketers.

Table 21

Table representing the opinion for statements that determine the purchase of celebrity endorsed products

	Strongly Agree	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
I buy a product based on the attractiveness of the celebrity.	61	30.5%	35	17.5%	23	11.5%	37	18.5%	44	22%
I remember a brand just because the celebrities are endorsing it.	18	9%	91	45.5%	27	13.5%	30	15%	34	17%
I buy a product just because the celebrities are using it.	26	13%	31	15.5%	49	24.5%	34	17%	60	30%
I think celebrity endorsement is an important factor when I make my decision.	17	8.5%	47	23.5%	51	25.5%	50	25%	35	17.5%
I don't believe the celebrities also use those products which they themselves endorse.	56	28%	61	30.5%	49	24.5%	14	7%	20	10%
I would buy a brand if my favourite celebrity is endorsing it.	30	15%	41	20.5%	39	19.5%	48	24%	42	21%

From the above table, the following are interpreted:-

- 30.5% of the respondents strongly agree that the purchase of a product is based on the attractiveness of the celebrity.
- 45.5% of the respondents agree that they remember a brand just because the celebrities are endorsing it.
- 30% of the respondents strongly disagree that they buy a brand just because the celebrities are using it.
- 25.5% of the respondents are neutral to the idea that they think celebrity endorsement is an important factor when they make their decision.
- 30.5% of the respondents agree that they don't believe the celebrities also use those products which they themselves endorse.
- 24% of the respondents disagree that they would buy a brand if their favourite celebrity is endorsing it.

Table 22
Table representing the opinion for statements that deals with celebrity image or appeal

	Strongly Agree	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
My favourite celebrity gives a positive image to the endorsed brand.	46	23%	58	29%	67	33.5%	10	5%	19	9.8%
I always compare the product I own with the product the celebrities are endorsing.	16	8%	57	28.5%	39	19.5%	46	23%	42	21%
I don't believe products specifically advertised by the celebrities are of good quality.	48	24%	59	29.5	68	34%	12	6%	13	6.5%
I think investing large amount of money for using celebrities helps companies to increase their total revenue.	41	20.5%	79	39.5%	58	29%	19	9.5%	3	1.5%
I think celebrity endorsement help in strong brand promotion.	57	28.5%	80	40%	42	21%	17	8.5%	4	2%
I will stop buying a brand if my favourite celebrity endorsing it gets involved in scandal.	22	11%	37	18.5%	76	38%	39	19.5%	26	13%

From the above table, the following are interpreted:-

- 33.5% of the respondents are neutral to the idea that their favourite celebrity gives a positive image to the endorsed brand.
- 28.5% of the respondents agree that they always compare the product they own with the product the celebrities are endorsing.
- 34% of the respondents agree that they don't believe products specifically advertised by the celebrities are of good quality.
- 39.5% of the respondents agree that they think investing large amount of money for using celebrities helps companies to increase their total revenue.

- 40% of the respondents are neutral to the idea that they think celebrity endorsement help in strong brand promotion.
- 38% of the respondents are neutral to the idea that they will stop buying a brand if my favourite celebrity endorsing it gets involved in scandal.

Table 23
Table representing how ideal are the celebrities as a brand endorsers.

Name of the celebrity	Excellent	%	Average	%	Poor	%
Sachin	151	75.5%	44	22%	5	2.5%
Shahrukh	119	59.5%	73	36.5%	8	4%
Amitabh	127	63.5%	58	29%	15	7.5%
Aamir	96	48%	80	40%	24	12%
Saif	43	21.5%	127	63.5%	30	15%
Virat	87	43.5%	82	41%	31	15.5%
Aishwarya	114	57%	67	33.5%	19	9.5%
Dhoni	97	48.5%	72	36%	31	15.5%
Priyanka	70	35%	103	51.5%	27	13.5%
Abhishek	41	20.5%	102	51.5%	57	28.5%

From the table above interpret the following:-
- 75.5% of respondents agree that sachin's endorsement is excellent while 22%of respondents give the idea that he is average but only 2.5% says he is poor for endorsing brands.
- 59.5% of respondents agree that Sharukh khan's endorsement is excellent while 36.5%of respondents give the idea that he is average but only 4% says he is poor for endorsing brands.
- 63.5% of respondents agree that Amitabh's endorsement is excellent while 29%of respondents give the idea that he is average but only 7.5% says he is poor for endorsing brands.
- 48% of respondents agree that AmirKhan's endorsement is excellent while 40%of respondents give the idea that he is average but only 12% states that he is poor for endorsing brands.
- 63.5% of respondents states that Saif Ali Khan's endorsement is average while 21%of respondents gives the idea that he is excellent but only 15% states that he is poor for endorsing brands.
- 43.5% of respondents states that Virat 's endorsement is excellent while 41 %of respondents gives the idea that he is average but only 15.5% states that he is poor for endorsing brands.
- 57% of respondent's states that's Aishwarya Roi's endorsement is excellent while %of respondents gives the idea that he is average but only % states that he is poor for endorsing brands.
- 48.5% of respondents state that Dhoni's endorsement is excellent while 36%of respondents give the idea that he is average but only 15.5% states that he is poor for endorsing brands.
- 70% of respondents states that Priyanka 's endorsement is excellent while 51.5% of respondents gives the idea that he is average but

only13.5 % states that he is poor for endorsing brands
- 51.5% of respondents states that Abishek 's endorsement is average while 40% of respondents gives the idea that he is average 28.5 % states that he is poor for endorsing brands

VII. CONCLUSION

The research explains about the impact or influence of celebrity endorsement in purchasing products. After conducting a study on this here are some of the conclusions
- 51% of the respondents consider quality of the product as an important factor while purchasing a product
- 45.5% respondents are able to recollect the brand that is endorsed by the celebrity.
- 53% of respondents agree that celebrity endorsement helps them to recognize a product.
- 23% of respondents strongly agree that they will get a positive image if their favourite celebrity endorses a product.
- 51% of the respondent's state that film stars endorsements persuades them personally to purchase products.
- 69% of respondents state that television is means of advertisement persuades them most to purchase a product.
- 39.5% of respondent's s strongly agrees that Sachin Tendulkar is the best celebrity endorser among all others.
- 30.5% of respondent's strongly agrees that they buy a product based on the attractiveness of the celebrity.
- 30.5% of respondents agree that they don't believe the celebrities also use those products which they themselves endorse.

- 28.5% of respondents agrees that always compare the product they own with the product the celebrities are endorsing
- 39.5% of respondents agree that investing large amount of money for using celebrities helps companies to increase their total revenue.

- 40% of respondents agree that celebrity endorsement help in strong brand promotion.

APPENDIX

CHAPTER VI

APPENDIX

A study on the influence of celebrity endorsement on the consumer's purchase decision with reference to Coimbatore

By

JIJA-P

II MJMC (MASTER OF JOURNALISM AND MASS COMMUNICATION

Dear Respondent,

I would be grateful if you could spare some of your time to respond to the following questions. Your response will be treated as confidential and would only be used for the purpose of the study.

Name:

Age:

Gender: a) Male ☐   b) Female ☐

Educational Qualification:

1. What means of advertisement persuades you the most to purchase a product?

a. Television ☐

b. Radio ☐

c. Newspaper ☐

d. Magazine ☐

e. Internet ☐

2. What do you value the most when purchasing a product?

a. Price of the product ☐

b. Celebrity endorsement ☐

c. Quality of the product ☐

d. Value of money. ☐

3. Indicate your opinion for the statements that determine the purchase of celebrity endorsed products where SA denotes Strongly Agree, A denotes Agree, N denotes Neutral and SD denotes Strongly Disagree.

		SA	A	N	D	SD
1	I buy a product based on the attractiveness of the celebrity.					
2	I remember a brand just because the celebrities are endorsing it.					
3	I buy a product just because the celebrities are using it.					
4	I think celebrity endorsement is an important factor when I make my decision.					
5	I don't believe the celebrities also use those products which they themselves endorse.					
6	I would buy a brand if my favorite celebrity is endorsing it.					

4. Indicate your opinion for the following statements that deals with celebrity image or appeal where SA denotes Strongly Agree, A denotes Agree, N denotes Neutral and SD denotes Strongly Disagree.

		SA	A	N	D	SD
1	My favorite celebrity gives a positive image to the endorsed brand.					
2	I always compare the product I own with the product that the celebrities are using.					
3	I don't believe products specifically advertised by the celebrities are of good quality.					
4	I think investing large amount of money for using celebrities helps companies to increase their total revenue.					
5	I think celebrity endorsement help in strong brand promotion.					
6	I will stop buying a brand if my favorite celebrity endorsing it gets involved in scandal.					

5. How ideal are the following celebrities as brand endorsers? Tick one which ever you think is the best option.

Name of Celebrity	Excellent	Average	Poor	Unsure
Sachin Tendulkar				
Shahrukh Khan				
Amitabh Bachan				
Aamir Khan				
Saif Ali Khan				
Virat Kohli				
Aishwarya Rai				
Dhoni				
Priyanka Chopra				
Abhishek Bachan				

6. What type of celebrity endorsement persuades you personally to purchase products?

a. Film star ☐

b. Famous personalities (like musicians, sports apart from cricket) ☐

c. Cricketer ☐

d. Common man as a brand ambassador ☐

7. What do you think is the reason for the companies to choose celebrity endorsement for promoting their products?

a. Easy recognition of product ☐

b. Cannot generate new ideas ☐

c. To be able to increase sales and profit ☐

d. To compete strongly ☐

8. Name your favourite celebrity along with the product or service they endorse.

1. _____

9. **Match the following celebrities with their endorsing brand.**

The Big Endorser	The Brand	
(a) Sachin Tendulkar	Coke	( )
(b) Shahrukh Khan	Toyoto Liva	( )
(c) Amitabh Bachan	MRF	( )
(d) Aamir Khan	L'Oreal Paris	( )
(e) Saif Ali Khan	Cadbury Dairymilk	( )
(f) Virat Kohli	Idea	( )
(g) Aishwarya Rai	Hero Honda Pleasure	( )
(h) Dhoni	Videocon	( )
(i) Priyanka Chopra	Aircel	( )
(j) Abhishek Bachan	Lays	( )

Thank you for your precious time to fill up this questionnaire.

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AUTHORS

First Author – G.Radha (HOD, School of Communication,
G.R. Damodaran College of Science, Coimbatore)
Second Author – Jija.P (Ast. Proffessor, School of
Communication, G.R. Damodaran College of Science,
Coimbatore)

Millennium Development Goals: Achieve Universal Primary Education from Indian Perspective

Shoiab Ahmad Bhat

* Research Scholar in the Deptt. Of Sociology, Institute of Social Sciences, Dr. B. R. Ambedkar University, Agra (U.P.)

Abstract- Education is a decisive component of human development, and progress towards this goal will deeply influence that towards other Millennium Development Goals. Primary education is the source for high-quality skills development in numeracy and literacy, which are critical for skills development in scientific and technological education. All human beings should have the prospect to make a better life for themselves. Regrettably, too many children in the world today grow up without this prospect, because they are denied their basic right to even attend primary school. The millennium development goals discernible a strong dedication to deal with the problems of the right to development, to peace and security, for gender equality, and eradication of the poverty in its all form and to promote sustainable human development. The focal point of this research paper is to assess the progress of the Goal two that aims at achieving Universal Primary Education from Indian perspective. The related target is to ensure that, the children everywhere (both boys and girls) would be able to complete full course of primary schooling by the year 2015.Education is a powerful instrument for reducing poverty and inequality, improving health and social well-being, and laying the groundwork for sustained economic growth. It is essential for building democratic societies and dynamic, globally competitive economies. Providing universal primary education, however, remains a great challenge. In this regard the present study is an effort to analyse the stipulation and situation of primary education in India.

Index Terms- Education, human, development, primary, skills, scientific, technological, millennium, development, goals, universal, instrument and globally.

I. AN INTRODUCTION OF MILLENNIUM DEVELOPMENT GOALS

The aim of the MDGs is to encourage development by improving social and economic conditions in the world's poorest countries. The MDGs emphasize the role of developed countries in aiding developing countries, as outlined in Goal Eight. Goal Eight sets objectives and targets for developed countries to achieve a "global partnership for development" by supporting fair trade, debt relief for developing nations, increasing aid and access to affordable essential medicines, and encouraging technology transfer. Thus developing nations are not seen as left to achieve the MDGs on their own, but as a partner in the developing-developed compact to reduce world poverty.[1]

The millennium development goals represent a consensus among nations on a core agenda for development. They constitute eight global objectives each with one or more quantitative targets, which the developing countries plan to achieve by 2015. These objectives encompass the following

II. MILLENNIUM DEVELOPMENT GOALS AND TARGETS: AT A GLANCE

1. Eradicate extreme poverty and hunger	1. Halve the proportion of people whose income is less than one dollar a day by 2015 2. Halve the proportion of people who suffer from hunger by 2015
2. Achieve universal primary education	3. Make sure that all boys and girls are able to complete a full course of primary schooling by 2015
3. Promote gender equality and empower women	4. Get rid of gender differences in primary and secondary education by 2005
4. Reduce child mortality	5. Reduce the number of under-five children who die by two thirds by 2015
5. Improve maternal health	6. Reduce the maternal mortality ratio by three quarters by 2015
6. Combat HIV/AIDS, malaria and other diseases	7. Halt and begin to reverse the spread of HIV/AIDS by 2015 8. Halt and begin to reverse the spread of malaria and other major diseases by 2015
7. Ensure environmental sustainability	9. Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources by 2015 10. Halve the proportion of people without sustainable access to safe drinking water by 2015 11. Make a significant improvement in the lives of at least 100 million slum dwellers

	by 2020
8. Develop a global partnership for development	12. Develop further an open trading and financial system that is rule-based, predictable and non-discriminatory. Includes a commitment to good governance, development and poverty reduction—nationally and internationally
13. Address the least developed countries' special needs. This includes tariff- and quota-free access for their exports; enhanced debt relief for heavily indebted poor countries; cancellation of official bilateral debt; and more generous official development assistance for countries committed to poverty reduction
14. Address the special needs of landlocked and small island developing States
15. Deal comprehensively with developing countries' debt problems through national and international measures to make debt sustainable in the long term
16. In cooperation with the developing countries, develop decent and productive work for youth
17. In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries
18. In cooperation with the private sector, make available the benefits of new technologies—especially information and communications technologies

Further, we are now beyond the mid-point between the adoption of the Goals and the target date of 2015. Important progress has been made and there are many notable successes that offer encouragement. In all but two regions, primary school enrolment is at least 90 percent; about 80 percent of children in developing countries now receive a measles vaccine and 1.6 billion people have gained access to safe drinking water since 1990. But, despite significant achievements towards some targets, much more needs to be done. Numerous Goals and targets are likely to be missed without additional, strengthened or corrective actions that are urgently needed. At the current rate of progress, the proportion of people living on less than a dollar a day is unlikely to be reduced by half in Sub-Saharan Africa by 2015; a quarter of all children in developing countries are still undernourished, and 100 countries will fail to achieve gender parity in both primary and secondary school enrolment.

Achieving the MDGs is now all the more challenging because the development environment is more threatened now than it has been at any time in the recent past. A global economic slowdown, a food security crisis of uncertain magnitude and duration, the development impact of climate change, all directly affect efforts to reduce poverty and to attain the MDGs more broadly. And, for many developing countries, there is a risk that important advances made can quickly unravel.[2]

III. THE GLOBAL PROSPECTS FOR UNIVERSAL PRIMARY COMPLETION BY 2015

A new World Bank database developed for this study shows that over the 1990s the average rate of primary school completion in the developing world (on a country weighted basis) improved only from 72 to 77 percent, far short of the progress needed to ensure achievement of the education MDG of universal primary completion. On a population-weighted basis, buoyed by China's high reported completion rate, the global picture looks slightly better, rising from 73 to 81 percent over the decade.

On either basis, however, the global average masks large regional differences in both the distance from the MDG and the progress made over the last decade, as can be seen from figures 1 and 2. Sub-Saharan Africa has the lowest completion rate by far, with barely half of all school-age children completing primary school; it is followed by South Asia, with an average completion rate of about 70 percent. The Middle East and North Africa showed a disturbing pattern of stagnation over the 1990s, with the average completion rate remaining around 74 percent. The Europe and Central Asia region (92 percent) is closest to the goal of universal primary completion, followed by Latin America and the Caribbean (85 percent) and East Asia and the Pacific (84 percent).

Moreover, within every region, trends at the country level diverge sharply, with rapid progress registered in some countries, stagnation in others, and declines elsewhere. For example, while the global average completion rate for girls improved more than that for boys over the 1990s, it still lags that of boys, at 76 percent compared to 85 percent. Serious gender disparities are evident in at least 13 countries, where girls' completion rates trail those of boys by more than 10 percentage points. While countries such as Tunisia, Bangladesh, and Sri Lanka have made impressive progress in narrowing the gender gap, in other countries it has widened, or narrowed only because of declines in boys' completion rates rather than improvement in girls'.

Overall, though, the trends over the 1990s provide some encouraging evidence that where political will is strong, effective reforms are adopted, and international support is adequate, dramatic progress in increasing primary completion rates is possible. A significant number of countries, from Brazil and Nicaragua in Latin America to Cambodia in East Asia to South Africa and The Gambia in Africa, registered improvements in the primary completion rate of 20 percentage points or more in less than a decade. This holds out hope that any developing country

whose completion rate is currently 70 percent or higher could meet the MDG by 2015, provided it can achieve and sustain the rate of improvement registered by these high-performing countries.

At the trend rate of progress achieved over the 1990s, by 2015 the global primary completion rate will not exceed 83 percent. On a population-weighted basis, the world would come closer to achieving the MDG, with about 9 out of every 10 children globally completing primary school. But, as figures 1 and 2 indicate, underlying this global average would be a wide gulf in performance across regions. Ultimately, the MDG will not be attained unless every child in every country has the chance to complete primary school, and change will have to happen at the level of national education systems in order to reach the goal. Therefore, the focus of this analysis is the country-by-country prospects for reaching universal primary completion (UPC) by 2015.[3]

Universal primary education would be a hollow achievement if the focus were simply on enrolment rather than on the completion of primary education. In 2010, the global

primary completion rate (measured by the gross intake ratio to the last grade of primary education) reached 90 per cent, compared with 81 per cent in 1999. Regional values ranged from 70 per cent in sub-Saharan Africa to almost 100 per cent in Latin America and the Caribbean and also in the Caucasus and Central Asia.[4]Education is included in all major international human rights treaties. All countries in the world have signed unto one, if not more, of these documents, thus accepting to bear duties in realising education as a right. In practical terms, this means recognising that education is not merely a policy goal but consists of entitlements, obligations and freedoms. According to UN documents and interpretation, these are reflected in 4 key elements (4As): Availability, Accessibility, Acceptability and Adaptability.

Too many children are still denied their right to primary education, if current trends continue the world will not meet the goal of universal primary education by 2015.Adjusted net enrolment rate in primary education, 2000 and 2011 (Percentage).
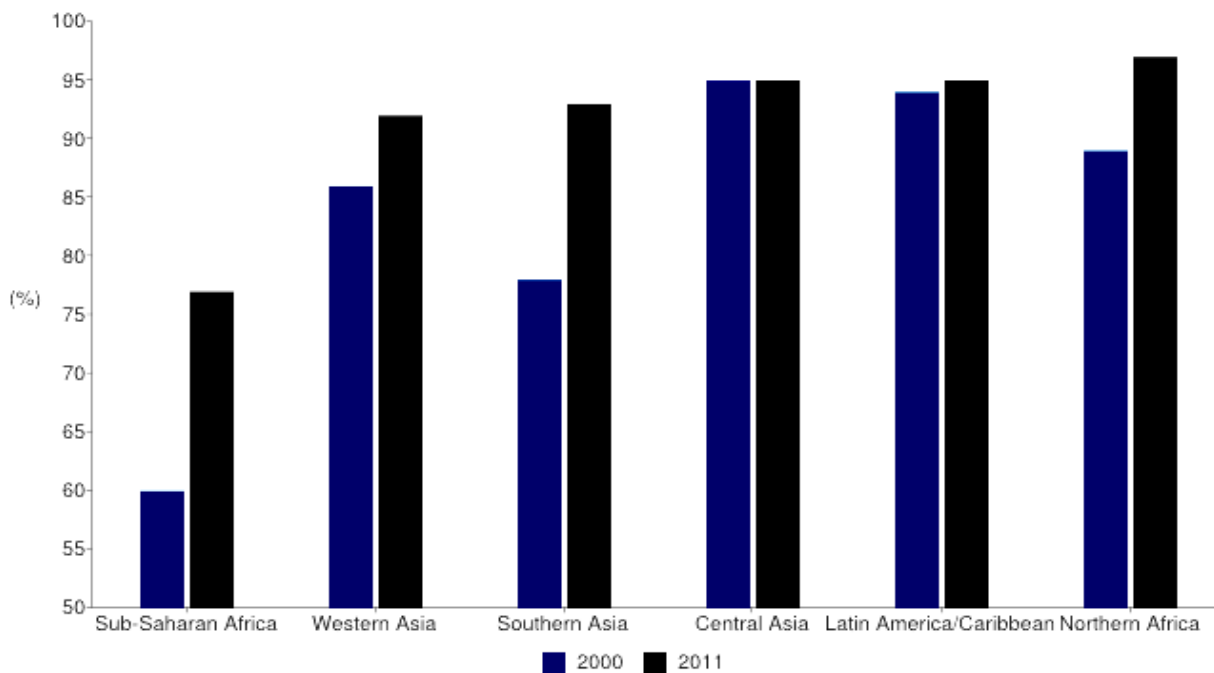
(Source: The Millennium Development Goals Report 2013)

IV. MILLENNIUM DEVELOPMENT GOALS: ACHIEVE UNIVERSAL PRIMARY EDUCATION FROM INDIAN PERSPECTIVE

India is far behind in the goal to achieve universal primary school enrolment. In 1999, the net primary enrolment rate was only 52.5 percent—a long way off from the goal of 100 percent enrolment by 2015 (World Bank, 2004).9 Primary completion rates rose slightly between 1993 and 2000, from 58.7 percent to 61.4 percent, but dropout rates are clearly still very high.

Although more than 90 percent of Indians have a primary school located within one kilometre of their residence, the quality of the teaching and the lack of facilities, such as classrooms and

basic water and sanitation, lead to a lack of functional literacy in many of the children who manage to complete school (Bajpai and Goyal, 2004). Another major factor affecting student enrolment in and completion of primary school is teacher absenteeism. Data from a 2003 World Bank survey indicate that about 25 percent of teachers were absent on any given day they were supposed to teach.

The Indian government has set goals for improving access to and completion of elementary education that are more ambitious than the MDGs. The National Program of Universal Education, known as Sarva Shiksha Abhiyan (SSA) was launched by the government as part of its commitment to universalize access to and ensure completion of primary

schooling by 2010. The SSA sets out to have all children complete five years of schooling by 2007, to have all children complete eight years of schooling by 2010, to eliminate gender and social disparities in primary schooling by 2007 and by 2010 in secondary schooling, and to have universal retention of children in primary school by 2010. The Tenth Five-Year Plan sets out to increase the literacy rate to 75 percent by 2007 and to reduce gender gaps in literacy and wage rates by at least 50 percent by 2007. While it is extremely promising that the government itself has laid out these goals, which go beyond the MDGs within a shorter time frame, it remains to be seen whether any of these will be met.

The literacy rate of 15-24-year olds increased from 64.3 percent in 1990 to 73.3 percent in 2001. It is noteworthy that primary school completion rates were lower than youth literacy rates, bringing to light the question of the definition of literacy and/or the manner in which it is measured. While the increase in literacy rates is of significance, the numbers may be misleading as to what such literacy rates actually mean about the presence of effective literacy in the population (Bajpai and Goyal, 2004).

India is off-track in terms of improving the proportion of girls to boys in primary education. The ratio was 0.71 in 1990-91 and climbed to 0.77 by 1999-2000. It is estimated that if improvements continue at their current rate, the ratio of girls to boys in primary school will be 0.83 in 2015, which is substantially below the goal of equal schooling for girls and boys by that year. In secondary and tertiary education, there is even more room for improvement, as in 1999-00, the ratio of girls to boys in secondary school was 67 and in tertiary school it was a mere 51 (HDR, 2003).

Gender disparity in schooling varies across India and is greatest in Bihar, Uttar Pradesh, and Rajasthan, where gross primary enrolment rates are about two thirds or less for females than for males (World Bank, 2004). At the same time, gross primary enrolment rates for girls and boys are on or near-par in Punjab, Haryana, Sikkim and Kerala. Between 1980-81 and 1999-00, there was a lessening of gender disparity in primary enrolment ratios in most states, but Uttar Pradesh and Orissa actually experienced a minor relative decrease in their ratios.

As mentioned earlier, among other factors, the provision of midday meals for school children has been seen as a key element in increasing enrolment and retention of students. Historically, Tamil Nadu has been successful in using the midday meals scheme to enhance rates of enrolment and retention over time. In Tamil Nadu in 1986-87, the total primary school dropout rate (girls and boys combined) was 22.9 percent and by 2000-01, it had decreased to 14.4 percent. The dropout rate for girls during the same period was reduced by more than two-thirds, from 25 percent to 16 percent. At the same time, the dropout rate for boys decreased from 19.8 percent to 12.9 percent (Government of Tamil Nadu, various years).

There are wide interstate disparities in dropout rates of children in grades one through five. In 1999-00, over 50 percent of children in Bihar did not complete primary schooling, while over 90 percent of children completed primary school in Kerala (World Bank, 2004). Maharashtra, Karnataka and Tamil Nadu, followed Kerala with the country's highest primary school completion rates-- all above 75 percent. The north eastern states, along with Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan ranked at the bottom, with completion rates at about 50 percent or lower. Taken together, Uttar Pradesh and Madhya Pradesh and Rajasthan account for almost one third of India's population, and the poor performance of these states not only fails the children within them, but diminishes India's chances of meeting the MDG on education.

Madhya Pradesh, one of India's poorest states, has been working to improve its poor education record and in 1997, the state government began the Education Guarantee Scheme (EGS) in an effort to ensure universal access to primary school throughout the state. The EGS is part of Madhya Pradesh's broad decentralization program and it builds a three-way partnership among the state government, local governments (usually a village council or panchayat), and the community. The responsibility of identifying needs for schools falls on the community, the panchayat oversees the schools' functioning, and the government grants funds for salaries, training and supplies within a three-month time period following community identification of need. The binding time frame is essential, in that its statutory framework forces movement from rhetoric to action, similar to the Employment Guarantee Scheme in Maharashtra (Government of M.P., 2000). Another key element is one that reflects a decentralized aspect of the scheme: teachers are locally appointed and overseen by the panchayat, which can help reduce the high rates of absenteeism that plague the educational system.

Within the first year of operation, an average of 40 primary schools emerged each day in Madhya Pradesh, revealing the overwhelming demand for facilities. Of the 15,568EGS schools that cropped up between 1997 and 1998, most of them were in tribal areas; SC/ST make up almost 70 percent of enrolment in these schools and girls account for about 45 percent enrolment. Not only has the EGS been instrumental in scaling up access to schools, but it has provided access to segments of the population that have been traditionally left behind, making strides towards greater social and gender equality in the state. The program spread to Rajasthan and Uttar Pradesh in 1999 and to Orissa in 2000.

In 2001-02, India spent about 4 percent of its GDP on education (GOI, Department of Education). Expenditure on education has been rising over the years, but is still lower than the targeted expenditure by the government of 6 percent of GDP. As a proportion of government expenditure on all sectors of education, about half was spent on primary education in 2000. The situation in 1990 was very similar, as India spent 3.8 percent of its GDP on education, of which about 1.8 percent was spent on primary education. In comparison to China, which has the largest education system in the world, India actually spends a larger percentage of its GNP on education, but its literacy rates are notably lower than China's.12 In 2000, China's literacy rate was about 86 percent, while India's was about 65 percent. China's net rates of school enrolment and its proportion of girls to boys enrolled in school are substantially higher than India's.[5]

Ensure that by 2015 children everywhere, boys and girls alike, will be able to complete a full course of primary education:-

By the measure of net enrolment ratio (NER), an appropriate indicator for enrolment, the country has already crossed by 2008-09, the cut-off line regarded as the marker value

for achieving 2015 target of universal primary education for all children aged 6-10 years Primary enrolment of 6-10 year old children by their NER measure has improved from 83% in the year 2000 to over 95% in 2007-08. The NER estimated from this trend works out to be about 75 % for 1990 and is about 96% for 2008. In the years 2008-09 and 2009-10, India's NER by the DISE statistics, are 98.6% and 98.3% respectively.

State-wise decomposition of NER as available for 24 States/UTs from DISE based reports for the more recent years does not really form any indicative basis for the purpose of estimating the States" trend in NER and their projected levels by 2015. Due to various shortcomings with the sub-national estimates of NER by DISE data, the national series of values only have been used for this report. The trend of national estimates suggests that the country is likely to achieve universal primary enrolment by the measure of NER well before 2015. However, the States" levels of Net Attendance Rate (NAR) presented by NSS report for the year 2007-08 have been used here as a proxy indicator to suggest indicative measures of the net effect of enrolment in schools in the year 2007-08 taking into account the expected high positive correlation between NER and NAR.

Against 95.9% NER for the country as a whole in 2007-08, the all-India level NAR for the same year is estimated to be 84%. Thus, of the children aged 6-10 years who are enrolled in Class I-V, only84% attends the school/classes. Universal enrolment of pupils in the primary grade therefore, does not necessarily imply students" cent percent attendance in schools. It is observed that only in the States/UTs of Assam (90%), Chhattisgarh (91%), Himachal Pradesh (91%), J&K (92%), Karnataka (92%), Kerala (91%), Maharashtra (91%), Mizoram (97%), Sikkim (90%), Andaman and Nicobar Is (93%), Daman & Diu (97%) and Lakshadweep (96%) have 90% or more children aged 6-10 years attending classes I-V of primary grade in 2007-08. Other States/UTs which have 80% or less children aged 6-10 years attending classes I-V include Arunachal Pradesh (75%), Bihar (72%), Jharkhand (79%) and Meghalaya (75%). Majority of States/UTs (19 out of 35) have 80-90% children of 6-10 years of age attending primary grade classes.

Table -1: Net Enrolment Ratio (Primary) Percentage

	STATES/UTs	2007-08 NAR	2007-08 NER	2008-09 NER	2008-09 NER	Projected Estimate	
						Target 2015	Likely Ach'nt 2015
1	Andhra Pradesh	86	98.2	100.0	100.0	100.0	100.0
2	Arunachal Pradesh	75	85.6	88	87.8	100.0	100.0
3	Assam	90	100.0	100.0	100.0	100.0	98.85
4	Bihar	72	82.2	84.5	84.31	100.0	91.17
5	Chhattisgarh	91	100.0	100.0	99.7	100.0	100.0
6	Delhi	89	100.0	100.0	100.0	100.0	100.0
7	Goa	89	100.0	100.0	100.0	100.0	100.0
8	Gujarat	89	100.0	100.0	100.0	100.0	98.85
9	Haryana	86	98.2	100.0	99.7	100.0	100.0
10	Himachal Pradesh	91	100.0	100.0	100.0	100.0	98.85
11	Jammu & Kashmir	92	100.0	100.0	99.7	100.0	100.0
12	Jharkhand	79	90.2	92.7	92.4	100.0	100.0
13	Karnataka	92	100.0	100.0	100.0	100.0	98.85
14	Kerala	91	100.0	100.0	100.0	100.0	98.85
15	Madhya Pradesh	88	100.0	100.0	99.7	100.0	98.85
16	Maharashtra	91	100.0	100.0	100.0	100.0	100.0
17	Manipur	87	99.3	100.0	100.0	100.0	100.0
18	Meghalaya	75	85.6	88	87.8	100.0	100.0
19	Mizoram	97	100.0	100.0	99.7	100.0	98.5
20	Nagaland	86	98.2	100.0	99.7	100.0	100.0
21	Orissa	85	97	99.8	99.5	100.0	100.0
22	Punjab	82	93.6	96.2	96	100.0	100.0
23	Rajasthan	83	94.8	97.4	97.1	100.0	100.0
24	Sikkim	90	100.0	100	100.0	100.0	100.0
25	Tamil Nadu	84	95.9	98.6	98.3	100.0	100.0
26	Tripura	89	100.0	100.0	100.0	100.0	98.9
27	Uttarakhand	86	98.2	100.0	100.0	100.0	100.0
28	Uttar Pradesh	82	93.6	96.2	96.0	100.0	100.0
29	West Bengal	88	100.0	100.0	100.0	100.0	98.9
30	A & N Island	93	100.0	100.0	100.0	100.0	98.9

32	Chandigarh	85	97.0	99.8	99.5	100.0	100.0
33	Dadra & Nagar Haveli	87	99.3	100.0	100.0	100.0	100.0
34	Daman & Diu	97	100.0	100.0	100.0	100.0	98.9
35	Lakshadweep	96	100.0	100.0	100.0	100.0	98.9
36	Puducherry	86	98.2	100.0	100.0	100.0	100.0
	All India	84	95.9	98.6	98.3	100.0	100.0

(Source of data:- Estimates based on DISE data for the reference years concerned with adjustments made using NAR data of NSS report No. 532: Participation and Expenditure on Education in India 2007-08)

Attendance ratio drops drastically in upper primary grade classes VI-VIII (59% in 2007-08) in the country as a whole though the overall attendance ratio in Classes I-VIII is higher(86% in 2007-08) as compared to the primary level attendance ratio (84%). This signifies that a sizable number of pupils who are over-aged for attending Grade I-V and not counted for NAR(I-V) as well as a sizable number of pupils who are under-aged for attending Grade VI-VIII and so not counted for NAR (VI-VIII) are eligible for getting counted for the NAR(I-VIII), thereby pushing the NAR (I-VIII) level of the country as a whole and that for the States/UTs higher than corresponding NAR (I-V) levels. As a result, as many as 19 out of 35 States/UTs have 90% or more NAR in Grade I-VIII: Assam (91%), Chhattisgarh (90%), Delhi (91%), Himachal Pradesh (96%), J&K (93%), Karnataka (91%), Kerala (94%), Maharashtra (91%), Manipur (91%), Mizoram (97%), Nagaland (90%), Sikkim (93%), Tamil Nadu (92%), Tripura (90%), Andaman and Nicobar Is (94%), Dadra & Nagar Haveli (90%), Daman & Diu (97%, Lakshadweep (94%) and Puducherry (92%).

(Source of Data: NSS Report 532: Participation and Expenditure on Education in India 2007-08)

The sustainability of the NER at the level of attainment as in 2009-10 will largely depend on sustained improvement in survival rate in the primary stage upto Grade V, which has risen from 62% in 1999 to 72% in 2007-08. About 9.36% children who got enrolled in Grade I to Grade V dropped out of the system before completing the primary schooling during 2007-08 against 9.96% during the previous year.

Attaining 100% Youth literacy is also concomitant; going at the rate by which it increased between 1991 and 2001- from 61.9% to 76.4 %, India is expected to have youth literacy of 82.1% by 2007 and 100% by the end of 2012. The youth literacy rate among urban persons was 82% in 2001 against 59.7% for rural persons in 2001. The youth literacy among males was 76.7% in 2001 against 54.9% for females. The rural-urban gap in youth literacy also has significantly reduced. Compared to males", the youth literacy of females tends to move faster. The male-female gap in youth literacy is predominantly confined to the north, north-eastern and central Indian belt. Literacy data from intervening survey results with post-2001 reference years also indicate the on-track movement of youth literacy.[6]

Table-2: Net attendance ratio in the Class-group I-VIII for selected State/UT : (2007-08)

	State/UT	Population category				
		Rural	Urban	Male	Female	All
1	Andhra Pradesh	84	89	83	88	86
2	Arunachal Pradesh	79	92	81	82	81
3	Bihar	74	79	70	78	74
4	Gujarat	85	90	84	89	86
5	Haryana	87	90	85	90	88
6	Jharkhand	80	90	82	81	81
7	Manipur	89	96	90	91	91
8	Meghalaya	80	86	81	81	81
9	Punjab	88	81	85	87	86
10	Rajasthan	83	87	79	88	84
11	Uttar Pradesh	84	77	81	85	83
12	Chandigarh	74	89	82	88	86
13	Dadra & Nagar Haveli	88	99	81	95	90
	All India	85	87	84	87	86

Table-3: Literacy rates for 15+ age-Groups

	Indicator of literacy	Year	Male	Female	Rural	Urban	Total
1	Literacy (%) in the age-group 15-24 yrs	2001	68.0	84.0	72.0	87.0	76.0
2	Literacy (%) in the age-group 15-49 years	2005-06	78.1	55.1			
3	Literacy (%) in the age-group 15+ years	2007-08	76.7	54.9	59.7	82.0	66.0

| 4 | Literacy (%) in the age-group 15-24 yrs | 2007-08 | 91.0 | 80.0 | 83.0 | 93.0 | 86.0 |

(Source of Data: - Population Census of India, 2001; NFHS-III report 2005-06 and NSS Report 532: Participation and Expenditure on Education in India 2007-08)

As per Census 2001, the States which reported youth literacy rates less than the national estimate of 76% are Andra Pradesh (73.6%), Arunachal Pradesh (70.1%), Assam (73.5%), Bihar (56.8%), Jammu & Kashmir (68.2%), Jharkhand (65.2%), Madhya Pradesh (74.6%), Meghalaya (74%), Nagaland (75.5%), Orissa (75.4%), Rajasthan (72%) and Uttar Pradesh (66.5%). The low levels are due to the prevailing huge gap in male- female literacy and urban –rural literacy in these States. For these States with Youth Literacy less than the national level as per Census 2001, the status as per 2007-08 NSS results is as under:

Table - 4: Percentage of literates among youth Census 2001 NSS 2007-08 for low performing States

State Name	% literates among youth: Census 2001					% literates among youth: NSSO (2007-8)				
	All	Female	Male	Rural	Urban	All	Female	Male	Rural	Urban
Jammu & Kashmir	68	57	78	63	83	88	83	93	87	94
Rajasthan	72	55	87	68	84	78	64	90	74	89
Uttar Pradesh	67	53	78	63	77	80	73	87	79	84
Bihar	57	43	69	53	80	67	55	77	64	86
Arunachal Pradesh	70	62	78	65	86	84	77	90	80	97
Nagaland	76	73	78	73	90	99	98	100	100	97
Meghalaya	74	74	74	69	92	97	96	97	96	97
Assam	74	68	79	71	90	92	90	94	92	97
Jharkhand	65	50	79	57	88	75	62	86	70	93
Orissa	75	66	85	73	89	84	78	91	82	95
Madhya Pradesh	75	63	85	69	88	85	77	92	82	93
Dadra & Nagar Haveli	67	48	80	60	89	85	63	99	83	97
Andhra Pradesh	74	65	82	68	86	87	82	92	84	94

(Source: Census 2001, NSSO 2007- 08)

As per the Census 2011 results, the all India literacy rate (7+years) has surged forward from 64.83% in 2001 to 74.04% in 2011 showing an increase of 9.21 percentage points. The literacy rate for males and females works out to 82.14% and 65.46% respectively. The increase in literacy rates in males and females during 2001 - 2011 are of the order of 6.88 and 11.79 percentage points respectively corroborating the conclusion of on-the -track movement of youth literacy.

V. NATION'S PLEDGE TO ACHIEVE THE GOAL OF UNIVERSAL PRIMARY EDUCATION

The 86th Constitutional Amendment Act, 2002 has made elementary education a Fundamental Right for children in the age group of 6-14 years by providing that "the State shall provide free and compulsory education to all children of the age of six to fourteen years in such a manner as the State may, by law, determine". This has been a path breaking legislation in India, where such a major commitment to the cause of elementary education has bound governments, community based organizations and civil society into a common resolve to achieve universal elementary education.

Drawing upon the Constitution and other policy statements articulated in the years that followed, the Government of India in partnership with State Governments has designed different strategies, interventions, schemes and programmes with specific objectives that impinge on girls' education.

Sarva Shiksha Abhiyan (SSA) is Government of India's flagship programme for achievement of Universalization of Elementary Education (UEE) in a time bound manner, as mandated by 86th amendment to the Constitution of India making free and compulsory Education to the Children of 6-14 years age group, a Fundamental Right. SSA is being implemented in partnership with State Governments to cover the entire country and address the needs of 192 million children in 1.1 million habitations.

The programme seeks to open new schools in those habitations which do not have schooling facilities and strengthen existing school infrastructure through provision of additional class rooms, toilets, drinking water, maintenance grant and school improvement grants. Existing schools with inadequate teacher strength are provided with additional teachers, while the capacity of existing teachers is being strengthened by extensive training, grants for developing teaching-learning materials and strengthening of the academic support structure at a cluster, block and district level. SSA seeks to provide quality elementary education including life skills. SSA has a special focus on girl's education and children with special needs. SSA also seeks to provide computer education to bridge the digital divide.

The Mid Day Meal Scheme (MDMS) is the world's largest school feeding programme reaching out to more than 11 crore children in 12.63 lakh institutions across the country. With a view to enhancing enrollment, retention and attendance and simultaneously improving nutritional levels among children, the National Programme of Nutritional Support to Primary Education (NPNSPE) was launched as a Centrally Sponsored Scheme on 15th August 1995, initially in 2408 blocks in the country. The Scheme had undergone a number of revisions in the past and today, Mid day Meal scheme is serving children of classes I-VIII studying in Government, Local Body, Government Aided and National Child Labour Project Schools and the centres run under Education Gurantee Scheme (EGS)/ Alternative & Innovative Education (AIE) centres including Madarasas / Maktabs supported under SSA. Studies have shown that, MDMS has helped in preventing classroom hunger, promoting school Participation, fostering social equality and enhancing gender equity thereby facilitating overall healthy growth of children.
With the committed initiatives by the Government and its successful initiatives, the Country will be achieving and maintaining the universalisation of Primary education and leading to sustained cent percent youth literacy.[7]

VI. SUGGESTIONS

1. Improve the quality of education. Providing access to schooling is not sufficient, the quality of teaching must be good. The identification of factors which influence learning and optimisation of such factors is essential: use of manuals, training teachers, curriculum reforms, teaching in national languages, understanding French as a teaching language, schooling organisation and school establishment management.

2. Supporting the development and piloting of efficient sector based policies. Improvement in the efficacy of educational systems is a prerequisite for their extension and overall efficiency, the alternative being deploying ever greater resources with proportionately diminishing returns.

3. Support the deployment of participative management of schools with development of greater levels of responsibility and synergy with local actors in the education community (parents and their associations, representatives of local authorities, teachers) in the expression of the education offer and demand and the management, follow up and evaluation of the primary education system.

4. Strengthen and maintain national political commitments to the provision of free and compulsory primary education for all and support such commitments through coordinated provision of technical and financial resources.

5. Promote primary education through a holistic approach to the entire education sector, with stronger planning and implementation processes and through linking education to broader development policy and budgetary frameworks.

6. Develop and strengthen inclusive and efficient education systems that are resilient to external pressures by reinforcing capacities and improving governance and efficiency.

7. Commit to reducing disparities and inequalities through fostering inclusive education policies and disaggregated initiatives, programmes and interventions aligned with broader policies in education and beyond.

8. Increase access to educational opportunities at primary level through removing all barriers, outside and within education systems, including cost and distance barriers as well as providing more accessible and flexible schools and classrooms.

VII. CONCLUSION

A completed primary education is a basic human right and is necessary for enjoying many other rights. It is transformative and empowering, and a means for accessing broad economic, social, political and cultural benefits. Primary education is a powerful driver for realizing all of the Millennium Development Goals (MDGs) and for sustainable development more generally. Education contributes to building more just societies through reducing poverty and inequalities. No country has ever climbed the human development ladder without steady investment in education. Primary education is a powerful driver for the realization of all the Millennium Development Goals (MDGs) and for sustainable development more broadly. India is making great strides in order to achieve the goal of universal primary education (UPE), which is the second of the MDGs and it requires that every child enrol in a primary school and completes the full cycle of primary schooling.

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AUTHORS

First Author – Shoiab Ahmad Bhat, Research Scholar in the Deptt. Of Sociology, Institute of Social Sciences, Dr. B. R.

Ambedkar University, Agra (U.P.), E-mail:
shoaib_socio@yahoo.com, Contact : +91 9906918509

Diagnosis of Heart Diseases with the Help of a System Using Artificial Neural Network in ECG Signal Analysis

A.Muthuchudar[1], Lt.Dr.S.Santosh Baboo[2]

[1] Ph D Research Scholar , School of Computer Science & Engineering, Bharathiar University, Coimbatore – 641029, Tamilnadu, India
[2] Associate Professor , PG & Research Dept. of Computer Applications, D.G. Vaishnav College, Chennai -600106, Tamilnadu, India

Abstract- Heart attack medically known as cardiac arrest is a killer disease. It is a felt need to invent a system which saves time between the precise diagnosis and appropriate treatment to the specific heart disease. This researcher has taken up the challenge of managing to devise a system that does 3 functions in a short time. Those functions are i) finding whether a person is suffering from one of the four heart diseases namely, Atrial Fibrillation, Atrial Flutter, Branch Bundle Block and Myocardial Infarction. After locating the exact heart disease, the system calculates the criticality of that disease. The methodology involves three steps: i) Artificial Neural Network (ANN) training process   ii) ANN testing process and   iii) calculating the criticality of the affected person . The sources of date are *physionet* and *ECG library*. 20 to 25 ECGs are used for training the Neural Network. A total of..... EGCs were given as input into the system and the results give the researcher some insights into the pattern of relationship between factors such as the age of the patient and criticality.

Index Terms- ECG Signal Analysis, Wavelet Transform and Artificial Neural Network, Cascade Feed Forward Back Propagation Network

I. INTRODUCTION

Advancement in technology has resulted in the rapid advancement in the field of medicine. Due to this man has conquered many killer diseases such as plague, cholera and tuberculosis. But heart attack, often causing sudden death, has been brought under control to some extent. Quite a large number of research studies have been carried out on the basis of the various results obtained through Electro Cardio Gram (ECG), Echo Cardiogram, Tread Mill Test and Angiogram.

Heart attack, known as cardiac arrest may suddenly happen to any individual at any point of time. In case, the patient suffers cardiac arrest, he / she should not lose time in taking tests such as ECG and Echocardiogram. The time saved may help the patient to speed up the treatment, thereby saving his/ her life. So, the interface of computer science and cardiology should come forward with devices that do a few steps in the process of diagnosis, within a very short time thereby saving time for the physician to loss time before giving treatment.

II. OBJECTIVES OF THE STUDY

The main objectives of this research is to evolve a system, which will facilitate the Cardiologist or the heart patient is able:

(a) To find out whether the person is suffering from one of the following diseases :
    (i) Atrial Fibrillation (A Fib)
    (ii) Atrial Flutter   (A Fl)
(iii) Bundle Branch Block (BBB)
(iv) Myocardial Infarction (MI)

(b) To get at the exact heart disease from which the person is suffering and
(c) To measure the extent, to which the person has been affected by that   particular kind of disease.

The above diagnosis is achieved on the basis of ECG signal analysis, using Discrete Wavelet Transform (DWT) together with Artificial Neural Network (ANN) and Cascade Feed Forward Back Propagation (CFFBP).

III. DEFINITION OF CONCEPTS

(i) Wavelet Transform

The understanding of the following key concepts is essential for getting across the analysis in this article. Wavelet Transform: A number of alternative time – frequency methods are now available for signal analysis. Of these, the wavelet transform has emerged over recent years as the most favoured tool by researchers for analyzing problematic signals across a wide variety of areas in Science, Engineering and Medicine.

(ii) Artificial Neural Network

An Artificial Neural Network, often just called a neural network, is a mathematical model inspired by biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation. In most cases a neural network is an adaptive system that changes its structure during a learning phase. Neural networks are used to model complex relationships between inputs and outputs or to find patterns in data.

(iii) Feed forward neural network

The feed forward neural network was the first and simplest type of artificial neural network devised. In this network, the information moves in only one direction, forward, from the input nodes, through the hidden nodes (if any) and to the output nodes. There are no cycles or loops in the network.

IV.   METHODOLOGY

The main objectives of this research is to evolve a system, which will facilitate the Cardiologist or the heart patient so that he or she is able:

(a) To find out whether the person is suffering from one of the following diseases at all:
 (i)   Atrial Fibrillation (A Fib)
 (ii) Atrial Flutter   (A Fl)
 (iii) Bundle Branch Block (BBB) and
 (iv) Myocardial Infarction (MI)
(b)   To get at the exact heart disease from which the person is suffering and
(c)   To measure the extent, to which the person has been affected by that particular kind of disease.

The methodology used here, consists of three major steps viz.
(i) Preprocessing
(ii)   ECG Signal Decomposition and
(iii)   ANN Training , Testing & Calculation of the Percentage of Deviation

(i) (i) Preprocessing:

The diagnosis is achieved on the basis of ECG signal analysis in which an ECG signal is given as input, for which the preprocessing steps namely, Denoising, Classification and Feature Extraction are done.

DENOISING.

Though a number of filters are available for denoising the Median Filter is chosen for this research work. In this study the given ECG signal is decomposed into different frequency ranges and only specific frequencies like high frequency and low frequencies alone are considered. It was found that the Median Filter was more suitable for extracting the required frequencies for our study.

CLASSIFICATION

The ECG signals will have some cycles (PQRST) repeated after regular intervals. These cycles are analyzed using Signal to Noise Ratio (SNR) method in order to classify the relevant and irrelevant cycles for the study. The method of classification involves selecting one cycle as the reference cycle and the remaining cycles are compared with the selected reference cycle and their SNR is calculated. The same process is repeated with different reference cycles and their respective SNR values are calculated. It was found that some of the cycles , for different reference cycles, have been found to have the same values. From this we can infer that those are the cycles that are of good performance and are the cycles chosen for the study. It was found that those cycles were the ones which gave accurate results in this study. The other cycles are of less importance for this study and can be ignored.

FEATURE EXTRACTION

In this research, the PCA has been used for feature extraction because it shows lots of very minute variations even, precisely, which is very much needed for this research. The

output signal got, using this method can be used directly as an input to the system.

(ii) ECG Signal Decomposition:

The ECG signal after undergoing the preprocessing stages, will become noise-free signals. Those signals are then decomposed into different frequencies, from which the desired frequencies can be filtered and those of interest for the research work are separated. For decomposing the given ECG signal, the Discrete Wavelet Transform has been applied. The DWT 1D was found to be more effective for this study because the decomposition was done very effectively and also the required frequency levels, namely the high- high (HH)frequencies and low- low(LL) frequencies were decomposed using DWT 1D Filter Banks .
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Figure.1 gives the decomposed signal after applying DWT to the input signal.
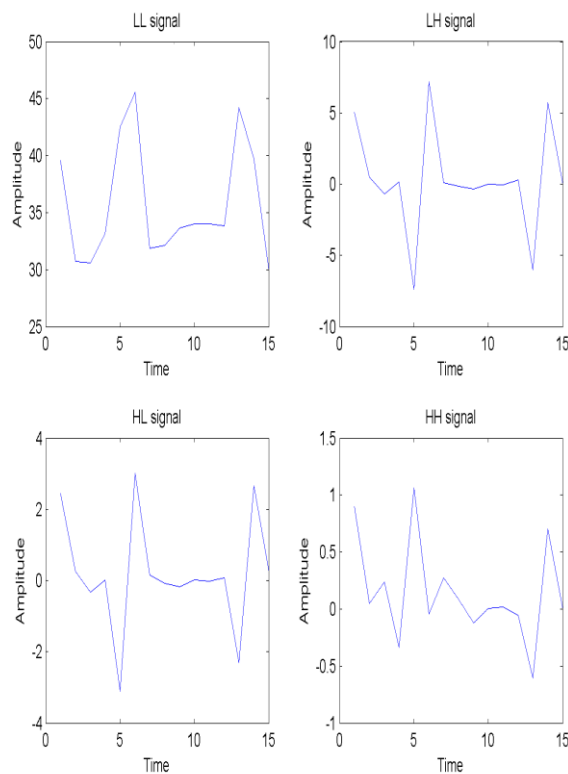
Figure. 1 The Decomposed wavelet using DWT

(iii) ANN Training & Testing & Calculation of the Percentage of Deviation:

The Discrete Wavelet Transform is applied to the ECG signal and the resultant coefficients would be of two frequency ranges Low - Low(LL) and   High - High(HH).   The input coefficients as well as the target coefficients are given as input the Cascade Feed Forward Neural Network. The training function used here is Levenberg - Marquardt function and also the Performance analysis function chosen here is the Mean Square Error (MSE) . The Transfer function used is the Tan

sigmoid function which is a mathematical modeling function and is automatically derived by the trained network. The number of neurons is also given as input and in this study the number of neurons is 6, because the system gave its best performance with 6 neurons.

Figure.2 The ANN Training Process

STEPS IN THE TRAINING PROCESS:

1. Two trained networks are created for LL_N and HH_N frequencies for the normal person's ECG signals giving the required inputs.

2. Create 8 trained neural networks for , 2 each (one for LL and one for HH) for the four diseases that are considered for the diagnosis by the system namely *ATRIAL FIBRILLATION, ATRIAL FLUTTER, BUNDLE BR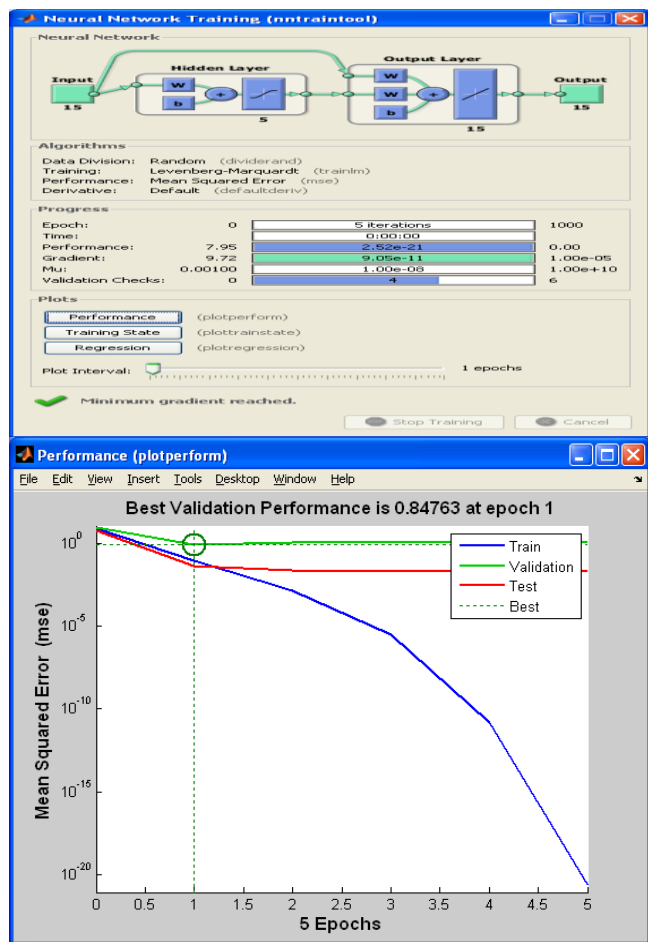ANCH BLOCK* AND *MYOCARDIAL INFARCTION*. These 8 networks are created for finding out if the input signal given is of a normal person or of an affected person.

3. After training the 10 networks, The Query LL signal (LL_Q) is given as input to the trained normal person's network LL_N . The network calculates the Mean Square Error

comparing LL_Q and the LL_N using the following formula ,
$$MSE = Mean (LL_Q - LL_N)^2$$

The system is designed allowing a threshold of 0.3 (ie. 30% error is allowed because almost even normal persons' may have 30% to be affected which can be treated to be normal), which means that above 0.3 indicated that the person is affected by some disease.

If MSE < 0.3 ----- NORMAL PERSON
If MSE > 0.3 ---- AFFECTED PERSON

4. If $MSE > 0.3$, then the same LL_Q is given as input to LL_{AFIB} , LL_{AFLU}, LL_{BBB}, LL_{MI} and their respective MSEs are calculated. The network which has the least MSE value is the best match , which means that they are almost similar and that is the disease the person is suffering from.

5. If the least MSE was for the disease say, MI, then the HH_Q (now the high - high frequencies) of the query ECG is given as input to the trained network of normal persons and the MSE_N (Normal persons MSE) is calculated.

6. The HHQ is now compared with the HHMI and the MSE_A(Affected Persons MSE) is calculated.

7. The Percentage of Deviation from the normal is calculated using the formula
$$\% \text{ of Deviation} = \frac{MSE_A}{MSE_N} \times 100$$

The HH is chosen for finding the percentage of deviation because even the smallest variations are recorded very clearly in the HH frequency domains.

V.   RESULTS & DISCUSSION

The Figure.3 depicts how the neural network reports the diagnosis of the disease. and its percentage of deviation from the normal ECG signal which may help the doctor predict the criticality of the patient and give him priority of treatment..
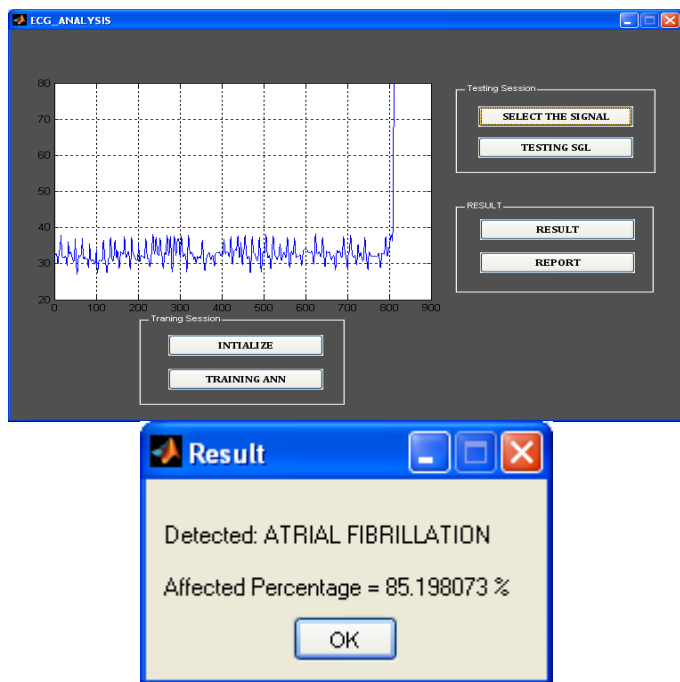
Figure. 3 The Diagnosis of the disease

The Cascade Feed Forward Neural network is used for training and testing the network. Three other algorithms namely, Feed Forward Neural Network and Radial Basis networks were also used   for training the neural network but the Cascade Feed Forward network performed well when compared to the other 3 algorithms.

The positive and negative results produced by all the algorithms are depicted in the Figure.4.
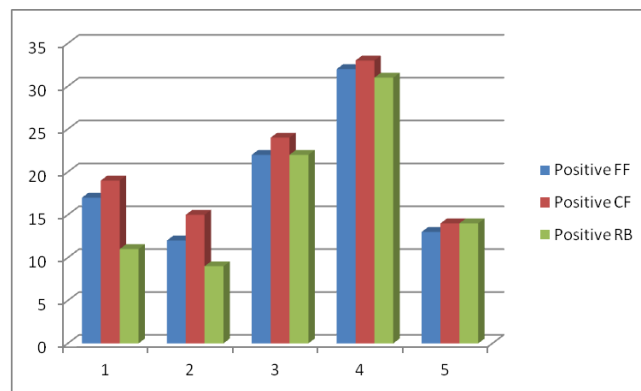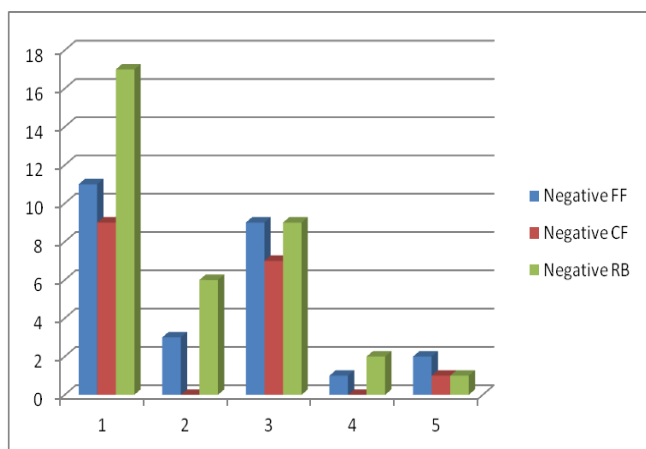

Figure.4 The CFFNN performance comapred with other networks

VI.   CONCLUSION

This research is limited to only 4 specific heart diseases. If further research is taken up, more number of diseases may be diagnosed in a short time so that the diseased person can be attended to immediately. This kind of system will, no doubt, be a powerful tool in the hands of the healthcare personnel in their life saving mission.

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AUTHORS

First Author – A. Muthuchudar has a B Sc in Physics, MCA, and M.Phil from Bharathiar University. She is pursuing her PhD at the School of Computer Science and Engineering of Bharathiar University. She has been a faculty at the Kongunadu Arts and Science College, Coimbatore for about 4 years and has

a total teaching experience of 7 years. She has presented 2 papers in National level seminars. Her areas of interest are Data Mining, Artificial Intelligence and Medical Applications of Computer Science.

Second Author – Lt. Dr.S.Santhosh Baboo has around twenty years of postgraduate teaching experience in Computer Science, which includes Six years of administrative experience. He is a member, board of studies, in several autonomous colleges, and designs the curriculum of undergraduate and postgraduate programmes. He is a consultant for starting new courses, setting up computer labs, and recruiting lecturers for many colleges. Equipped with a Masters degree in Computer Science and a Doctorate in Computer Science, he is a visiting faculty to IT companies. It is customary to see him at several national/international conferences and training programmes, both as a participant and as a resource person. He has been keenly involved in organizing training programmes for students and faculty members. His good rapport with the IT companies has been instrumental in on/off campus interviews, and has helped the post graduate students to get real time projects. He has also guided many such live projects. Captain. Dr.S.Santhosh Baboo has authored a commendable number of research papers in international/national Conference/journals and also guides research scholars in Computer Science. Currently he is Associate Professor in the Postgraduate and Research department of Computer Science at Dwaraka Doss Goverdhan Doss Vaishnav College (accredited at 'A' grade by NAAC), one of the premier institutions in Chennai.

Correspondence Author – A. Muthuchudar,
muthuchudar@gmail.com,
balaji.shanmugasundaram@gmail.com, 91 – 9965383999

Dams and Environmental Movements: The Cases from India's North East

Jhimli Bhattacharjee

Department of Sociology, Assam University, Silchar

Movements against dams not only counts high among all environmental movements in India but also in the world. India's North East with its increased emphasis on construction of dams has also triggered number of protests in the region. This makes it necessary to delve into the issue of movements against dams in North East India.

When the director of Centre for Science and Environment, Sunita Narain   maintained that the strongest environmental protests in India have centred around dams and displacement, a close look at the North East reiterates the fact. The harnessing of hydropower has however led to a lot of resistance from the people of the region. The strongest protests in the region are mainly against the dams that are to be constructed on the river Barak and Brahmaputra. Besides dams on Loktak and Tipaimukh in Manipur and on the Gomti river in Tripura have also invited strong resistance from the people.

The major objectives of this paper lie to understand the nature of movements against the construction of dams. It tries to explore the causes of movements against dams in the region in particular and in India and the world in general. Moreover, since the region is the abode of a number of ethnic groups with their distinct set of culture and values, the paper also keeps a scope to inquire if the region has a 'special variety of environmentalism' in so far as the movements against dams is concerned.

The data used for the purpose are of both primary and secondary types. Though primary data are used in certain cases, which are mainly the result of unstructured interview with certain activists, most of the data are of secondary nature and includes newspaper reports, information provided in websites and some published as well as unpublished research works.

A brief survey of literature on environmental movements in North East

Study of environmental movements in North East India appears interesting for its very geopolitical location and ethnic composition. A good number of social scientists have discussed about the close proximity of the people of the region and nature (B.K. Roy Barman. The region remained outside the colonial regime for a longer period of time and the state centric resource intensive path of development is the late arrival in the region. Another set of scholars have discussed about the disruption of harmonious relationship between 'human' and environment. There are also studies which try to find out the causes of environmental problems and seek sociological explanation to these problems. But there are very few studies on people's response to such problems. A.C. Sinha (1993) considered the British penetration into the region has led to the disruption of the man-nature relationship, but he did not find any noticeable awareness and grass root movement in the region to safeguard their interests in forest in particular and environment in general. He blamed the newly emerged tribal elite in the name of contractor-politician who are instrumental to subvert the local interests for their own vested interests to supply timber to the industry away from their states. In contrast to Sinha, Dutta (2003) and Hussain (2008) in a similar vein to Shiva and Bandyopadhyaya   (1998) develops a critique of state as development giver and people as development receiver. Dutta while discussing about the causes of movement against Pagladia dam considers the incommensurability of languages and perception of development between potential displaces and implementing agency of the project. While giving similar kind view Monirul Hussain (Hussain : 2008) put emphasis on the organizational aspect of the movement. He considers the support of the movement by All Bodo Students Union (ABSU) gave it an added advantage. Political structure and arrangements are decentralized and autonomous compared to the non-tribal areas of Assam. Hence it is difficult for the central as well

as the state government to impose their dictate at will. For Hussain, these political factors also helped the movement to successfully resist the implementation of the PDP. The focus on differential political arrangement in the region and the role of political factor adds a new dimension to understand the environmentalism of this region. It not only reflects the political factor but also the nature and kind of activism prevailing in the region. North East India being an ethnically sensitive region comprises of people belonging to different ethnic communities who are not only conscious of their ethnic identity but also active in different fronts to preserve their identity which led to a different variety of politics and activism in the region. Hence environmentalism may get a ready platform to channelise its ideology from these platforms.

Hydropower generation: A brief look

Generating hydropower in North East India goes at par with the all India scenario. North East is regarded to have the potential to be India's largest Power House. The preliminary ranking study on the nation wide potential of hydroelectric schemes in October 2001 conducted by the Central Electricity Authority (CEA), gives Brahmaputra the highest potentiality mark. The ranking study considered 168 schemes which have an installed capacity of 63,328 MW and 149 of these were given A and B ranks, indicating high viability (Menon et.al : 2003) . In addition to these over 900 mini and micro hydel projects have been identified to meet the local needs of the North East while the major portion of the power generated from the large dams will be evacuated to other parts of the country.

The paper here does not highlight the resistance of people on each and every projects. Few major projects which have generated much hue and cry have been considered for analysis out of which lower Subansiri, Tipaimukh and Pagladia counts along with some dams of minor range. The strongest protest centres around dams that to be constructed on rivers Barak and Brahmaputra. Besides mention can also be made of dams on Loktak lake in Manipur and on Gumti river in Tripura.

As mentioned earlier that Brahmaputra alone has the potentiality and because of it, a number of dams have been constructed on the different tributaries of Brahmaputra. Of its seven states, Arunachal could singly produce most of the megawatts required to fulfill the country's national policy to generate 50,000 MW by 2012 to provide cheap electricity for the needs of the teeming millions and the growing economy (Chhakchhuak : 2006). The major projects i.e., mega projects include Subansiri multipurpose dam project the proposal of which include three dams namely 1) Upstream of Daporjio near Menga village on Subansiri river 2) On Kamala river upstream of Tamen 3) Gerukamukh at the original site of Subansiri river. The second the Siang Multipurpose Dam Project presently modified into three alternative dams at 1)Upstream of Yingkiong near Pugging village on the river Siang 2) at 15 km. upstream of Kaying on the river Siyom near Raying village.3) Upstream of Pasighat near Routung village.

The mega projects including the Lower Subansiri (2000) and three projects in the Siang basin have already been handed over to the NHPC for preparation of detailed project reports (DPR). The public hearings have already been held for four projects – the lower Subansiri, the Siang middle project, the Ranganadi Hydro Project State II (RHEP-II) and the Dikrong, now called Pare Hydro Project.

Besides this, Tipaimukh power project is yet another project that generated enough hue and cry not only at national level but also at international level. The project to be located in Tipaimukh, at the confluence of Tuivai and Barak rivers adjoining Bangladesh, the project was to harness 1500 megawatt energy at an estimated cost of Rs. 6800 Crores at the recent price level (Dainik Yugasankha: 2006). The proposed 162,8 m. high rock filled dam aims basically at production of 1, 500 megawatt of hydroelectricity, irrigation of the agricultural fields and prevention of flood in Barak valley of southern Assam and the development of ecotourism, to be implemented by NEEPCO.

Another project that equally needs mention is the Pagladia dam project. It was originally conceived in 1968-67 as a minor flood detection project at an estimated cost of Rs.12.60 crores. In 1984-85, the project was taken over by the Brahmaputra Board. Later, the irrigation aspect was added to the project costing 287.86 crores at 1988-89 price level. The project gradually took the form of multipurpose project with the goal of irrigation, flood detection and generation of electricity. The major target was protection of 40,000 hectares of land in Nalbari district, irrigation of 54,160 hectares of land spread over 145 villages of the district and to generate 3 megawatt electricity. A detailed report of the project in compliance with the observations of the technical advisory committee report of the Ministry of Water Resources was submitted in November 1992. This paved the way for the techno economic clearance of the multi purpose project. In 1995, the project received clearance from the Ministry of Environment and Forests and after updating the cost estimate of the project to 540.99 crores at 1999 price level, the Public Investment Board of the Government of India accorded its approval at the cost of 526.62 crores in March 2000.

Why protests?

North East India interestingly registers its strongest environmental movement centring the construction of dams. Though the projects are at different stages of development, some commonalities are observed in all cases. A clear observation is the social, economic, cultural and environmental impact of these dams on the affected people living in downstream areas. In most of the cases the experiences of the people with the project seems to create a crisis of confidence in the government particularly its department of environment and forests. The activists allege that the project clearance in the stages of site selection, making Preliminary Feasibility Report (PFR), Detailed Project Report (DPR), Environmental Impact Assessment (EIA), public hearings into stage managed affairs where people's voices were not allowed to emerge, ignored or cleverly manipulated to suit the project.

While taking lower Subansiri project under consideration, it is found that the 116 m. high dam would submerge 3,436 ha.of forests. The total requirement of forest land for the project is in Arunachal Pradesh and 856.3 ha. In Assam survey and investigation works have been completed and the Detailed Project Report (DPR) is presently undergoing the techno-economic clearance required from the MoEF.

The submergence area of the lower Subansiri dam will extend over 70 km. upstream along some of its tributaries such as the Kamala and the Sil. Since the submergence area is a gorge with steep slopes and rugged topography, relatively few villages will be directly displaced. According to the project authorities the dam will submerge the agricultural lands of two villages, Gengi and Siberite. The families to be affected belong to the Gallong tribe, a subgroup of the Adis. These are agricultural communities practicing jhum cultivation, terrace rice cultivation and wet rice cultivation near the river bed. Besides they also depend on forest for their livelihood. So, all these resources will no longer be available once they are displaced. According to the EIA report prepared by WAPCOS, New Delhi, for NHPC, the project affected people (PAP) will be offered housing and homestead land, cultivable land (one hectare), civic amenities, schools and vocational training in animal husbandry, horticulture, weaving and other activities. It has been seen that the Resettlement and Rehabilitation plan spelt out for the PAFs 38 hactares of cultivable land (one hectare for each family) and 200 sq. km. of homestead land for each family will be given as compensation for a total 960.11 hactares of land.

A major reaction and opposition from peoples' organization and environmental experts in the region came up because of the projects' failure to adhere to the legal processes created to safeguard public interest. Neeraj Vogolikar, an environmental activist and closely associated with the problems of environment in the North East maintained that MoEF has ignored the plea of the several organizations to the ministry for looking at the serious problems in the clearance process of the Lower Subansiri Hydroelectric Project and granting the clearance for the projects.

Like Subansiri, Tipaimukh hydroelectric project also has been the bone of contention between the government and the affected people. The project is anticipated to submerge 275.50 sq. km of land surface in the state and to affect 191 sq.km (*Dainik Yugasankha* : December 13, 2006) .[9] The dam is also anticipated to doom all the potentialities of the Barak catchment area. The project will submerge the national highway no. 53, the only alternative to Imphal Dimapur lifeline (NH No.39). Hence new alignment of the submergible points on the road will add a distance of another 60 kms to the existing Imphal-Jiribam-Silchar road. Though Manipur and Mizoram have been promised 12 percent of the output as royalty, the critics have long been warning that the dangers far outnumber the potential benefits. For instance, the Naga leaders claimed that the dam would submerge the socially and economically important places. The site chosen for the dam on the Tuivai river was also prone to intense seismic activity. The dam will also submerge various historical and legendary sites and sacred groves with vital spiritual and cultural significance to the communities and lead to destruction of rich biodiversity which is threatening the peoples' right to life and livelihood. Like other development projects in the north east, here too, the people that are most adversely affected are tribes: the Zeliangrong a constituent of three Naga tribes and the Hmar will be the direct victims of the project.

The dam also encountered opposition from the very day of the proposal for its adverse impact on 'Man and Environment.' The affected people had demanded that the project should not be taken ahead till the public scrutiny of the project is not accomplished. There is also demand that the project should follow the WCD guideline as it is going to affect the neighbouring countries. Thus this project also shows a 'crisis of confidence' on government by the affected people. Environmental groups alleged that the NEEPCO authorities have been ignoring the demand of the people to supply them with details of the environment study report despite the statutory provisions for supply of such reports to the people. They also alleged that the authorities concerned have paid no attention to the demand for holding public hearings in Manipur and Assam, which will also be affected by the project. Also, compliance with the international norms for consulting the riparian countries in case the river in question is an international one is also ignored by the authorities concerned in this case.

The crisis of confidence thus emerges centring different issues relating to social, cultural, economic and environmental impact assessment by the government on project affected people. If in one side there is a fear of loosing the homestead, on the other side it is the fear of loosing the cultural heritage. Along with these, the knowledge of the people about the fate of affected people of dams like Gumti, Koptai etc. also have created further crisis in affected people's mind.

The instance of Pagladia dam project highlights the problem in further detail. The project also registers major hue and cry from the affected people of the dam built on the river Pagladia. According to the project plan, a 23 kilometers long and 26 meters high dam will be constructed along with a reservoir to retain 446 million cubic meters of water. The main canal would be 66.2kms long and a branch canal of 39.5 kilometers making it 105.7 kilometers in total.

Altogether, 38 villages would be submerged under the proposed project. In January 2003, the government issued notification for the acquisition of land from the villagers. Mention may be made that all the villages expected to be submerged fall under the proposed Bodoland Territorial Council (BTC) area. While the Brahmaputra Board, the implementing agency of the dam project claimed that only 20 percent of the potential displacees belonged to the Scheduled Tribes, according to the affected people the figure is around 90 percent. According to its estimation the Board has drawn up a Resettlement and Rehabilitation (R&R) package at the cost of Rs .47.89 crores, aiming to rehabilitate 18 ,473 people and 3, 271 families. However, in the opinion of the affected people, the government figure was extremely low and the actual figure comes to around 50,000 people belonging to 5,000 families. Moreover the figure did not include the number of potential displaces of the five villages newly added to the original 33 affected villages pointed out by the dam resistance committee that had launched a long struggle against the construction of the dam and the Brahmaputra Board.

While the government claimed that it would compensate all the affected people of the dam project, by providing handsome R and R package, the people were not convinced. The villagers had their own view of the fate of the dam displaces based on their assessment of the affected people of similar projects as has been mentioned in an article published in the souvenir of the PDPKASS. The people of the projects who have not been given rehabilitation and some of the projects which have not been completed are mentioned in the article as affected people of Borlia river, Suklai, Champanadi, military base at Satgaon in Guwahati, Jagiroad paper mill, capital complex at Dispur, NEEPCO Duliajan Project at Kathalguri, Dinjan Military Base and Numaligarh Refinery project   (K.N. Bodo : 2000). The people were also aware of the fate of other projects, such as, Bhakranangal projects learnt from the interaction they had with the dam activists. Hence people felt that both the state government and Union Ministry of Water Resources have simply been fooling the people of Nalbari who were going to be affected by the project. Besides more than 40, 000 people were expected to be affected by the project, the government proposed to acquire another 34, 000 acres of land, which is very fertile. Though the project was going to affect different communities such as Rabha, Rajbanshi, Nepalese, Bengalis, Santhals etc, the Bodos were demographically the largest groups to be affected in the area, most of whom were peasants. Hence acquisition of land from them was thus the acquisition of livelihood of these victims. In addition to this, the proposed project would submerge four high schools and forty primary schools, several primary health centres, temples, *Namghars* and other places of worship.

While the rehabilitation of the social and cultural assets of these victims would be practically impossible to achieve, the economic rehabilitation was yet another hidden difficulty observed by the villagers. Though the Brahmaputra Board has prepared a separate R and R package for the displacees, only 47.89 crores had been allocated for the same. Moreover the potential displacees have lost faith in the state government and the claim of the Brahmaputra Board. Moreover the land selected by the government of Assam for the rehabilitation of the displacees were already occupied by thousands of refugees from East Pakisthan (present Bangladesh), the Nalbari district does not have sufficient land at its disposal to accommodate the displaced population. Thus the people are aware that the government would not be in a position to rehabilitate peasants with due grant of fertile land in the newly settled area. Hence they are to be settled in hill reserved forests which will not only lead to forest loss but also once again bring a threat to the livelihood of the people. Besides, the district being densely populated, it can not accommodate the entire gamut of population in the same area which would lead to ethnic dispersion and loss of traditional kinship and ethnic ties. The lack of absolute ownership over land by many of the inhabitants of the affected area has created another feeling of scarcity in the minds of the victims. They feared that like in many other cases of developmental projects, the people who did not possess proper land documents will not be able to avail the R and R measures. All these cummulutive feelings of the villagers have led them to refuse and reject each step by the Brahmaputra board and the government of Assam to implement the plan to construct a dam on the Pagladia river.

The situation has been better analysed by the noted social scientist from the region as the situation of contestation between state as development giver and people as development receiver which is continuing for four decades with a periodic lull. The protest of the people against the dam thus clearly reflects the unease of the people who are affected by the project, shows the penetration of the state in the lifeworld of the people who are affected by the project creating a legitimacy crisis or a crisis of confidence. Dutta here even questions the inter linkage between development and democracy. He highlights the incommensurability of languages and perception of development between the potential displaces and Brahmaputra Board of Assam. For him, the affected people find the project as illegimate and undemocratic, what he considers as marginalization of democratic right of the people.

The move

The construction of dams in the region have met with opposition from the very inceptions. Different organizations emerged at different periods of time to register their protests. The organizations that strongly opposed the lower Subansiri dam project are

Arunachal Citizens' Rights (ACR), Dam Displaced People (DAP) , Probable Project Affected Peoples Committee (PPAP), Downstream Peoples' Committee (DPC), Proposed Project Land Affected Peoples' Forum, Yazali (PPLAPFY), Subansiri Bachao Committee, Siang Valley Bachao Andolan etc. Citing the example of the impact of Koptai dam in Bangladesh which has displaced thousands of Chakma to this region the Chairman of the ACR says, "We don't need to go anywhere to see this; we have an example right here. Rehabilitation, no matter how good the intention, is just not possible."[10]

Twenty NGOs and voluntary organizations based in North East have come together under the banner of the North East Dialogue Forum to register a combined protest against the building of large dams in the region (The Assam Tribune : 2006).[11] The office bearers maintained that apart from the displacement of huge sections of people and infringement of land ownership rights , the proposed dam will also have a negative impact on the downstream residents of Assam, effect on whom had not been studied in detail. K.K.Chandradhara, Secretary of the Peoples' Movement for Subansiri-Brahmaputra Valley (PMSBV), who was also present during the media briefing insisted that this flouting of rules and norms has been brought to the notice of the Union Ministry of Environment and Forests by the activists of PMSBV which has been at the forefront of the opposition to the project since its inception. The case for the construction of mini hydel projects in place of big dams to meet the power short fall in the country have also been stressed .

The Tipaimukh dam has encountered opposition from the very day of the proposal. There has been pronounced campaign against the project for its adverse impact on environment. A committee named Commitee against Tipaimukh Dam, which constituted various people's organizations was formed to create mass awareness on the negative impacts of big dams and mobilize public opinions for resisting the controversial Tipaimukh High Dam. But the Union Power Ministry has continued to pursue the construction of the dam despite the continued protest from the project affected people.[12] Various representatives from the Committee Against Tipaimukh Dam (CATD), NWUM (Naga Women's Union, Manipur), NPMHR (Naga People's Movement for Human Right), UNC (United Naga Council), ANSAM (All Naga Student's Association, Manipur)including the ZU (Zeliangrong Union), ZWU (Zeliangrong Women's Union), ZSUM (Zeliangrong Students Union, Manipur), ZYF (Zeliangrong Youth Front) called on the Governor and the Chief Minister of Manipur to apprise them about the feelings and stand of the people regarding the construction of the Tipaimukh dam. In reply, the Governor said all have the constitutional rights to preserve their cultural identity. He said that he knows Barak waterfall and Zelliad lake are the cultural heritage of Manipur. Similarly, the Chief Minister O. Ibobi Singh while listening to the people's concern shared that a project of such magnitude should very much have wide consultation with the people who are to be adversely affected by the dam. But all opinions and commitments could hardly bring any reflection in the activities as the Dam Action Committee was very often brought the fact of lack of accountability of the Manipur Government in the preparation of different reports on the fate of the dam and its impact on people.

Five Naga organizations of Manipur: UNC, NWUM, CATD, NPMHR, ANSAM in another move have petitioned the centre to shelve the Tipaimukh Dam, citing threats to the existence of 18 Zeliangrong Naga inhabited villages and several sites held sacred by the community. The organizations in a memorandum to Union Power Minister strongly stated that the dam was not conceived with the interests of the tribal people in mind. They also threatened the Manipur government that they would go in for more stringent action if the government failed to shelve the project.

The organizations also demanded that the Nagas should not be denied the right to information on environmental assessment and for participation in any development project that affect their livelihood and dignity. The dams can not be allowed to be

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[10] Ibid

[11] 3, August, 2006, *The Assam Tribune*

[12] SANDRP, 2003.

constructed if it is inevitably going to destroy one section of society. Besides the *Citizens Concern for Dams and Development* (CCDD) have demanded that till informed public scrutiny of the project is not accomplished, the project should not be taken ahead. CCDD also demanded that the project should follow WCD guideline[13].

On January 4, 2005, altogether 17 organisations from the country and abroad have objected to the then Union Minister of state for Industries and Public enterprises Santosh Mohan Dev who convened a meeting of the Chief Secretaries of the three states of Manipur, Assam and Mizoram at New Delhi for discussions on the project. The indigenous people spearheaded the people's movement in these two states argueing that the proper documents relating to the assessment study were not supplied to the people by NEEPCO authorities.

The public meeting on the assessment report called by the Mizoram Pollution Control Board on December 2, 2004, had to be postponed following wide spread public protest. In a communiqué to the authorities concerning the dam, on January 9, CCDD said "any decision on the Tipaimukh power project should not be taken without the prior and informed consent of the people of Manipur. An independent accountable and participatory Environmental Impact Assessment must be undertaken involving full participation of people of Manipur." CCDD also maintained that there are no concrete plans for resettlement and rehabilitation of the people who will be displaced by the project. It also added that no environment management plan, risk management plan or cost benefit analysis have been conducted.

The opposition to the Pagladia dam began from a period between 1968 and 1971, when investigation was conducted by the state for the construction of a minor flood detention project. To combat the government's attempt to construct the dam the educated people of the effected area formed a committee called "Pagladia Dam Protection Committee". Late Sri Mukundaram Medhi was the founder president of the committee and late Bitty Barman was the Secretary.

Soon after its inception, the activists of the protection committee went to Shillong, the then capital of Assam and demanded the immediate closure of the project by the Assam Legislative Assembly. Due to the relentless opposition by the people, the Government had to close the project. But the AGP Government tried to re-open the file of Pagladia dam project and restart the project by investing Rs.500 crores in order to solve the problem of perennial flood in the region.

After this declaration the disappointed people of the effected area formed another committee called *Pagladia Bandh Prakolper Khatigrastha Alakar Sangram Somittee* [PD PKASS] to counter what they consider to be an onesided undemocratic decision. Adopting a non violent and democratic strategy, this committee opened a new chapter in the history of movement against Pagladia dam project.

In their attempt to secure closure of the project, copies of the memorandum were sent to various agencies: the District Commissioner of Nalbari, the Chairman of Bramhaputra Board, the Chief Executive Engineer, Local Legislatures, Minister of Dam Control, Government of Assam and to the Chief Minister of the state. In 1989, a memorandum was sent to the Prime Minister of India through the MLA of Kokrajhar, late Samar Brahmachoudhury.

The movement took momentum in 2000, on the eve of the observation of sixteenth biennial session of PDPSSS. With lots of encouragement and immense mass support, the two day long session was observed successfully. The mobilization was done by the leaders of the movement through their speeches inviting the people to join hands in the protest against the project. The project was also severely criticized by Sri Sansuma Khungdor Bosumatiari, Member of Parliament (MP) representing the 5th Kokrajhar constituency, as well as by the core members of All Bodo Students Union (ABSU), All Assam Rabha Student's Union (AARSU) etc.

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[13] Dams, Rivers and People update**,** *SANDRP***,** February, 2003

in their speeches during the session. The project was also criticized by the former revenue minister of Assam, Sri Padma Bahadur Chauhan in his long speech at the session. All the speakers criticized the dam for its destructive effect on the people of the downstream area and thus demanded for withdrawal of the project. In his speech, the MP had advised the protesters to send a delegation to Delhi. A twelve member committee was formed following the suggestion of Sri Bosumatiary and on March 9, 2000, the delegates left Guwahati for Delhi under the leadership of the president of the movement committee.

The twelve member delegation reached Delhi on March 12, 2003. The delegates consisting of the *Sangram Samittee* leaders and the ABSU members were hosted by Mr. S K Basumatiary at his official residence. Parliament was in session at that time. Despite, a meeting with Central Ministers and bureaucrats was arranged by the MP. The memorandum demanding the closure of the project was given to the MP, and then subsequently to Srimati Bijoya Chokroborty, Minister of State, Water Resource Development, Mr. Zed Hussain, Secretary, Water Resource Department, Dr. AK Kundra, Chairman Planning Department, Prime Minister Sri Atal Bihari Bajpai, Mr.L.K. Advani, Home Minister, and Sri K.R. Narayanan, President of India.

Communication was also estsblished with the former Revenue Minister cum Congress I leader, Mr.Padma Bahadur Chauhan residing in Delhi. However, not much could be achieved from the twelve member's delegation to Delhi. A meeting was arranged by the Brahmaputra Board on construction of the dam in Tamulpur. But agitated masses rendered the meeting futile by making a demonstration to the Central Water Resource Minister Bijoya Chokroborty (Pratidin 22, 2000). Another meeting was held on February 1, 2001, between Bramhaputra Board, *Sangram Samitee* and the administration at the office of DC of Nalbari which was also attended by the renowned people of Nalbari District, the *Gao Burhas* of the affected areas and the then MLA of Tamulpur, Sri-Drhagra, but again the attempt failed to produce any tangible result. Likewise the endeavor to discuss on the building of Pagladia dam by the former Health, Panchayat and Rural Development Minister of Assam Dr. Bhumidhar Barman invited by the Brahmaputra Board of Assam, also went in vain due to the protest by the agitated people. The Minister had promised that no injustice will be done to the people of the downstream. On July 28, 2001 six MLAs of ABSU/BDLP along with the circle officer, the BDO of Tamulpur and some important people of Tamulpur visited the affected area of Pagladia river. In a discussion with the people of the Tamulpur area, the MLA promised to put pressure on Government to stop the dam project.

The Sangram Samittee, along with ABSU central committee, BDLP and the MP of Kokrajhar had called for a Dharna near the main Secretariat, for closure of the Dam work. But the government.stopped the bus carrying twenty five participants of Dharna and with the help of the police and detained the bus in Amin gaon. The day following the incident when the Brahmaputra Board authority came to take measurement of the land inhabited by the Dam affected families, the agitated people did not allow the Brahmaputra Board Authority even to measure the land. Thus the different steps of the Brahmaputra Board authority went in vain as every time there is a massive protest by the effected people of the Dam project.

The movement has got widespread support from different organizations. These organizations are: All Bodo Student's Union (ABSU), Central committee; M.P. Lok Sabha, Kokrajhar,Bodoland Demand Legislative Party (BDLP),All Assam Tribal Sangha (AATS),All Bodo Sahitya Sabha (ABSS), Bebak Rabha Kraurang Ranchum (BRKR), All Assam Sarania Cachari Students' Union (AASKU). All Assam Rabha Students' Union (AARSU), All Assam Napali Students' Union. (AANSU), All Assam Students' Union (AASU), Baganpara Anchalik Committee , All Assam Students Union, Tamulpur Anchalik Committee. On October 29, 2001, the PBPKASS with the cooperation extended by ABSU and BDLP organized a dharna near the Last Gate of the state secretariat at Dispur. The program   received widespread support from the people. On their way towards Dispur, the procession was stopped near Amingaon checkgate, a distance of 20 kms from the state complex. While the crowd showed firm determination to reach the destination, the police used their *lathicharge* and exploded tear gas to suppress the protest. A large number of people, including children and women were injured in the Melee and many of them had to be hospitalised. Yet this did not deter the protesters. A large

number of people continued to gather in the capital and demonstrated against the PDP. The demonstration was represented mainly by the ABSU, MPs and MLAs belonging to the BDLP, ARSU, and All Bodo Employees Federation (ABEF).

Police high handedness on the people protesting against the state is not a rare phenomenon in the region. In another incident, a group of young people informed of the corruption by the Brahmaputraputra Board official involved in rehabilitation package, had to face police firing when they tried to put up posters to oppose the said corruption. According to the protesters the board officials had exaggerated the cost of the model house for resettlement from Rs.30, 000 - 1, 24, 620. They pointed out that the houses proposed were so small that they are inadequate even to accommodate a small family.

On January 29, 2004, the movement took a major momentum when a large contingent of officials from Brahmaputra Board and district administration reached Thalkuchi, to conduct the land Survey and to assess the compensation package required for the displacees. The angry villagers registered their protest by blocking all the roads barring the entry of the officials into the villages in order to stop the survey work they intended to do. Around 40,000 people participated in such protest including a significantly large number of women, children and aged villagers. When the people were adamant in their protest and did not give ear to the threat issued by the officials, the police resorted to blank firing to frighten the people, but to no avail. The team had to go back without completing their assignment after 35 days of continuous trial and confrontation with the villagers.

This movement is not only one of the oldest movements against dam construction it is also an important symbol of people's resistance against the anti people model of Government and lack of concern for the need and inspirations of the masses. While the government is sanguine for its extraction of hydro-energy, the affected people are also mobilizing their strength by seeking to establish network with the anti dam activists such as Medha Patkar and other like minded groups at state, region and national levels. Mention has already been made of the existence of antidam lobby in the region including the activists of affected people of Tipaimukh dam, Subansiri dam and other high dams which are equally threat to the people's life and livelihood in North East India.

But for the government of the state and nation, the hope for Vajpayee Government appears afresh with their fresh strategies developed time to time. The Chief Minister of Assam is thus with a new hope sent a letter to the centre to give more incentive to the people who would be displaced. "The local people are of the opinion that the dam will not help them in any way. We suggested the centre to release more incentives so that they can buy land in some other areas and settle there" (The sentinel : January 1 ,2006) . The Public Investment Board returned the project to the ministry saying that the Ziraat Survey which had given details of the land holders to be displaced is 'inadequate' and 'lacking in Facts'. The ministry has hence asked the government to sort it out with the Bodoland Territorial Council (BTC). At the end of 2005, hence a meeting was called in Guwahati between Bodo leaders and representatives of the Board and state government but it failed to arrive at any agreement. Endeavours were also going on to seek the aid of NGOs to persuade the people to accept the rehabilitation package.

The project has thus divided the population settled in the two streams of the river. The people living in the southern part of the district in the flood affected plain downstream of the river supported the dam while the upstream people settled in the northern part who stood to lose their land and livelihood from the project opposed it. While the upstream people were getting organized to resist the dam, the government was trying to mobilize the downstream people to support the dam, besides using repressive measures to suppress the anti-dam movement. Two NGOs Manab Seba Sangha and Assam Council for People's Action have been patronized by the Brahmaputra Board to mobilise support for the project. But the two NGOs failed in their missions in the face of popular opposition to the construction of the dam

Gumti dam : A lesson yet to be learnt

In Tripura, the construction of Gumti Hydel project generated environmental awareness and fight for right to land among the people of Tripura. This 30 km. high gravity dam has been constructed across the Gumti river about 3.5 km. upstream of Tirthamukh in South Tripura district for generating 8.60 MW of power from an installed capacity of 10 MW. The dam submerged a valley area of 46.34 sq. km. This was one of the most fertile valleys in an otherwise hilly state, where arable flat land suitable for wet rice agriculture make up a mere 28 percent of the total land area. According to official records, 2, 558 tribal families were displaced from the Gumti project area. But this number only includes families who could produce land deeds to their land as proof of ownership of the submerged land leaving out a large number of families who could not do so.

According to Subir Bhowmick, the official estimates vary between 8, 000 to 10, 000 families or about 60, 000-70, 000 tribal people displaced by the project (Bhowmick 2003) .

The project has attracted major criticism and protests. Since the construction of dam involves large scale alienation of tribal land, the project has acquired an ethnic colour. The tribal insurgency gathered momentum by 1970s. In certain parts of South Tripura District, as much as 60 percent of the tribal lands were alienated and sold in distress conditions as a result of unequal economic competition with Bengali settlers. Along with the steady land loss suffered by the people, the submergence of a large swathe of arable land owned by the tribals in the Raima valley disturbed the ecological balance in the region. As Bhowmick says, this project not only disturbed the fragile ecology of the Raima valley, it also left a permanent scar on the tribal psyche. All tribal organizations including the communist backed *Gana Mukti Parishad* fiercely protested the commissioning of the Gumti hydroelectric project. But the protest was crushed by the Congress led Government which was determined to augment Tripura's power supply. This led to the augmenting of tribal unrest by dispossessing and denying thousands of their only source of livelihood, the land. Though the project was ultimately decommissioned for its inability to harness sufficient power, it has generated a new consciousness about the value of land and environment in the minds of people.

Success that counts

 Movements against dams in North East India does not give a clear cut picture to make a final remark on its success or failure. It has been seen that despite the continuous protests the state is not able to give a final verdict against dam construction in the region. In case of Subansiri lower it is found that despite the protest by the down stream people and also by the Assam government the project does not get a halt. Arunachal Pradesh Chief Minister is sanguine to construct the dam and the implementing agency NHPC claims to complete it by 2012. In case of Tipaimukh dam though the Indian government says no Tipaimukh move before informing Dhaka, the Manipur government is hopeful and still continues with its move for the dam which shows the will of the state is of more vigour than the protesters against the dam. Yet from analytical point of view the movement shows different levels of success of the movements against the dams. The region being in the remote corner does not find much handicap for communicating to different groups to campaign against the dam. Very often combined afforts are made to protest against the movement. by networking at local, regional, national and international level. in many cases it brought partial success which is highly observed in case of Tipaimukh dam that the Indian government has to give a second thought over the issue of construction of dam in Tipaimukh and in January 2010 the PM of India has assured Hasina not to go ahead with the project if it hurts Bangladesh. The case of protest against Subansiri also shows success in so far as the move is concerned. The protest by the affected people make it a political issue in Assam that in July , 2009 Assam Legislative Assembly had to set up a multi-party panel to look into the impact of the dams on Assam. The movement against Pagladia dam equally registers success as the protesters are continuously driving away the move of the Brahmaputra board to initiate anystep for the construction of the dam.

Conclusion

Throughout the work it is observed that the strongest protest in the region are mainly against the dams constructed on the river Barak and Brahmaputra. The major movements discussed in this paper are movements against Subansiri, Pagladia and Tipaimukh dams. Though most of these protests against dams involve number of environmental concern, a major concern that dominates these movements is the issue of compensation and the unjust and inadequate Resettlement and Rehabilitation (R&R) package proposal which in turn criticizes state's attitudes towards its subjects. Besides, North East being a region highly inhabited by ethnic groups gets another setback as most of the people are found to be worst effected because of tribal customary laws related to the ownership of land and other natural resources.

The study thus reinvigorates the very political closure approach which emphasizes state's penetration into the 'life world' of people. The situation is worse in case of North East India because of the distinct cultural practices of the people inhabiting this part of the country where penetration of state in the life world of people becomes acute.

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ADVANCED MANUFACTURING TECHNOLOGY

"The future aspects in manufacturing industries"

ASHISH MATHEW

Department of Mechanical Engineering
Ph.D. Scholar
Shri.JJT University, vidyanagari,
Jhunjhunu, Rajasthan, India
ashish.mathew22@yahoo.com

Abstract— Within the last decade, the importance of flexibility and efficiency has increased in the manufacturing sector. The rising level of uncertainty in consumer preferences has caused many organizations to aggressively search for cost reductions and other sources of competitive advantage. The small and medium scale industries (SMIs) are the backbone of the industrialization process in developing and developed countries. They play a crucial role in increasing the country's economy. With globalization and free trade agreements, the SMIs are under increasing pressure to adopt advanced manufacturing technologies (AMTs) to be competitive or simply to survive. Even though studies have shown that AMT can be implemented in smaller firms and are more successful than bigger firms, the implementation of AMT requires the SMIs to adopt new ways of thinking and doing work. The successful implementation of AMT will require the companies to have a workforce with higher level of skills, a flexible organizational structure and inculcate a new culture in managing, training and planning of the manufacturing industries. A study was conducted using survey questionnaire to investigate the ability of the SMIs of Malaysia to implement AMT successfully. The results of the survey showed that the main factors preventing the SMIs from obtaining the strategic benefits of AMT are the lack of an organic structure and understanding of the technologies, planning, the level of skilled workers and engineers and the culture of the industries. To increase competitiveness and flexibility of the organizations, a flexible structure is required. There is a need for the SMIs to increase the number of engineers and training provided in the companies to enable a positive contribution to AMT implementation. The ability of the workers to run multiple machines, stopping production when problem occurs, communication of organizational goals, and participation in idea generation and decision- making are important in achieving the flexible benefits of AMT. The SMIs have to increase the educational and training needs of the workers and also have a higher understanding of the technology to realize its potential. Consistently high levels of quality, accuracy, and repeatability will be demanded, as well as permitted by the technology.

Index Terms- advanced manufacturing technology (AMT) , Computer Integrated Manufacturing (CIM), AMT Implementation, SMIs, Developing Country, Organizational Structure.

I. INTRODUCTION

Historically, the process of manufacturing goods has evolved from craftsmanship to a highly organized factory system. The factory system itself has changed dynamically from mechanized powered systems to the present day trend towards application of advanced manufacturing technology (computerized design, planning, and manufacturing tools such as CAD, CAM, MRP, etc.). Paralleling this evolution have been dramatic changes in the skills required of the human component of the system. Such improved skills are needed in both cognitive and psychomotor areas. Although recent developments in technology have made very significant contributions towards improving productivity in the manufacturing sector, there has been an increase in the skill demands placed on the human as an integral component of the continually evolving work system. For example, the introduction of automation has increased the cognitive skill demands, and in many cases, it has not addressed its primary objective of decreasing the level of physical demands placed upon workers. Nevins and Whitney (1989) state that the drive to automate has led to automating simpler activities, leaving difficult tasks for humans to perform. Further, the changes in the organizational structure, workplace philosophy, and the market demands for product mix, volume, economy, and quick response times have placed additional burdens on the skill demands of the entire workforce, ranging from the hourly worker to the professional manager. As a result, a member of the workforce in a modern manufacturing setting frequently has to work as member of a team and is required to make decisions while being confronted with a continual row of vast amounts of information. The worker must be able to make effective use of the tools of modern technology. Members of workteams have been relegated to the roles of system monitor and controller as opposed to routine performers of a task. Organizationally, changes in the expected role of the human component in a manufacturing environment demand that workers possess a wide variety of skills at various levels. Currently, most manufacturing organizations train their employees in various ways, using different means, and achieving different levels of proficiency. Rarely does one end standardized and consistent training programs to develop worker skills; optimal training programs are not generally

known. This leads to workers acquiring industry or company-specific skills, often leaving them with only a few transferrable skills. It is well recognized that the failure of many companies to transition to modern competitive manufacturing organizations is primarily due to their mismanagement of human resources (Ettlie, 1988; Majchrzak, 1988). Specifically, many organizations have failed to upgrade worker skills to levels compatible with advanced manufacturing technologies (Butera and Thurman, 1984; Gerwin and Tarondeau, 1982; Shaiken, 1984; King and Majchrzak, 1996). It has been shown that variables such as comprehensive training are essential to human resource management practices, particularly in advanced manufacturing environments (Walton and Susman, 1987; Commission on the Skills of the American Workforce, 1990; Hitt et al., 1991; Perry, 1991; Snell and Dean, 1992). A number of investigators have shown that worker skill levels are a direct determinant of levels of quality performance (Flynn et al., 1995; Hackman and Wageman, 1995). It is also reasonable to suggest that investments in human resources should keep pace with the changing technology particularly if the workers are to take responsibility for quality, productivity, and customers (Majchrzak and Wang, 1996).

II. OVERVIEW

Manufacturing systems are considered essential by most nations for the creation and propagation of wealth, and for improving the standard of living of its people. Estimates show that developed countries, such as USA, Japan, Germany, and other nations in the Pan-Pacific region, such as Taiwan, South Korea, Singapore, and Hong Kong, have a manufacturing base comprising at least 20% of their gross domestic product which provides for at least 30% of their traded goods. Given the extent of manufacturing activities carried out in many different countries in the World, the design and operation of manufacturing systems assumes tremendous importance from the perspective of making nations competitive. The ability to compete is vital for contemporary manufacturing due to the globalization, or internationalization, of all aspects of product manufacture (quality, product variations, labor, technology, markets, etc.). In the United States, the issue of designing and operating manufacturing systems that can retain the global economic advantage is a major concern to industry leaders, academic researchers, Congressional policymakers, and socials in the Federal Government. The Report of the President's Commission on Industrial Competitiveness (1985), and research reports generated by the National Academy of Engineering (1988), the National Research Council (1990), and the National Science Foundation sponsored workshops conducted at the University of Cincinnati (Mital et al., 1994b; Mital, 1995, 1996) demonstrate the seriousness of this concern. Some of these reports also contrast the relative importance of advanced technology with human resource-based

technology and highlight the fact that, among countries with a large manufacturing base, the United States no longer dominates in the creation of new and advanced technologies. According to Farnum (1987), the worldwide share of American advanced machine tool production in 1987 dropped to 7.8% as compared to Japan's share of 20.5% and Germany's share of 19.9%. Also, in advanced machine tool exports, the US share was low (4.4%) compared to Japan (20.8%) and Germany (22.6%). Further, many countries now have the scientific and technological infrastructure to create new technologies. What then must make a positive difference to the United States industrial competitiveness, these reports conclude, is the development of a skilled human resource base Benexts of training Overall, training leads to acquiring new skills and/or improvements in existing skills (Carnevale and Goldstein, 1990). These, in turn, lead to two distinct economic benefits: (1) improvements in individual choices and earnings, and (2) cost savings for the organization. According to Carnevale and Goldstein (1990), on the average, about half of one's lifetime earnings are driven by learning in school and on the job. People with low skills, or skills not needed by employers, have limited choices and low earnings (Lillard and Tan, 1986). Increasingly, we are encountering situations where people with low or unneeded skills are unable to and employment that will maintain their standard of living, or are being forced to accept jobs that result in a substantial lowering of their earnings. Since the skills learned on the job complement educational experiences and lead to individuals' having more choices, on-task training is critical. Economic benefits of training for organizations include significant improvements in productivity (through improvements in quality, reduction in scrap and waste, reduction in throughput time, greater flexibility to respond to needs, etc.), and a competitive advantage of employers and the nation as a whole (e.g. Denison, 1984; Mincer, 1988; Carnevale and Goldstein, 1990). The United States Department of Labor (1993b) has reported that formal worker training introduced in 180 manufacturing firms in the United States increased overall productivity by 17% in 3 years when compared to industries that did not introduce any training program. The Department of Labor also reported that another survey of 157 small manufacturers observed a drop of 7% in scrap and an increase of 20% in the

productivity of production workers. The economic bene"ts of training, thus, point out the necessity of introducing formal training programs in manufacturing industry. Moreover, the greater the complexity of technology, the greater will be the training and human resource management needs.

III. DIFFICULTIES WITH EXISTING TRAINING PROGRAMS AND TRAINING RESEARCH

A review of training literature reveals that the wealth of learning and training studies are concerned to collecting data in laboratory settings, needs assessment, individual and cultural differences or deal with mathematical or behavior modeling of training (e.g. Bilodeau, 1966; Special Issue of Human Factors, vol. 27(3), 1985; Adams, 1987; Mayer and Russell, 1987; Campbell, 1988; Black et al., 1990; Park, 1991; Glencross, 1992; Felan et al., 1993; Stewart et al., 1994; Gilbert and Rogers, 1996; Volpe et al., 1996; Prislin et al., 1996). Analytically based training techniques have generally been concerned to the military (e.g. Johnson, 1981; Travillian

et al., 1993; Goettl et al., 1996). Reviewers, in general, have concluded that training theory and practice do not complement each other, and that research findings are not interpreted into effective training methods (Cannon-Bowers et al., 1991). Wexley (1984) stated that certain critical areas of training need systematic study which includes factors such as the organization, task and program design, individual differences for training strategies, and workplace factors affecting the transfer of training. In fact, very few research studies using systematic procedures for developing employee training protocols have been conducted and validated within an industrial setting. Also, statistically designed experiments to test various training methods have not been formulated and evaluated within the workplace. Thus, there is a need to develop training protocols using a systematic procedure and conduct empirical assessments using these developed training protocols within an industrial setting to determine the effectiveness, efficiency, and productivity of training. There is also the issue of the lifespan of learning for adults. In the era of rapidly changing technology, ability to learn new things is more critical than experience or years on the job. The ability to learn is particularly critical for adult employees as employers

tend to believe that workers who have been on a job for sometime have difficulty in adapting to new methods (Hall and Mirvis, 1994). The learning also needs to be holistic and systemic, and less linear (Senge, 1990; Bolman and Deal, 1991; Schein, 1992; Stacey, 1992; Fullan, 1993; Muncie and McQuillan, 1996). While significant work has been done on child learning (goal oriented), relatively little has been done in the area of goaloriented adult learning (Tannenbaum and Yukl, 1992; Froman, 1994). Adult learning has implications for the development of comprehensive performance- based goal-oriented training programs. Many adult workers and themselves in a transition period, particularly in mid-career, and question and reappraise their life and career structure. In such periods, individuals may experience conflict between the motivation to learn, on the one hand, and perceptions, fears, and habits that block change, on the other. Any effective training program will need to consider employee needs, their motivation, career plans, etc. Despite the economic advantages of training and the need to prepare the American workers for global competitiveness, training studies dealing with industrial applications, particularly those that are performed in field, are scarce. It is also worth noting that critical review articles dealing with the training issues are lacking (Howell, 1996). Workers in modern manufacturing environments not only need training in depth (level of proficiency in a skill) but breadth (different skills) as well (Jacobs, 1994). Moreover, these skills need to be updated and modified regularly as the technology changes. In contrast, the traditional model of industry training, if any, requires an apprenticeship, sometimes an extended one (e.g. 5 years) only at the beginning of a career. At present, relatively few American industry workers receive training. Those trained, in turn, train others. A survey of auto workers at a General Motors assembly plant revealed that less than 20% of production workers received technical training, although nearly 83% received some form of training. A survey of contract labor in the US petrochemical industry by the John Gray Institute (1991) revealed less than 33% of workers to have received company training upon entering the industry. Further, 20% of this same labor force reported receiving no on-going training throughout their employment. Also relevant is the question `How well current training programs work?´ This question has been partially answered at

the Federal Government level. According to Senator Mike DeWine, the current Chairman of the Senate Labor and Human Resources Committee, there are over 160 different job training programs sponsored by the Federal Government. These programs are frequently not only duplicative, they are short on proven results. Such job training programs, considered essential to improving the American work force, need to be consolidated, to just 4 or 5 primary programs with training success being quantified and documented (Senator Mike DeWine in The Cincinnati Enquirer, 3 January 1997). It is also known that the amount of training is a function of professional position managers receive far more training than line workers (Carnevale, 1991), and professional associations union labor receive significantly greater training than non-union labor (John Gray Institute, 1991), and direct-hires receive double the level of on-going training as contract labor (John Gray Institute, 1991).

IV. CONCLUSION

The discussion in previous sections has revealed the scarcity of industrial training research, particularly, field studies. Given the complexities of modern manufacturing, the national need to be globally competitive, the need to retain and enhance the standard of living of Americans through gainful employment, and the increased burden placed on the skills required of the workforce at all levels line and maintenance workers, supervisors, professionals, and managers, it is absolutely essential that the United States initiate a comprehensive industrial training program. The dire necessity for such a program is further demonstrated by the fact that we have: workers who do not have skills industry needs (and such workers often remain without jobs for prolonged periods of time); a proliferation of training programs that do not meet worker, industry, and national needs; inadequate training given to line workers; few transferrable skills possessed by workers; etc. Realizing that the economic growth of our country is dependent upon developing our human resources (e.g. Coleman, 1988; Boothroyd, 1990; St. Charles, 1990) and the productivity of Americans is directly proportional to America's economy, it is essential that we develop an industry-based generic 180 A. Mital et al. / International Journal of Industrial Ergonomics 24 (1999) 173,184 training process that, at the very least:

1. Can enhance the skills of workers at all levels,
2. Allow them to dynamically cope with changing Technology,
3. Give them options for personal and professional Growth,
4. Cut costs, increase productivity, and quality of Products manufactured, and
5. Make the U.S. human resource base second to none in the world.

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An ASCII value based text data encryption System

Udepal Singh*, Upasna Garg**

*Computer Science & Engineering, Guru Kashi University (Talwandi Sabo), INDIA.
** Computer Science & Engineering, Guru Kashi University (Talwandi Sabo), INDIA.

Abstract- Encryption is a process of generating secrect text from the input text using a secret key and a encryption algorithm. Input text is refered to as plain text and the secret text generated is known as cipher text. Encryption algorithms are mainly divided into two categories which are symmetric key encryption algorithm and asymmetric key encryption algorithm. In Symmetric key encryption algorithm the same key is used by both sender and receiver but in asymmetric key algorithm sender and receiver both uses the different keys. In this paper, we present a technique based on symmetric key encryption algorithm which uses ASCII vales of input text to encrypt the data. Text data encryption techniques are very useful in data communication where one user want to send some secret messages to another users.

Index Terms- Encryption, Decryption, ASCII, Symmetric Encryption, Plain Text, Cipher Text

I. INTRODUCTION

Cryptography or cryptology; from Greek meaning "hidden, secret"; and "writing", or "study" respectively; is the practice and study of techniques for secure communication in the presence of third parties called adversaries. More generally, it is about constructing and analyzing protocols that overcome the influence of adversaries and which are related to various aspects in information security such as data confidentiality, data integrity, and authentication. Modern cryptography intersects the disciplines of mathematics, computer science, and electrical engineering. Applications of cryptography include ATM cards, computer passwords, and electronic commerce.
There are two main types of cryptography. Those are public-key and symmetric-key. Public-key is a form of cryptography in which two digital keys are generated, one is private, which must not be known to another user, and one is public, which may be made available in public. These keys are used for either encrypting or signing messages. The public-key is used to encrypt a message and the private-key is used to decrypt the message. However, in another scenario, the private-key is used to sign a message and the public-key is used to verify the signature. The two keys are related by a hard one-way (irreversible) function, so it is computationally infeasible to determine the private key from the public key. Since the security of the private key is critical to the security of the cryptosystem, it is very important to keep the private key secret. This public-key system has the problem of being slow.
On the other hand, the system has powerful key management and, even more importantly, public-key cryptography has the ability to implement digital signatures in an efficient way. However, symmetric-key is a form of cryptography in which two parties that want to communicate can share a common and secret key. Each party must trust the other not to tell the common key to anyone else. This system has the advantage of encrypting large amount of data efficiently. However, the problem arises when it comes to key management over large number of users.

II. Research Elaborations

In this system we are using ASCII values of text data and a random key of 4 charcters to encrypt the data for communication purpose. The key by which plain text is encrypted is generated randomly by our system. Various transformations are applied to encrypt this plain text with the help of randomly generated key and the result becomes ciphertext. To decrypt the ciphertext reverse transformations are applied and the result becomes the original plain text. We are using visual C# to implement the algorithm.

Character	ASCII Value	Character	ASCII Value
A	97	n	110
B	98	o	111
C	99	p	112
D	100	q	113

E	101	r	114
F	102	s	115
G	103	t	116
H	104	u	117
I	105	v	118
J	106	w	119
K	107	x	120
L	108	y	121
M	109	z	122

Table I: A table for ASCII values for text data.

An algorithm to encrypt the data for our system is as follows :

Step I : Input the plain text and store it.

Step II: Find the ASCII values for each characters of the input.

Step III : Find the minimum ASCII value from the data.

Step IV: Perform the modulus operation on each ASCII content value with the minimum value find in the step no. III . i.e. (ASCII Content % minimum value) If the value of mod content is greater than 16 then again perform modcontent %16 and record the positions where the value of mod content is greater than 16.

Step V: Generate a random key of 4 characters by the system.

Step VI : Find the ASCII values of the key generated.

Step VII :Find the minimum value from the ASCII values of step VI.

Step VIII : Perform the modulus operation on key ASCII values with the minimum value obtained in step VII.

Step IX : Right shift the key one time.

Step X : Add minimum ASCII value from step III to mod key values to obtain the final key.

Step XI : Add mod contents of data to the final key obtained in step X.

Step XII : Generate the ciphertext from the ASCII values obtained from step XI

Algorithm to decrypt the data:

Step I : Input the ciphertext and find mincipher.

Step II: Obtained the ASCII values of this ciphertext and find mincipher.

Step III: Find the ASCII values of final key.

Step IV : Find the minimum value of final key.

Step V: calculate the difference of ASCII values of ciphertext and ASCII values of final key and add 16

     To the stored positions where the modcontent value is greater then 16.

**Step VI** : Add the minchiper to the difference to obtain the plaintext ASCII values.

Step VII: Generate the text with the help of ASCII values.

III. Results

Below figures and table shows the results obtained by our porposed algorithm. We use input data of various lengths with fixed length key to generate the cipher text. The system is adequate to generate cipher text with this variable length input data.
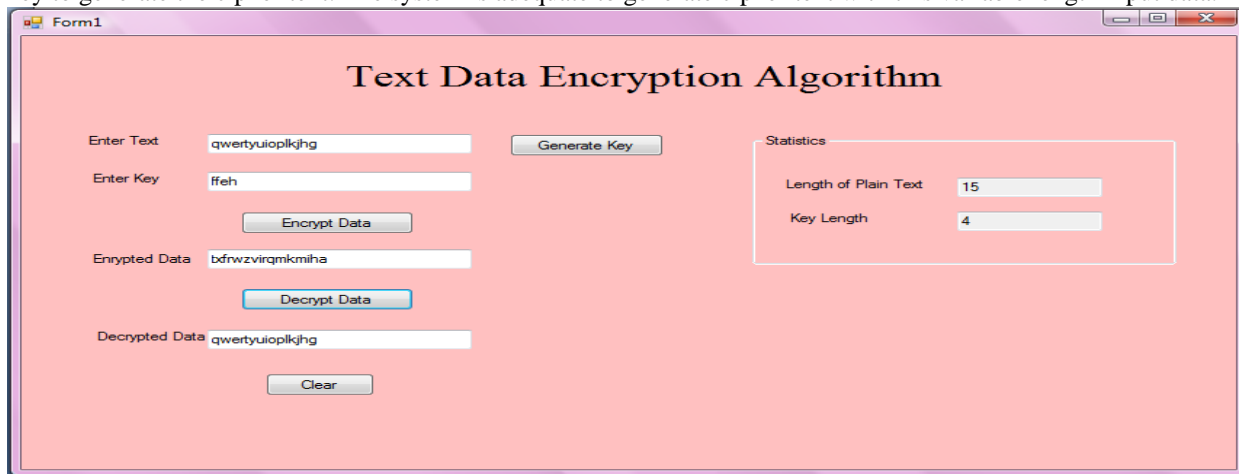
Figure 1: Output screen for 15 characters input.
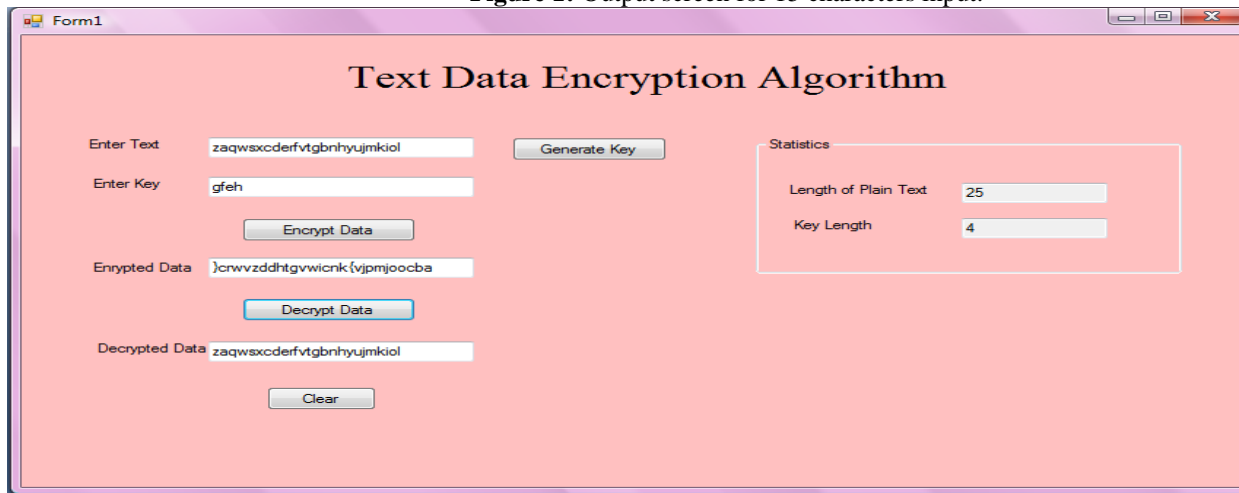
Figure 2: Output screen for 25 characters

Table II: The table which shows the result of the input data

Input data (Plain Text)	Symmetric Key (generated by system)	Out put Data (Cipher Text)
qwertyuiop	gaed	t}evwumrvac
asdfghjklmnbvcx	kjfg	bxhfhmnkmnbwhla
qwertyuioplkjhgfdsac	gijl	vwguyywltpnnohiiiscf
abcdefghijklmnopqrstuvwxy	glhl	fbhejflinjpmrntqvrxuzv|y~afb

IV. Conclusion

In this paper, we proposed an algorithm to encrypt and decrypt the data base on symmetric key encryption technique. The proposed system is generating very good results. In future, **:** the system can be further improved by using variable length key. System can be made to encrypt the data on the basis of Unicode values. It also can be improved for to decrypt the sentence form of data. so that it can be accepted globally

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Authors

First Author – Udepal Singh, M.Tech (Computer Science & Engg.), Guru Kashi University (Talwandi Sabo), INDIA, udepalsingh87@gmail.com

Second Author – ER. Upasna Garg, M.Tech (Computer Science & Engg.), CDLU, SIRSA.
        Astt. Prof. (CSE Deptt.), GKU (Talwandi Sabo), INDIA. Upasna.garg44@gmail.com

Static Analysis on Custom Polyurethane Spokes of Airless Tire

Anuj Suhag*, Rahul Dayal**

* School of Mechanical and Building Sciences, V.I.T University, India
** School of Mechanical and Building Sciences, V.I.T University, India

Abstract- The airless tire is a single unit replacing the pneumatic tire, wheel and valve assembly. It replaces all the components of a typical radial tire and is comprised of a rigid hub, connected to a shear band by means of flexible, deformable polyurethane spokes and a tread band, all functioning as a single unit. The Tweel, a kind of airless tire, though finds its generic application in military and earth moving applications due to its flat proof design can also render the pneumatic tire obsolete in domestic cars.

Our project involves fabrication of an airless tire prototype for domestic cars; this will be followed by a stress analysis study of the prototype. The study has been done on the SolidWorks design package wherein – stress and deflection studies have been performed.

***Index Terms*- Airless tire, Michelin^R, Pneumatic tire, SolidWorks, Tweel.

I. INTRODUCTION

Michelin first announced the Tweel in 2005. The name is a combination of the words tire and wheel because the Tweel doesn't use a traditional wheel hub assembly. A solid inner hub mounts to the axle that's surrounded by polyurethane spokes arrayed in a pattern of wedges. A shear band is stretched across the spokes, forming the outer edge of the tire (the part that comes in contact with the road). The tension of the shear band on the spokes and the strength of the spokes themselves replace the air pressure of a traditional tire. The tread is then attached to the shear band. When the Tweel is put to the road, the spokes absorb road impacts the same way air pressure does in pneumatic tires. The tread and shear bands deform temporarily as the spokes bend, then quickly spring back into shape.

Airless tires can be made with different spoke tensions, allowing for different handling characteristics. The lateral stiffness of the tire is also adjustable.

1) Drawbacks of Pneumatic tire

One of the basic shortcomings of a tire filled with air is that the inflation pressure is distributed equally around the tire, both up and down (vertically) as well as side-to side (laterally). That property keeps the tire round, but it also means that raising the pressure to improve cornering - increasing lateral stiffness - also adds up-down stiffness, making the ride harsh.

II. HISTORY

For more than 100 years, vehicles have been rolling along on cushions of air encased in rubber. The pneumatic tire has served drivers and passengers well on road and off, but a new design by Michelin could change all that – the **Tweel Airless tire**. This report discusses what such Airless Tires are, why one would use it in place of traditional tires, some of the problems that may occur with an airless tire and where one might see such Airless Tire in the future. When the tire is put to the road, the spokes absorb road impacts the same way air pressure does in pneumatic tires. The tread and shear bands deform temporarily as the spokes bend, then quickly spring back into shape. Airless tires can be made with different spoke tensions, allowing for different handling characteristics. More pliant spokes result in a more comfortable ride with improved handling. The lateral stiffness of the tire is also adjustable. However, you can't adjust a such a tire once it has been manufactured. You'll have to select a different one. For testing, Michelin equipped an Audi A4 with Tweels made with five times as much lateral stiffness as a pneumatic tire, resulting in "very responsive handling". Non-pneumatic tires (NPT), or Airless tires, are tires that are not supported by air pressure. They are used on some small vehicles such as riding lawn mowers and motorized golf carts. They are also used on heavy equipment such as backhoes, which are required to operate on sites such as building demolition, where tire punctures are likely. Tires composed of closed-cell polyurethane foam are also made for bicycles and wheelchairs. The main advantage of airless tires is that they cannot go flat, but they are far less common than air filled tires.

Airless tires generally have higher rolling resistance and provide much less suspension than similarly shaped and sized pneumatic tires. Other problems for airless tires include dissipating the heat buildup that occurs when they are driven. Airless tires are often filled with compressed polymers (plastic), rather than air.

Michelin is currently developing an integrated tire and wheel combination, the "Tweel" (derived from "tire" and "wheel," which, as the name "Tweel" suggests, are combined into one new, fused part), that operates entirely without air. Michelin claims its "Tweel" has load carrying, shock absorbing, and handling characteristics that compare favorably to conventional pneumatic tires.

Automotive engineering group of mechanical engineering department at Clemson University is developing a low energy loss airless tire with Michelin through the NIST ATP project. Resilient Technologies and the University of Wisconsin–Madison's Polymer Engineering Center are creating a "non-pneumatic tire", which is basically a round polymeric honeycomb wrapped with a thick, black tread. The initial version of the tire is for the SUVs and is expected to be available in 2012.Resilient Technologies airless tires have been tested and are used by the U.S. Army.

III.   CALCULATIONS

The following calculations undertake the Shaft design, key design and rim design. Assumptions made during the calculations are underpinned.

1) Shaft Design

The shaft is a rod of circular cross section which is used in transmission of power over a long distance and also for load supporting. Axle shafts are used for transmitting rotating motion of cam shaft to wheels. The following values are assumed to design the axle shaft:

Weight of car= 1.5ton
Power =100HP.
Tire diameter=500mm
RPM of tire, $N_1=6000$ RPM.
Material of the shaft is assumed to be Cast Iron Gr3.Coressponding to the material the following values are obtained from PSG DATA BOOK.

Tensile Stress = 520N/mm^2.
Bending Stress = 270N/mm^2.
Shear Stress = 100N/mm^2.

Bending moment, M=5886Nm
Twisting moment, T=3000Nm
$T_e = ((1.5 \times 5880)^2 + (1.2 \times 3000)^2)^{1/2} = 9526.4$ Nm
$T_e \leq (\pi/16) \times 100 \times d^3$.
$9520 \times 10^3 \leq (\pi/16) \times 100 \times d^3$
Diameter of shaft= 80mm.

2) Key Dimensions

Keys are used as fasteners so that both shaft and the mounted elements rotate together. The following calculations are performed keeping in mind the" Pin key" type
d'=0.2xd.
Diameter of key=16mm.

3) Design of Rim

Rim is the skeleton of the tire and is the hardest part of the wheel. It provides rigidity to the wheel and it is also responsible for transmission of power. Material of the rim is considered to be Alloy Steel SS.
Density of material = 7700 kg/m^3.
Tensile Strength = 723825617 N/mm^2.
Poisson's ratio = 0.28
Velocity of rim, V_1=120km/hr.
Stress S_t=density x v^2
S_t=7700x120x5/18
S_t=256666.6 N/m^2.
The calculated stress value is less than tensile value of rim, therefore assumed velocity is in the safe limit.
$V_1 = \pi \times D \times N/60$
N=3350.526 RPM
The rim speed is well under the standard speed of the shaft, so it is under the safety limit of the wheel.

3.1) Rim Thickness

t = D/200 + 6
t = 0.36/200 + 6
t= 8mm

3.2) Dimensions of arms in the Rim

Load on each wheel =0.375 ton = 375 kg.
Compressive stress of material = 180956404.3 N/mm^2.
Load = n x cross section area x compressive stress of material.
The number of arms in each rim is assumed to be 4 i.e.. n=4
Area of each arm = 0.01 x 0.01 = 1 x 10^{-4} m^2.
Compressive load = 3678.75 /0.01^2 x 4 = 9197125N/mm^2.
The compressive stress of design by calculation is much lesser than the actual compressive stress of the material and well under the safety limit.

3.3) Dimensions of hub

The d_i is the inner diameter of the hub of the tweel.The d_o is the outer diameter of the hub and the d_s is the diameter of the shaft which is equal to 80mm.The d_i is equal to d_s.
The d_o=1.5d_s+25,
The d_o=2d_s (PSG DATA BOOK) for safe limits,
The d_o is 160mm
The Length of the hub is calculated to be 15 mm.

4) Final Calculated Values

Diameter of shaft = 80mm
Diameter of key = 16mm
Diameter of rim = 360mm
Number of arms = 4
Dimensions of arms: x=10mm
                     y =10mm
Diameter of the hub: Inner diameter = 80mm
                     Outer diameter = 160mm
Length of the hub = 15mm

IV. ANALYSIS

According to the International Standard a pneumatic tire is required to be inflated up to 25 psi in order to have a proper air cushion for drive comfort and fuel efficiency. This air pressure is subject extrinsic properties like temperature. As per a study performed on Yamuna Expressway, the tire pressure after an hour of continuous journey the air pressure inside the tube of pneumatic tire reaches up to 56 psi.

To simulate such dynamic environment the spokes are under the subjugation of force, torque and pressure due to car's weight and acceleration. The spokes were under following conditions:

Table 1.The values of these extensive parameters are decided to depict the harshest condition a tire can withstand in normal on road performance.

Pressure	1.033e+005 N/m^2
Force	10000 N
Torque	11230 N-m

The conditions that are simulated are of zero initial velocity and positive acceleration. This is a scenario where the car has to overcome static friction and the wheels posses' higher stress. In such cases the design of spokes is significant in deciding the load bearing capacity and the materials elasticity. Therefore both design and material of spokes, is pivotal in the success of airless

Fig1. Isometric view of the wheel design .The design procedure is performed on the SolidWorks design package basedon the calculated parameters.

A. Material properties

The material property of the polyurethane polymer used in spokes of the tweel are listed below.These valuese are utilized in the static stress analysis on the wheel.
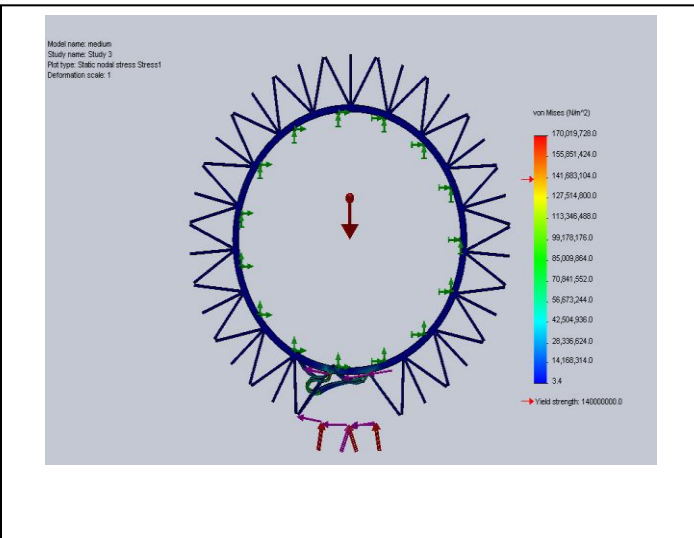

Fig.2. Stress analysis of wheel spokes subjected to high torque, pressure and normal forces on the wheel face.

Table 2.Material Properties

Table 2.Material Properties

V.RESULT

Mass density	1200	kg/m^3
Tensile strength	3e+007	N/m^2
Compressive strength	1.38e+009	N/m^2
Yield strength	1.4e+008	N/m^2
Thermal expansion coefficient	1e-006	/Kelvin
Thermal conductivity	0.209	W/(m.K)
Specific heat	1386	J/(kg.K)
Material damping ratio	0.4	NA
Elastic Modulus	6e+008	N/m^2
Poisson's Ratio	0.23	NA
Shear Modulus	2.5e+007	N/m^2

The maximum deflection in the spokes that are subjected to the aforementioned stress, torque and pressure values, are within the maximum permissible limits dictated by the material properties. It is found out from the analysis that the design is structurally rigid and stable to withstand all the simulated conditions and enough ductile to retreat to its original dimensions.

Table 3.Results of the simulation

Name	Min	Max
Stress	3.36838 N/m^2	1.7002e+008 N/m^2
Displacement	0 mm	130.165 mm
Strain	1.14799e-008	0.187904

VI.CONCLUSION

The spoke's design has performed satisfactorily under pre de--fined static conditions. The stress and deformation of material in these conditions is under permissible limits of material properties.

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[6] A tyre-terrain interaction model for off-road vehicles M. A. A. Emam1*, S. Shaaban1, S. El-Demerdash1 and H. El-Zomor2 1Automotive and Tractor Engineering Department,Helwan University, Egypt. Higher Technological Institute, 10th of Ramadan City – 6th of October Branch, Egypt. (Accepted 28 March, 2011).

AUTHORS

First Author – Anuj Suhag, B.Tech student, VIT University, E-mail: anuj.suhag27@gmail.com .
Second Author – Rahul Dayal, B.Tech student, VIT University, E-mail: rahul.dayal2007@gmail.com.

Mild and Efficient Phosphonitrilic Chloride mediated Synthesis for 1, 5-benzodiazepines

Ashok D. Sagar,[*a] Radhakrishnan M.Tigote,[a,b] Kishan P.Haval,[b] Yuvraj P. Sarnikar[c], Sunil Khapate[a].

[a] School of chemical sciences ,Swami Rammanand Teeth Marathwada University, Nanded-431 606
[b] Department of Chemistry, Dr.Babasaheb Ambedkar Marathawada University Subcampus Osmanabad-413 510
[c]Department of Chemistry, Dayanand Science College, Latur-413 512

Abstract- Phosphonitrilic chloride was found to be an efficient reagent for the preparation of 1,5-benzodiazepine derivatives of *o*-phenylenediamine and ketones. This method is an easy, rapid, and high yielding reaction for the synthesis of 1,5-benzodiazepine derivatives. The remarkable advantages offered by this method include green and reusable catalyst, mild reaction conditions, fast reaction rate, and excellent yield of products. This novel methodology maintains atom economy and an environmentally friendly approach.

I. INTRODUCTION

Heterocyclic compounds containing five or six membered ring with one or more nitrogen atoms are always of great importance in the pharmaceutical sector because of having bioisosteric factor. In 1971 Sternbach introduced benzodiazepines as drug.[1] Meanwhile Benzodiazepine is widely used as a primary etiological agent for the acquired immunodeficiency syndrome against the human immunodeficiency virus type 1 (HIV-1).[2] The anti-HIV chemotherapy era has started a decade ago. In the search for more effective and safe chemotherapeutic agents there has been considerable interest in non-nucleoside reverse transcriptase inhibitors or NNRTI's.[3] It was found that a number of compounds representing various structural types inhibit HIV-1 reverse transcriptase (RTase). [4]

In the view of 1,5-Benzodiazepine derivatives have received significant attention because of their accessibility, easy functionalization, and potential pharmacological properties including anti-inflammatory, antianxiety, anticonvulsant, and hypnotic activities. [5] It represents a "privileged scaffold" found in compounds active against a variety of target types including peptide hormones, [6a] interleukin converting enzymes.[6b] and inhibitors of mitochondrial F1F0 adenosine triphosphate (ATP) hydrolase. [6c]
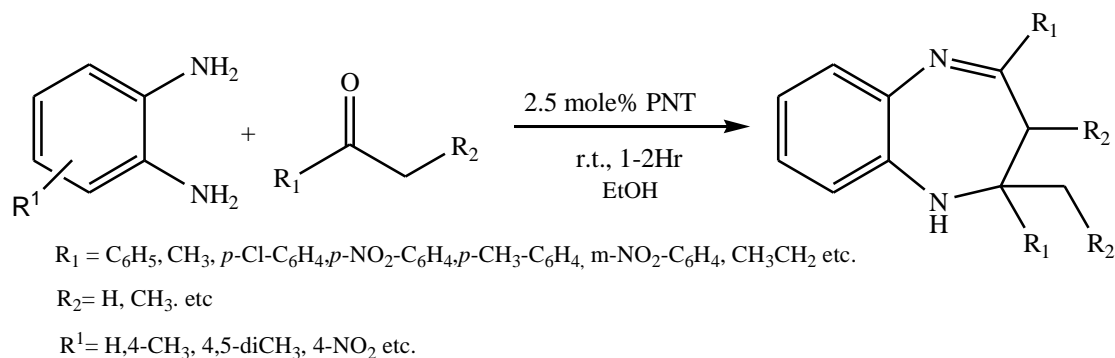
Consequently many methods has been developed for synthesis of1,5-Benzodiazepine derivatives , the area of biological interest in 1,5-benzodiazepines has been extended to various diseases such as cancer, [7a] viral infection, [7b] and cardiovascular disorders. [7c,d] These derivatives are also used as dyes for acrylic fibers in the photography industry. [8] Because of their wide range of pharmacological activity , industrial and synthetic applications, the synthesis of 1, 5-benzodiazepines has received increasing attention.

In addition, 1,5-benzodiazepines are key intermediates for the synthesis of various fused ring compounds such as triazolo-[9] and oxadiazolo-benzodiazepines. [10] The general and simplest method for synthesis of 1,5-benzodiazepines involves the acid catalyzed reaction of *o*-pheneylenediamine with ketones, β-haloketones and α,β-unsaturated carbonyl compounds. Many catalysts have been reported in the literature for this reaction including BF$_3$-OEt$_2$,[11] polyphosphoricacid-SiO2,[12] NaBH$_4$,[13] MgO/POCl$_3$,[14] Yb(OTf)$_3$,[15] CH3COOH using microwave,[16] Al$_2$O$_3$-P$_2$O$_5$. [17] ZnCl$_2$, [18] cerium ammonium nitrate (CAN). [19]

However, many of them suffer from the drawbacks such as high temperature, drastic conditions, relatively expensive reagents, and nonenvironmental friendliness except for some methods.[20] In camparison with broad spectrum utility of 1,5-benzodiazepines in many field , their preparation methods are limited in number and the chemical processes often employ large amounts of hazardous and toxic solvents. The choice of pursuing a low-waste route and reusable reaction media to minimize the economic cost and environmental impact of a chemical process is becoming ever more urgent for the future, so there is pressure on organic chemists to investigate clean, economical, and environmentally safer methodologies. Due to wide range of biological application of 1,5-benzodiazepines, the development of efficient, clean and environmentally friendly protocols for the synthesis of 1,5- benzodiazepines are desirable.

Recently, Phosphonitrilic chloride trimer (PNT) has received considerable attention as an inexpensive, nontoxic, readily available catalyst for various organic transformations, affording the corresponding products in excellent yields with high selectivity. The Lewis acidity associated with Phosphonitrilic chloride trimer (PNT) enhanced its usage in organic synthesis to realize several organic transformations using stoichiometric levels to catalytic amount. Owing to numerous advantages associated with this eco-friendly synthesis.

II. RESULTS AND DISCUSSION

In the present work, herein we wish to report PNT catalyzed efficient, simple and practical procedure for direct synthesis of 1,5-benzodiazepines through the reaction of o-phenylene diamine and ethyl methyl ketone (1:2) under stirring at room temperature in ethanol.

R_1 = C$_6$H$_5$, CH$_3$, *p*-Cl-C$_6$H$_4$,*p*-NO$_2$-C$_6$H$_4$,*p*-CH$_3$-C$_6$H$_4$, m-NO$_2$-C$_6$H$_4$, CH$_3$CH$_2$ etc.

R_2= H, CH$_3$. etc

R^1= H,4-CH$_3$, 4,5-diCH$_3$, 4-NO$_2$ etc.

Scheme 1

In our preliminarily investigation on model reaction of *o*-phenylene diamine and acetophenone , it was found that reaction could be finished under very simple reaction condition in the presence of catalytic amount of Phosphonitrilic chloride acid (PNT) and few (3 to 4) drop of EtOH as solvent which give desired 1,5-benzodiazepines product in good yield . The effect of solvent , catalyst, reaction time on the reaction was systematically investigated and result were summarized in **Table 1**. To optimize reaction condition to examine the effect of different solvent   H$_2$O, CH$_3$CN, MeOH, THF, Toluene, DCM, Ethanol and molar ratio of the catalyst at different . The reaction was monitoring by TLC and the entire yield reported in **Table 1**

Table 1 Optimization of reaction condition

Entry	Solvent	Time (Hr)	Yield [a] %
1	H$_2$O	12 Hr	Nil
2	CH$_3$CN	10 Hr	Nil
3	MeOH	8 Hr	20 %
4	THF	12 Hr	45 %.
5	Toluene	8 Hr	Nil.
6	DCM	5 Hr	65 %
7	**Ethanol**	2 Hr	**Above 80 %**

[a] Isolated Yield
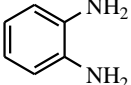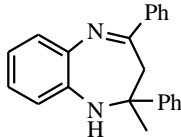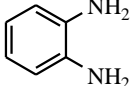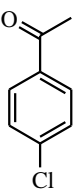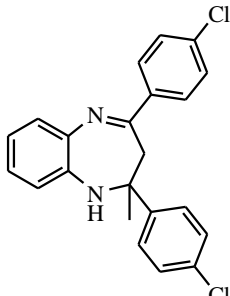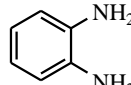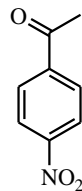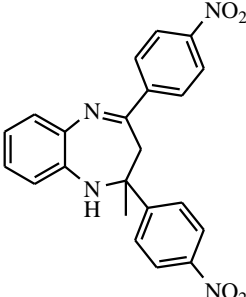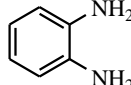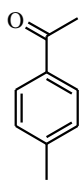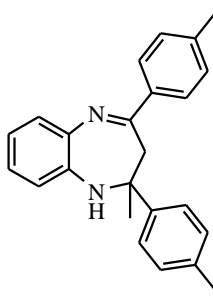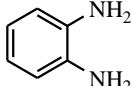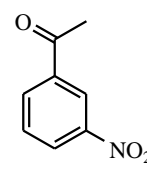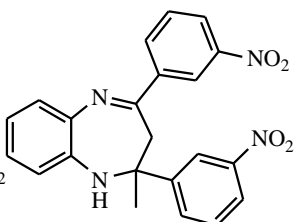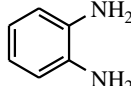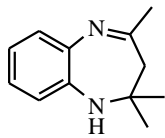
As can be seen from Table 1, solvent play an important role in the model reaction. It was found that Ethanol is the best one among the solvent tested and reaction proceeded smoothly in the ethanol and gave desired product in 80% yield, while DCM afforded the product only in 65% yield. Use of H$_2$O, CH$_3$CN, MeOH, THF and Toluene as solvent led to slower reaction (**Table 1, Entry 1-5**). To our delight, above 80% of model product was isolated when the model reaction was carried out in the presence of ethanol at room temperature for 1 Hr stirring only. With respect to catalyst loading, when 1 mol% to 5 mol % of PNT was used, the reaction goes to completion gave a satisfactory result.

During the course of our further optimization of reaction condition, the reactions were generally complete in a matter of 1-2 hours. Meanwhile experimental data indicated that the reaction was not complete when reaction time was less than 1 Hr. However, no increase in yield was observed when the reaction time was prolong with respect to solvent (**Table 1**). The optimized reaction conditions for the reaction were found to be PNT 2.5 mol % under stirring at room temperature for 1-2 Hr.
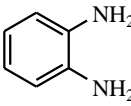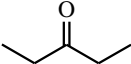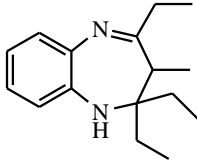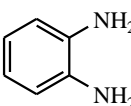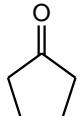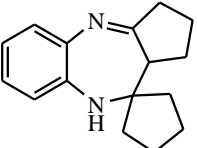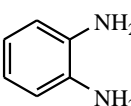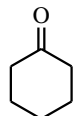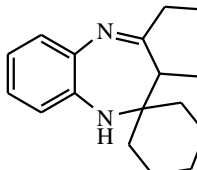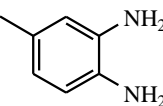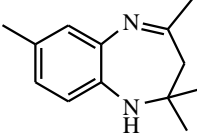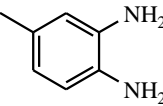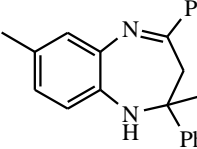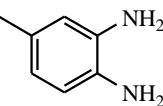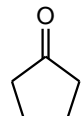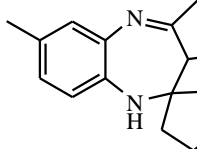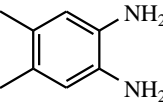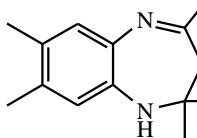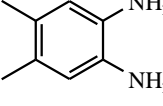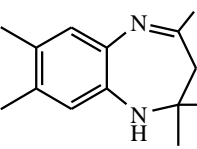
Having established the optimized reaction condition, we turn our attention to explore the scope of this protocol. The result are listed in **Table 2.**

Table 2 PNT catalyzed synthesis of 1, 5-benzodiazepines in ethanol[a.]

Entry	Substrate	Ketone	Product	Time (Hr)	Yield [b] %	M.P.^{o}C Reported	Found
1				2	87	150-152	152
2				1.2	82	143-144	145
3				3	80	156-158	155
4				2.2	90	98-99	101
5				2.4	85	151-153	157
6				1.4	90	137-138	136

Continue on next page

From Table 2

Entry	Substrate	Ketone	Product	Time (Hr)	Yield[b] %	M.P.°C Reported	Found
7				2	85	142-143	141
8				1.5	80	138-139	140
9				2.5	85	136-137	136
10				2	82	127-128	126
11				3	80	92-93	92
12				2	84	142-143	142
13				2.5	80	112-114	112
14				3	85	115-116	115

Continue on next page

From Table 2

Entry	Substrate	Ketone	Product	Time (Hr)	Yield[b] %	M.P.°C Reported	Found
15				2.5	75	113-114	114
16				3	80	136-138	136

[a]Reaction Condition : o-phenylene diamine (1 mmole) , acetone (2 mmole) and
Phosphonitrilic Chloride (Trimer) (2.5 mole %) in ethanol (2-4 drops) stir, 2 Hr R. T.
[b] Isolated Yield

As shown in the Table 2, in the most cases, o-phenylene diamine reacted with wide variety of substituted acetophenone completely and afforded the corresponding 1,5-benzodiazepines in good to excellent yield (**Table 2 , Entries 1-5**). Substituted acetophenone containing electron-donating or electron-withdrawing group on the benzene ring reacted with o-phenylene diamine smoothly under optimal condition to give the desired product. Furthermore, sterically demanding *ortho*-substituents hampered reaction so which are not shown in the **Table 2**.

To our delight cyclic ketones such as cyclopentanone, cyclohexanone whereas 3-pentanone (**Table 2, Entry 8, 9,7**) also reacted well and equally efficiently with similar success to afford fused ring 1, 5-benzodiazepines in high yields. Meanwhile substituted o-phenylene diamine with electron donating or electron withdrawing groups on the benzene ring reacted with ketone or cyclic ketone to generate corresponding product in high yield (**Table 2, Entry 10-16**) . It is important to note that substituted o-phenylene diamine with a strong electron withdrawing groups, such as nitro group on the benzene ring showed lower reactivity than those of ones with electron donating groups . (**Table 2, Entry 15-16**)

III.   CONCLUSION

We have presented an elegant and simple methodology for the synthesis of 1, 5-benzodiazepine derivatives from o-

phenylene diamine and cyclic or acyclic ketone in the presence of Phosphonitrilic Chloride by stirring in ethanol at room temperature. The reactions were performed smoothly to generate the corresponding products in high yields under the safe experimental condition and the procedure is simple and convenient. Furthermore, the catalyst is environmentally friendly and expensive. This method offer one of the important motifs for the synthesis of 1, 5-benzodiazepine, as natural product, biological active compounds and pharmaceutical agents.

Experimental Section
(a)*General Experimental Procedure for the synthesis of 1, 5-benzodiazepine:*

A mixture of *o*-phenylenediamine (1 mmol) and ketone (2. mmol) was stirred in the ethanol solvent at room temperature using Phosphonitrilic chloride (2 mol %) for an appropriate time as 2 Hr . The progress of the reaction was followed by TLC using 20%-40% EtOAc in *n*-Hexane as eluent. After completion of the reaction, the reaction mixture was separated from ethyl acetate (5ml) and water . The organic layer was evaporated and crud products were purified by recrystalization in *n*-Hexane or by column chromatography by silica gel using EtOAc : *n*-Hexane 20 : 80 as eluent.

Spectral analysis
2-methyl-2,4-phenyl-2,3-dihydro-1*H*-1,5-benzodiazepine [18] (Entry 1):
Yellow solid; M.P. 152 [0]C IR (CHCl$_3$, υ max): 3325, 2100, 1635, 1465, 1245, 1055, 815 cm^{-1}.; ^{1}H NMR (CDCl$_3$): δ 6.83–7.60 (m, 14H, ArH), 3.52 (s, 1H, NH), 2.96–3.15 (d, 2H, J = 13.2 Hz), 1.76 (s, 3H, CH$_3$).; ^{13}C NMR (CDCl$_3$, 100 MHz): δ 168.2 (C=N), 148.0, 140.5, 139.9, 130.2, 128.8, 128.5, 127.5, 126.7, 125.9, 122.1, 121.9, 74.2, 43.5, 30.3.Elemental Analysis: C$_{22}$H$_{20}$N$_2$ Calcd. C, 84.58; H, 6.45; N, 8.97. Found C, 84.43; H, 6.37; N,8.91.

4-(4-Chlorophenyl)-2- methyl-2,3-dihydro-*1H*-1,5-benzodiazepine[5c] (Entry 2):

M.P. 147^{0}C ^{1}H NMR (CDCl3): δ 6.84–7.53(m, 12H, ArH), 3.43 (s, 1H, NH), 2.87–3.09 (dd, 2H, J_1 = 12 Hz, J_2 = 12.8 Hz), 1.74 (s, 3H, CH3).

2-methyl-4-(4-nitrophenyl)-2,3-dihydro-1*H*-1,5-benzodiazepine[19] (Entry 3):

M.P. 155^{0}C ; ^{1}H NMR (CDCl$_3$): δ 6.90–8.08 (m, 12H, ArH), 3.64 (s, 1H, NH), 2.99–3.32 (m, 2H, CH$_2$), 1.85(s, 3H, CH$_3$). ;Elemental Analysis: C$_{22}$H$_{18}$N$_4$O$_4$ (402.13) calcd.: C, 65.66; H, 4.51; N, 13.92.Found: C, 65.37; H, 4.47; N, 14.01

2-methyl-4-(4-methyl phenyl)-2,3-dihydro-1*H*-1,5-benzodiazepine (Entry 4) [19]: **M.P.** 101^{0}C ;^{1}H NMR (CDCl$_3$): δ 6.81–7.59 (m, 12H, ArH), 3.52 (s, 1H, NH), 2.96–3.11 (m, 2H, CH$_2$), 2.34 (s, 3H,CH$_3$), 2.31 (s, 3H, CH$_3$), 1.74 (s, 3H, CH$_3$).;^{13}C NMR (CDCl$_3$):δ 168.1 (C=N), 145.5, 140.8, 140.5, 138.7, 137.4, 137.2, 129.5, 129.3,129.0, 127.6, 126.6, 125.7, 122.1, 122.0, 73.9, 43.3, 30.3, 21.8, 21.4.

2-methyl-4-(3-nitrophenyl)-2,3-dihydro-1*H*-1,5-benzodiazepine[5c] (Entry 5):

Mp 157 ^{0}C;^{1}H NMR (CDCl$_3$, 400 MHz): δ6.92–8.48 (m, 12H, ArH), 3.56 (s, 1H, NH), 2.99–3.28 (m, 2H, CH$_2$), 1.87(s, 3H, CH$_3$). ^{13}C NMR (CDCl$_3$): δ 164.6 (C=N), 149.6, 148.7, 141.0, 139.8, 137.6, 133.0, 132.4, 130.0, 129.7, 129.4, 127.9, 124.9, 122.9, 122.7, 122.0, 121.3, 104.0, 74.6, 43.3, 37.6, 30.4. HRMS (m/z): calcd. For C$_{22}$H$_{18}$N$_4$O$_4$; 402.1328; found 402.1295.

2,2,4-Trimethyl-2,3-dihydro-1*H*-1,5-benzodiazepine[18] (Entry 6):

Pale Yellow Solid M.P. 136^{0}C .^{1}H NMR (CDCl$_3$): δ 7.12–7.14 (m, 1H, ArH), 6.96–7.01 (m, 2H, ArH), 6.72–6.74 (m, 1H, ArH), 2.97 (s, 1H, NH), 2.37(s, 3H, CH$_3$), 2.22 (s, 2H, CH$_2$), 1.34 (s, 6H, 2CH$_3$). ^{13}C NMR (CDCl$_3$): δ 173.1 (C=N), 141.1, 138.3, 127.1, 125.9, 122.5, 122.2, 68.9,45.4, 30.8, 30.2;Elemental Analysis: C$_{18}$H$_{24}$N$_2$; Calcd. C,80.55; H, 9.01; N, 10.44. Found: C, 80.36; H,8.84; N, 10.31

2,2,4-Triethyl-3-methyl-2,3-dihydro-1*H*-1,5-benzodiazepine[16b] (Entry 7):

M.P. 141 ^{0}C ;^{1}H NMR (CDCl$_3$): δ 6.59–7.34 (m, 4H, ArH), 3.85 (s, 1H, NH), 2.81–2.83 (m, 1H), 2.49–2.57(m, 2H), 1.52–1.56 (m, 2H), 1.20–1.37 (m, 4H), 0.68–0.96 (m, 10H).

10- Spirocyclopentane- 1, 2, 3, 9, 10, 10ahexahydro-1*H*-dibenzo[b]-cyclopenta [e] [1,4] -diazepine (Entry 8); Yellow solid; M. P.   140ºC; IR (CHCl$_3$, υmax): 3338, 2150, 1670, 1640, 1245, 1050, 850 cm^{-1} ;^{1}H NMR: (CDCl$_3$) δ 6.6–7.39 (m, 4H). 4.54 (brs, 1H), 2.30–2.61 (m, 3H), 1.3–1.92 (m, 12H). ;^{13}C NMR: (CDCl$_3$) δ 178,143.1, 139, 132.2, 128.6, 126.3, 119.4, 118.3, 66.7, 54.4, 39.3, 38.5, 34.4, 33.2, 28.7, 24.5, 24.1, 23.2.;Elemental Analysis: C$_{16}$H$_{20}$N$_2$ Calcd. C, 79.96; H, 8.39;N, 11.66. Found: C, 79.78; H, 8.24; N, 11.43

10-Spirocyclohexane-2,3,4,10,11,11a-hexahydro-1H-dibenzo[b,e][1,4]

diazepine [16b] (Entry 9): Pale Yellow;M.P. 136^{0}C. ;IR(CHCl$_3$, υmax): 3290, 2100, 1850, 1640, 1150, 945, 758 cm^{-1}.;^{1}H NMR (CDCl$_3$): δ 6.99–7.33 (m, 4H, ArH), 3.80 (br, 1H, NH), 2.87–3.24 (m, 3H), 1.55–2.75 (m, 16H).;HRMS (m/z): calcd. C$_{18}$H$_{24}$N$_2$; 268.1939, found 268.1929.

2, 2, 4-Trimethyl-2, 3-dihydro-8 -methyl-1*H*-1, 5-benzodiazepine (Entry 10)

Yellow solid; M. P. 126ºC ;IR (CHCl$_3$, υmax): 3325, 2800, 2200, 1665, 1450, 1150, 945, 850, 710 cm^{-1}.;^{1}H NMR (CDCl$_3$): δ 7.05– 7.10 (m, 1H), 6.70–6.80 (m, 1H), 6.65–6.75 (s, 1H), 2.80 (s, 3H), 2.23 (s, 3H), 2.19 (s, 2H), 1.30 (s,6H).;^{13}C NMR (CDCl$_3$) :δ174.3, 138.1, 136.7, 127, 126.6, 122.6, 67, 45.8, 30.8, 30.8, 30.4, 29.6, 20.9.;Elemental Analysis: C$_{13}$H$_{18}$N$_2$; Calcd. C, 77.18,H, 8.97, N, 13.85. Found C, 77.10, H, 8.78, N, 13.72.

2-Methyl-2, 4- diphenyl – 2 , 3 – dihydro – 8- methyl-1*H*-1,5-enzodiazepine (Entry 11)

Yellow solid; M. P. 92ºC: IR (CHCl$_3$, υmax): 3275, 2750, 2100, 1659, 1240, 1045, 935, 850, 745 cm^{-1}.; ^{1}H NMR(CDCl$_3$): δ 6.70–7.69 (m, 13H), 3.5(brs, 1H), 3.13–3.17 (d, J= 13 Hz, 1H), 2.98–3.03 (d, J= 13 Hz, 1H), 2.41(s, 3H), 1.8 (s, 3H).;^{13}C NMR CDCl$_3$) : δ164.6, 136.9, 134, 131.2, 130.8, 129, 128.6, 128.5, 128.3, 128.2, 127.4, 126.3, 125.7, 123.5, 113.5, 51, 45.9, 28.7, 20.9.Elemental Analysis: C$_{23}$H$_{22}$N$_2$ Calcd. C, 84.63;H, 6.79; N, 8.58. Found C, 84.51; H, 6.65; N,8.42.

2, 2, 4- Trimethyl - 2, 3-dihydro – 7 , 8 -dimethyl-1H-1,5-benzodiazepine (Entry 13)

Yellow solid; M. P. 112ºC.;IR (CHCl$_3$, υmax): 3290, 2230, 1635, 1240, 1035, 850, 745.cm^{-1};^{1}H NMR(CDCl$_3$): δ 6.52(s, 1H), 6.39 (s, 1H), 2.80 (brs, 1H), 2.34 (s, 3H), 2.22 (s, 2H), 2.20 (s, 3H), 2.19 (s, 3H), 1.35 (s, 6H).;^{13}C NMR(CDCl$_3$): δ 171.3, 138.4, 135.5, 133.6, 129.9, 127.8, 122.8, 67.7, 45.3, 30.4, 30.3, 29.8, 19.1, 18.9.;
Elemnetal Analysis: C$_{14}$H$_{20}$N$_2$ Calcd. C, 77.73; H, 9.32; N, 12.95. Found C, 77.52; H, 9.15; N, 12.82.

2-Methyl- 2, 4-diphenyl-2 , 3 – dihydro – 7 ,8 -dimethyl-1H-1,5-benzodiazepine (entry 14): Pale yellow solid; M. P. 115ºC;IR(CHCl$_3$, υmax): 3285, 2200, 1950, 1635, 1130, 1050, 940, 835 cm^{-1} ;^{1}H NMR(CDCl$_3$): δ 7.50–7.60 (m, 4H), 7.30–7.18 (m, 6H), 7.15 (s, 1H), 6.6 (s, 1H), 3.45 (brs, 1H), 3.10 (d, J= 12.8 Hz, 1H), 2.90 (d, J= 12.8 Hz, 1H), 2.25 (s, 6H), 1.70 (s,3H).;^{13}C

NMR(CDCl$_3$): δ 166.8, 147.8, 139.7, 137.6, 135.7, 134.8, 129.6, 129.4, 128.2, 127.8, 126.9, 126.8, 125.4, 122.3, 73, 43.2, 29.7, 19.3, 18.6.;Elemental Analysis: C$_{24}$H$_{24}$N$_2$ Calcd. C, 84.67;H, 7.11; N, 8.23. Found C, 84.42; H, 7.02; N,8.15.

2-Methyl-2, 4-diphenyl-2 , 3-dihydro-8-nitro- 1H-1,5-benzodiazepine (Entry 16):

Dark yellow solid; M. P. 136ºC; IR(CHCl$_3$, υmax): 3300,2150, 1950,1651,1430,1250,1085,970, 850. cm^{-1}; ^{1}H NMR(CDCl$_3$): δ 6.80–7.95 (m, 13H), 4.40(brs, 1H), 3.35 (d, J = 12.6 Hz, 1H), 3.05–3.15 (d, J =12.6 Hz, 1H), 1.80(s, 3H).

^{13}C NMR (CDCl$_3$): δ 168.4, 145, 136.9, 132.4, 130.8, 129, 128.6, 126.2, 121.2, 118.3, 60.8, 45.6, 29.2.;Elemental Analysis: C$_{22}$H$_{20}$N$_3$O$_2$;Calcd. C, 73.72; H, 5.62; N, 11.72. Found C,73.62; H, 5.51; N, 11.53.

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AUTHORS

First Author – Ashok D. Sagar, School of chemical sciences ,Swami Rammanand Teeth Marathwada University, Nanded-431 606, E-mail: sagaradd@gmail.com

Second Author – Radhakrishnan M.Tigote, School of chemical sciences ,Swami Rammanand Teeth Marathwada University, Nanded-431 606, Email: rmtigote@gmail.com

Third Author – Kishan P.Haval, Department of Chemistry, Dr.Babasaheb Ambedkar Marathawada University Subcampus Osmanabad-413 510

Fourth Author – Yuvraj P. Sarnikar, Department of Chemistry, Dayanand Science College, Latur-413 512, Email: sarnikaryp@gmail.com

Fifth Author – Sunil Khapate, School of chemical sciences ,Swami Rammanand Teeth Marathwada University, Nanded-431 606

Impact of Plant Growth regulators (PGRs) on callus induction from internodal explants of Tecomella undulata (Sm.) Seem- A Multipurpose Medicinal plants

Manisha B. Patel[*] and Rajesh S. Patel[**]

[*] Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan
[**] Maninagar Science College, Ahmedabad, Gujarat

Abstract- A study of callus induction of *Tecomella undulata* was conducted using a various concentrations of PGRs namely cytokinins such as BAP and KIN and auxins such as 2, 4-D, NAA and IAA. Internodal explants were aseptically cultured on MS medium supplemented with different concentrations (1.0- 3.0 mg/l) of BAP, KIN, 2, 4-D, IAA and NAA. After two weeks callus was formed at the cut surface of the explants. The highest number of callus forming was obtained from explants cultured on the medium supplemented with 2.0 mg/l in 2.5mg/l 2,4-D alone were the induced calli were ceramish white in colour and structurally friable.

Abbreviations s- MS - Murashige and Skoog (1962) basal medium; BAP - Benzyl amino purine; KIN- Kinetin 2,4-D - 2,4-Dichlorophenoxyacetic acid; NAA - a-naphthalene acetic acid; IAA - Indole acetic acid.

I. Introduction

Tecomella undulata (Sm.) Seem (Bignoniaceae) is a medicinally and economically important plant that originated in India and distributed in the drier parts of Arabia and Southern Pakistan. It is one of the co-dominant species of Drier parts of India in the desert of western Rajasthan and Gujarat. It is an important agro-forestry (Anonymous 2003), deciduous or nearly evergreen tree grows under natural conditions in wild, unprotected and highly exploited. It appears in the list of endangered plants of Rajasthan. (Tripathi and Jaimini, 2002). The plant has been extensively used since ancient times for the treatment of human ailments. It posses anticancer activity (Ravi *et. al.* 2011), hepatoprotective (Khatri *et. al.* 2008 and Gupta 2011 and Goyal *et. al*. 2012), analgesic activity (Ahmed *et. al.* 1994), antibacterial activity (Gehlot *et. al.* 2007), mild relaxant, cardiotonic and chloretic activities (Khare *et. al.*2007) etc. The bark obtained from the stem is contains certain secondary metabolites like tecomin, alkenes, alkanols, β-sitosterols, chromone glycosides, undulatoside, A and B, iridoid glucosides,tecomelloside, tecoside,lapachol, veratric acid (Nandkarni *et. al*. 2000, Rastogi *et. al.* 2006, and Ambasta *et. al*. 2006) and is employed for the treatment of various diseases of skin, central nerves system, urinary disorders, enlargement of spleen, gonorrhoea, leucoderma, liver diseases, jaundice, diabetes, cancer and swellings. Leaves shows significant antimicrobial activity and contains certain chemical constituents like triacontanol, betulinic acid, oleanolic acid and ursolic acid.

Triacontanol is an effective plant growth regulator while both betulinic acid and ursolic acid is potent antihuman immunodeficiency virus (HIV) and are used in treatment of AIDS (Azam, M. M., 1999 and 2000). Due to overexploitation and considerable demand of this medicinal plants, we are faced with the problem of losing our precious plant resource in the future need to conserve this plants.

II. Material and Methods

Collection and Sterilization of Explants

Explants were collected from Botanical Garden of H. N. G. University, Patan (Gujarat). The explants were washed thoroughly in running tap water and then surface sterilized with surfactant Tween-20 for 10 minutes followed by repeated rinsing with sterile double distilled water. The surface-sterilized explants were treated with 0.5% (4% sodium hypochloride) for 5 minutes and finally rinsed with sterilized double distilled water for 3-4 times to remove the traces of sterilants. They were further sterilized with 0.1% (W/V) $HgCl_2$ for 10 minutes under aseptic conditions in a Laminar Air flow Chamber and finally, the explants were washed thoroughly with autoclaved double distilled water for several times to remove traces of $HgCl_2$. Explants were cut into 1 cm segments and carefully cultured on the MS culture medium (Murashige and Skoog, 1962) consisting of different concentrations and combinations of auxin and cytokinin.

Media Preparation and culture conditions

The MS medium was used for callus induction containing 3% (w/v) sucrose was solidified with 0.8% (w/v) agar (Hi-Media, India). The MS medium is supplemented with various concentrations (0.5-3.0mg/l) of growth regulators namely cytokinins such as BAP and KIN and auxins such as 2, 4-D, NAA and IAA and also in combination. The pH of the medium was adjusted to 5.8 with 1N NaOH or 1N HCl solutions prior to autoclaving at 121°C at 15 psi pressure for 15 to 30 minutes. The cultures were incubated at were incubated at $25\pm 2°C$ and light intensity (3500- 4000 lux) under 16 hours photoperiod with cool-white fluorescent tubes and $55\pm 5\%$ relative humidity.

III. STATISTICAL ANALYSIS

The experiments of callus culture were conducted with a minimum of five replicates. All experiments were repeated three times. The data were analyzed by mean ± standard error.

IV. RESULTS AND DISCUSSION

Internodal explants of *Tecomella undulata* were cultured on MS media supplemented with BAP, KIN, 2,4-D, NAA and IAA alone for callus induction. The effect of PGRs on callus formation is shown in Table 1. The maximum callus induction to be found (94.00 ± 0.00) was observed in 2.5 mg/l 2,4-D were the induced calli were ceramish white in colour and structurally friable followed by (92.00 ± 0.00) was observed in 3.0 mg/l BAP were the induced calli were brownish white in colour and structurally compact. The callusing response increases with increases the concentration of BAP. The lowest callusing (22.7 ± 0.72) was observed in 3.0 mg/l IAA. No callus induction was found to in 1.0mg/l and 1.5mg/l of IAA and also the callusing response decreases with increases the concentration of IAA. The highest callus growth in terms of fresh and dry weight (2.58 ± 0.8 g and 1.12 ± 0.14 g) 2.5mg/l 2,4-D followed by 2.47 ± 0.02 g fresh weight and 0.76 ± 0.04 g dry weight was obtained in in 3.0 mg/l BAP (Table.1). The lowest growth rate of 0.12 ± 0.02g

fresh weight and 0.04 ± 0.01 g dry weight was obtained in 3.0 mg/l IAA. The effect of growth regulators on callus growth of different plant species were studied in several research reports. In this respect,

Similar response was also observed in the callus formation and shoot multiplication of *Oroxylum indicum (*Gokhale, M. and Bansal, Y. K., 2009).   In vitro regeneration of *Tecomella undulata* (Sm.) Seem- an endangered medicinal plant reported by Danya U. *et al*.,2012. Ragavendra singh et al (2009) achieved *in vitro* adventitious shoot regeneration in *T. undulata*. Gang *et al*., (2003) reported that auxins and cytokinins are the most widely used plant growth regulators in plant tissue culture and auxins play an important role in the callus induction and different types of auxins had various effects (Baskaran *et al*., 2006). Rao *et al*., (2006) reported the cytokinins facilitated the effect of auxin in callus induction.

V. CONCLUSION

The MS medium contains various plant growth regulators like 2,4-D, BAP, KIN, NAA and IAA using the range between 1.0-3.0mg/l. Callus induction was recorded and the maximum callus induction was observed in the 2,4-D 2.5mg/l.

Table 1: Effects of Plant Growth Regulators (PGRs) on callus induction and callus growth of internodal explant of *Tecomella undulata (Sm.) Seem* (Mean± S.E)

Plant Growth Regulators (PGRs)	Concentration of (PGRs) (mg/l)	Percentage (%) for callus induction (Mean±SE)	Response intensity of callus	Texure of callus	Callus colour	Fresh weight of callus (g) (Mean±SE)	Dry weight of callus (g) (Mean±SE)
Control	-	-	-	-	-	-	-
MS+ BAP	1.0	83.4 ±1.36	+++	Friable	Brown	1.25 ± 0.02	0.14 ± 0.04
	1.5	86.8 ± 0.58	+++	Friable	Whitish brown	1.28 ± 0.01	0.12 ± 0.03
	2.0	89.2 ± 0.49	+++	Friable	Whitish brown	1.2 4± 0.02	0.11 ± 0.03
	2.5	90.0 ± 0.54	++++	compact	Creamish brown	2.09 ± 0.02	0.52 ± 0.04
	3.0	92.0 ± 0.00	++++	compact	Brownish white	2.47 ± 0.02	0.76 ± 0.04
MS+KIN	1.0	47.2 ± 1.28	+	compact	Brownish white	0.44 ± 0.02	0.12 ± 0.02
	1.5	55.2 ± 1.59	+	compact	Brownish white	0.48 ± 0.06	0.11 ± 0.01
	2.0	67.4 ± 1.20	++	compact	Brownish white	0.52 ± 0.05	0.14 ± 0.02
	2.5	73.4 ± 1.36	++	Friable	Creamish brown	1.11 ± 0.07	0.28 ± 0.09
	3.0	89.6 ± 0.81	+++	Friable	Creamish brown	1.22 ± 0.07	0.90 ± 0.08
MS+2,4-D	1.0	65.0 ± 0.44	++	Friable	Creamish white	0.92 ± 0.03	0.14 ± 0.09
	1.5	74.4 ± 1.20	++	Friable	Creamish white	0.84 ± 0.03	0.52 ± 0.04
	2.0	89.5 ± 0.50	+++	Friable	Creamish white	1.23 ± 0.03	0.28 ± 0.04
	2.5	94.0 ± 0.00	++++	Friable	Creamish white	2.50 ± 0.80	1.12 ± 0.14
	3.0	85.8 ± 0.73	+++	Friable	Creamish white	1.96 ± 0.16	0.81 ± 0.01
MS+NAA	1.0	60.0 ± 0.70	++	Friable	Light green	0.69 ± 0.07	0.14 ± 0.03
	1.5	71.0 ± 0.44	++	Friable	Light green	0.78 ± 0.03	0.16 ±0.02
	2.0	77.6 ± 0.67	++	Friable	Light green	0.93 ± 0.09	0.49± 0.07
	2.5	88.0 ± 1.30	+++	compact	Brownish white	1.37 ± 0.09	0.86 ± 0.07
	3.0	88.8 ± 0.86	+++	Friable	Light green	1.05 ± 0.09	0.18 ± 0.03
MS+IAA	1.0	0.00 ± 0.00	-	-	-	0.00 ± 0.00	0.00 ± 0.00
	1.5	0 .00 ± 0.00	-	-	-	0.00 ± 0.00	0.00 ± 0.00
	2.0	40.0 ± 0.54	+	Friable	Whitish green	0.30 ± 0.01	0.11 ± 0.02

2.5	37.6 ± 0.87	+	Friable	Whitish green	0.28 ± 0.01	0.13 ± 0.04
3.0	22.7 ± 0.72	+	Friable	Whitish green	0.12 ± 0.02	0.04 ± 0.01

Note: (-) No response, (+) poor growth, (++) modrate growth, (+++) good growth, (++++) very good growth

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AUTHORS

First Author – Manisha B. Patel, Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan., Email: manishapatel66@gmail.com
Second Author – Rajesh S. Patel, Maninagar Science College, Ahmedabad, Gujarat.

Performance Appraisal System to Improve Construction Productivity paper submitted to International Journal of Scientific and Research Publications

Sheetal Marawar

Department of Construction Management, D.Y.Patil College of Engineering, Akurdi, Pune (M.S.)

Abstract- Performance Appraisal is the method of evaluating the behavior of the employees in the workplace, normally including both quantitative and qualitative aspect of the job.
How the employee is performing, how the employee can develop, what the superior can do to make it happen and how the job is going.

Performance Appraisal is conducted for the following:

- Provide information about the performance ranks. Decision regarding salary revision, confirmation, promotion and demotions.
- Provide feedback about level of achievement and behavior of the subordinate.
- Provide information which helps to counsel the employees.
- Provide information to diagnose the deficiency of the employees.
- Provide training and development needs of the employees.

I. INTRODUCTION

Performance Appraisal is the systematic evaluation of the performance of employees and to understand the abilities of a person for further growth and development. Performance appraisal is generally done in systematic ways which are as follows:

- The supervisors measure the pay of employees and compare it with targets and plans.
- The supervisor analyses the factors behind work performances of employees.
- The employers are in position to guide the employees for a better performance.

Objectives of Performance Appraisal

Performance Appraisal can be done with following objectives in mind:

- To maintain records in order to determine compensation packages, wage structure, salaries raises, etc.

- To identify the strengths and weaknesses of employees to place right men on right job.
- To maintain and assess the potential present in a person for further growth and development.
- To provide a feedback to employees regarding their performance and related status.
- To provide a feedback to employees regarding their performance and related status.
- It serves as a basis for influencing working habits of the employees.
- To review and retain the promotional and other training programs.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

- Identify construction companies which are using Performance Appraisal system for their employees
- Study and gather information for existing Performance Appraisal system
- Identify the flaws, drawbacks of existing PA system. Also, interview 4-5 employees and take their feedback about the performance appraisal system
- Propose a customized Performance Appraisal System which suits to the organizations existing PA system. Encourage construction companies of the importance of proper Performance Appraisal and explain them the benefits of the new proposed system
- Comparison between proposed PA system and existing system.

III. STUDIES AND FINDINGS

Some Purposes of Performance Appraisal

Organizational
- Set and Measure Goals
- Measure Individual Performance
- Give Feedback
- Get Performance Improvement

Administrative
- Award Pay Increases
- Promotion Screening/Decisions
- Career Advancement
- Downsize/Layoff Decisions
- Legal Documentation

Individual
- Motivate/Provide Recognition
- Coaching and Mentoring
- Counsel Problem Performers
- Development/Training Needs

Control
- Management Direction
- Employee Compliance

Characteristics of Performance Appraisal

Virtually all performance appraisal programs have the following characteristics:

1. Outside Judgment- Using the performance standards, each employee's individual actual work performance, behaviors, production, or traits are compared with the performance standards by someone other than the employee.

2. Specified Time Period- Employee ratings, judgments, and assessments relate to a specific time period rather than a particular work product or project (typically quarterly and/or annually).

3. Standardization- The process is systematically applied to all employees or class of employees.

4. Mandatory- The process is typically mandatory although certain upper-level executives may be excluded.

5. Documented- The results of the ratings, judgments, or assessments are recorded and preserved by someone in the organization other than the rated employee.

Factors Considered for Performance Appraisal

The following factors are considered for Performance Appraisal
- Performance Factor
- Behavioral Factor
- Grading System
- Personal Effectiveness

Performance Factor- Below are the performance related factors considered for Performance Appraisal

1. **Job Knowledge (knowledge of duties and responsibilities of position)**
   - Unable to complete job duties, poor understanding of job
   - Lacks knowledge of some phases of work
   - Has adequate grasp of job requirements, able to learn new aspects of job
   - Understands all phases of work, most job duties mastered

   - Has completely mastered job, strives to learn more/improve job skills

2. **Quantity of Work (amount of work done during workday)**
   - Minimum requirements not met, volume of work generally unsatisfactory
   - Volume of work is generally below what is expected, does just enough to get by
   - Volume of work meets job requirements; when situation requires, production increases
   - Volume of work frequently above that expected
   - Produces consistently high volume of work, extremely productive and fast

3. **Initiative (origination and development of vital job procedures)**
   - Develops new ideas and methods to improve quality of results
   - Seeks additional knowledge pertaining to job
   - Follows formal instructions as necessary
   - Shows little interest in current practices relating to job
   - Unwilling to demonstrate interest in gaining new knowledge

Behavioral Factor- Below are the behavioral related factors considered for Performance Appraisal

1. **Responsibility and Dependability (willingness to take on assignments and be held accountable)**
   - Requires minimum of supervision; seeks additional responsibility; is very reliable
   - Reliable, requires little supervision, carries through effectively
   - Usually takes care of necessary tasks and completes them with reasonable promptness

- Frequently requires prompting, often fails to meet deadlines
- Unreliable, requires close supervision, does not accept responsibility

2. **Attendance and Punctuality (conformity to work hours; timely attendance at meetings)**
   - Absent often, frequently late, chronic offender
   - Lax in attendance or reporting time, allows personal factors to interfere
   - Usually present and on time, generally reliable
   - Very prompt, shows responsibility toward regular attendance
   - Superior attendance and promptness, always dependable

Grading System - Below are the Grading System related factors considered for Performance Appraisal

1. **Effective use of time** (ability to organize, prioritize and schedule)
   - Ineffective in routine tasks, cannot plan or schedule
   - Difficulty in determining priority and schedule of duties
   - Completes assignments within time expected, meets schedules
   - Plans skillfully, handles unusual situations
   - Extremely capable in coordinating tasks in changing situations

Personal Effectiveness - Below are the Personal Effectiveness related factors considered for Performance Appraisal

1. **Quality (correctness, completeness, and accuracy of work duties performed)**

- Requires minimum of supervision, consistently thorough and accurate
- Requires little supervision, is exact and precise most of the time, seldom makes errors
- Usually accurate, makes minimum number of mistakes
- Makes above average number of errors, final product often needs revision or correction
- Makes frequent and recurrent errors

2. **Interpersonal Relations (communication and cooperation with fellow employees)**
   - Goes out of way to promote good interpersonal relations, very cooperative
   - Effectively handles difficult interpersonal relations
   - Adapts self to others and to most situations, seeks guidance when needed, user friendly
   - Sometimes rigid and defensive, does not foster good working environment
   - Fails to consider others, not courteous, lacks understanding

3. **Internal Control (performance as related to individual's internal control responsibilities)**
   - Has a minimum understanding of internal control procedures
   - Internal control practices are somewhat below normal expectations
   - Has an adequate knowledge of internal control practices and procedures
   - Internal control practices and procedures are frequently above those expected
   - Has completely mastered internal control policies and procedures for department

Model of Individual / Organizational Performance
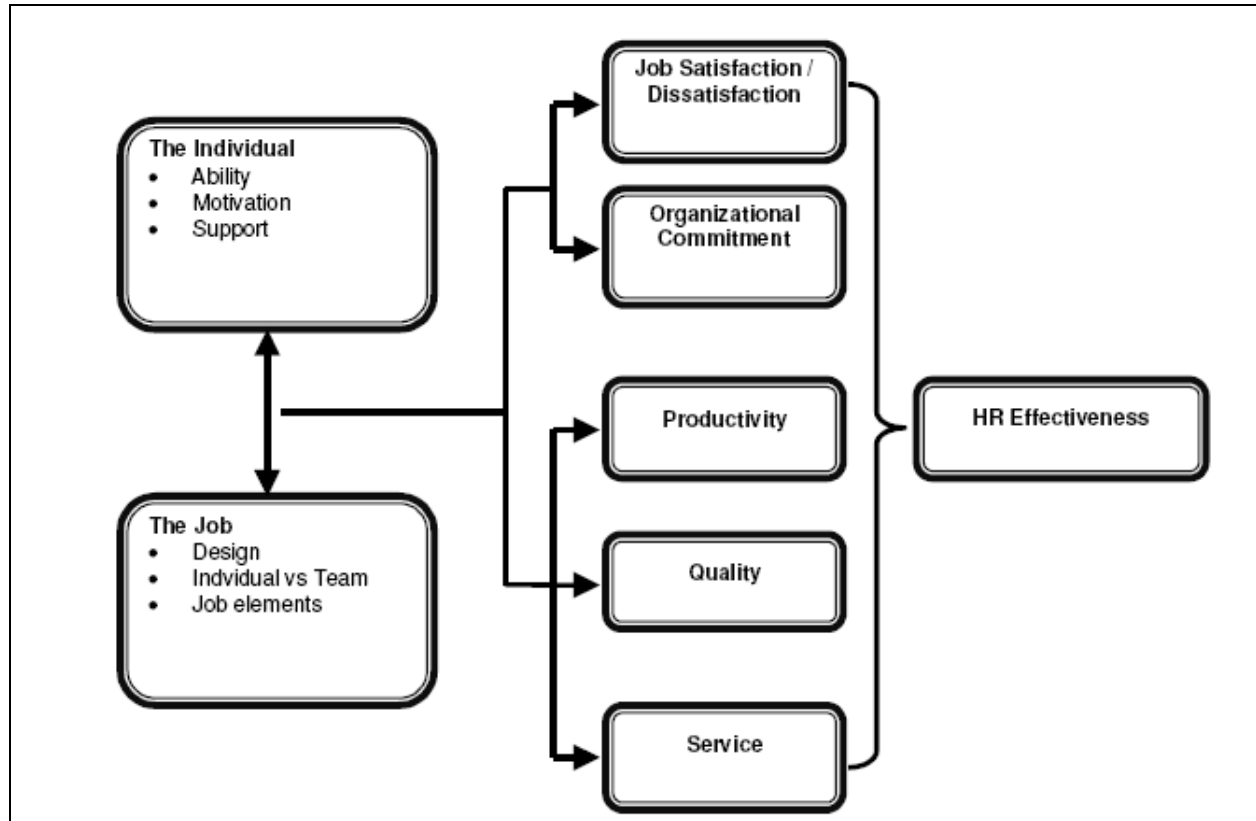
Steps of a Performance Appraisal

- Planning
- Performing
- Evaluating
- Finalization of results

Overall Performance Planning Cycle
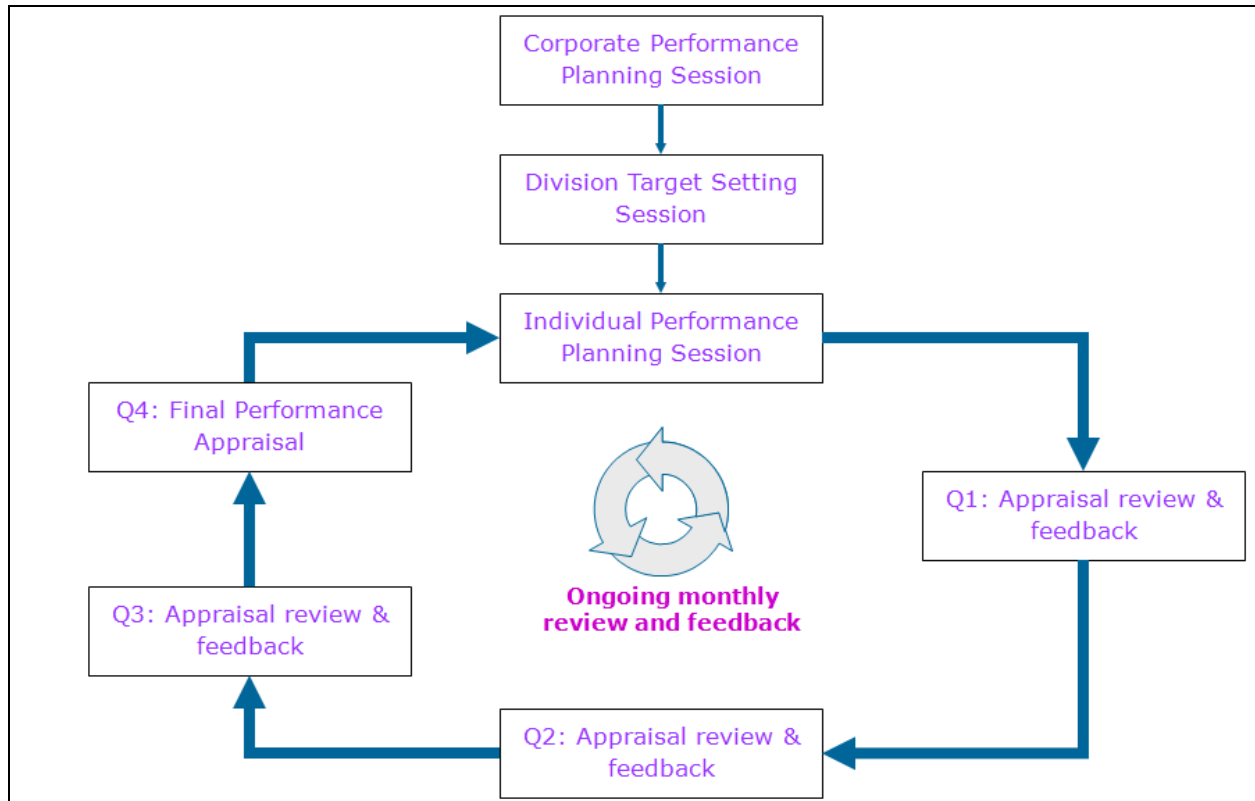
Methods of Performance Appraisal
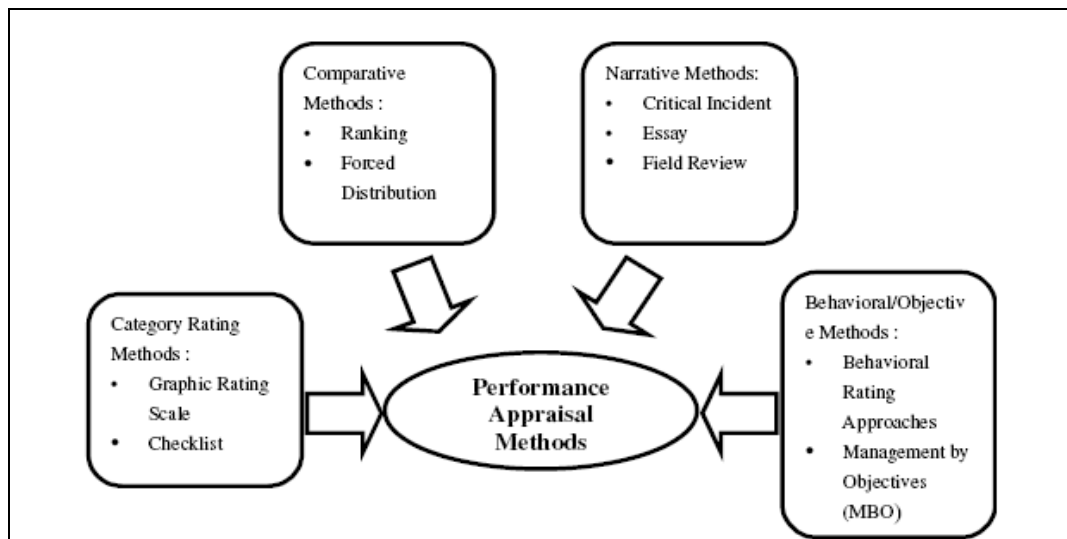
Figure3: Performance Appraisal Methods

Graphic Rating Scales
- A graphic scale 'assesses a person on the quality of his or her work (average; above average; outstanding; or unsatisfactory).'
- Assessment could also be trait centered and cover observable traits, such as reliability, adaptability, communication skills, etc.

- Although graphic scales seem simplistic in construction, they have application in a wide variety of job responsibilities and are more consistent and reliable in comparison with essay appraisal.

- The utility of this technique can be enhanced by using it in conjunction with the essay appraisal technique.

Typical Graphic Rating Scale
Employee Name...................   **Job title ....**
Department ....   **Rate ....**
Data ....

Criteria	Unsatisfactory (1)	Fair (2)	Satisfactory (3)	Good (4)	Outstanding (5)
Quantity of work: Volume of work under normal working conditions					
Quality of work: Neatness, thoroughness and accuracy of work Knowledge of job					
A clear understanding of the factors connected with the job					
Attitude: Exhibits enthusiasm and cooperativeness on the job					

Table1: Typical Graphic Rating Scale

Checklist Method
•   Another simple type of individual evaluation method is the checklist.
Example:
Is the employee really interested in the task assigned? Yes/No
Is he respected by his colleagues (co-workers)
        Yes/No
Does he give respect to his superiors?
        Yes/No
Does he follow instructions properly?
        Yes/No
Does he make mistakes frequently?   Yes/No

Ranking Method
        This is one of the oldest and simplest techniques of performance appraisal. In this method, the appraiser ranks the employees from the best to the poorest on the basis of their overall performance. It is quite useful for a comparative evaluation

Forced Distribution
- Unlike the field review method, the forced-choice rating method does not involve discussion with supervisors.
- Although this technique has several variations, the most common method is to force the assessor to choose the best and worst fit statements from a group of statements.
- These statements are weighted or scored in advance to assess the employee. The scores or weights assigned to the individual statements are not revealed to the assessor so that she or he cannot favor any individual.
- In this way, the assessor bias is largely eliminated and comparable standards of performance evolved for an objective.
- However, this technique is of little value wherever performance appraisal interviews are conducted.

Critical Incidence Method
        Under this method, the manager prepares lists of statements of very effective and ineffective behavior of an employee. These critical incidents or events represent the outstanding or poor behavior of employees on the job

Essay appraisal method
- The assessor writes a brief essay providing an assessment of the strengths, weaknesses and potential of the subject.
- In order to do so objectively, it is necessary that the assessor knows the subject well and should have interacted with them.
- Since the length and contents of the essay vary between assessors, essay ratings are difficult to compare.

Field review method
- Since individual assessors differ in their standards, they inadvertently introduce bias in their ratings.
- To overcome this assessor-related bias, essay and graphic rating techniques can be combined in a systematic review process. In the field review method, 'a member of the HRM staff meets a small group of assessors from the supervisory units to discuss each rating, systematically identifying areas of inter-assessor disagreement.'
- It can then be a mechanism to help each assessor to perceive the standards uniformly and thus match the other assessors.
- Although field review assessment is considered valid and reliable, it is very time consuming.

Behaviorally anchored rating scales (BARS)
- This is a relatively new technique.
- It consists of sets of behavioral statements describing good or bad performance with respect to important qualities.

- These qualities may refer to inter-personal relationships, planning and organizing abilities, adaptability and reliability.
- These statements are developed from critical incidents collected both from the assessor and the subject.

Management by Objectives

- The employees are asked to set or help set their own performance goals.
- This avoids the feeling among employees that they are being judged by unfairly high standards.
- This method is currently widely used, but not always in its true spirit.
- Even though the employees are consulted, in many cases management ends up by imposing its standards and objectives.
- In some cases employees may not like 'self-direction or authority.' To avoid such problems, the work standard approach is used.

360-Degree Feedback

360 Degree Feedback is a multi - rater feedback system where an individual is assessed by a number of assessors including his boss, direct reports, colleagues, internal customers and external customers

Figure1: 360 Degree Feedback
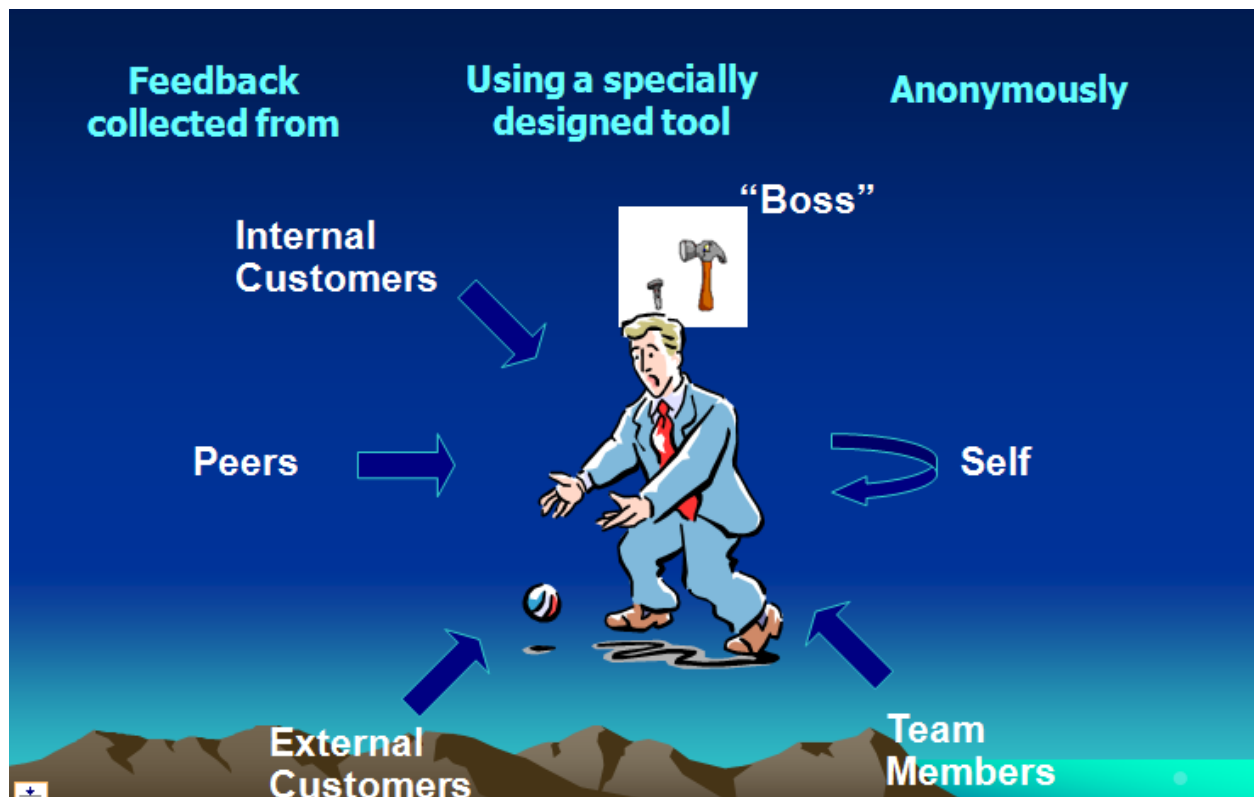
Figure2: 360 Degree Feedback

Case Study on Performance Appraisal System in Construction Industry

In this I will be doing the following activities for 5 construction companies:

- ➢ Identify construction companies in Pune area where the Performance Appraisal system is being implemented.
- ➢ Gather information for the existing PA system in those companies
- ➢ Analysis of their existing PA system

> ➢ After thorough evaluation, assess their Performance Appraisal system by sending the appropriate questionnaire to selected employees.
> ➢ Propose a new Performance Appraisal system which removes the drawbacks of current system
> ➢ Comparison between proposed PA system and existing system .Identify advantages of the proposed PA system over the existing system
> ➢ Propose to implement this new Performance Appraisal System

AUTHORS

First Author – Sheetal Marawar, Department of Construction Management, D.Y.Patil College of Engineering, Akurdi, Pune (M.S.)

Active Integrated Antenna (AIA) system for wireless communication

Kumara Swamy [*], **Manjulatha Veluri** [**]

[*] BIET, Hyderabad
[**] Osmania University, Hyderabad

Abstract- In this paper, an active integrated antenna (AIA) system is proposed for mobile and wireless communication devices. The AIA system consists of a microstrip patch antenna and a low noise amplifier (LNA), which are integrated together with a matching circuit and printed on an FR4 PCB circuit board. The system is designed, analyzed, and optimized by targeting to satisfy the design specifications for both the microstrip antenna and the LNA in terms of the industrial parameters.

I. INTRODUCTION

From a systems standpoint, antennas have historically been viewed as static and passive devices with time-constant characteristics. Once an antenna design is finalized, its operational characteristics remain unchanged during system use. While the method of antenna operation is evolving, its role in communication systems still remains the same. The task that an antenna must perform is fundamentally that of a radiator and thus the metrics by which antennas operate and are measured are still intact. Gain, bandwidth, polarization, antenna feature size, etc.are still the realizable quantities of interest. But now the introduction of dynamic radiating structures has given the antenna designer an additional degree of freedom to meet these design goals.

The high demands for wireless communications systems in compatibility and efficiency have been greatly leading to rapid development and growth in the microwave and monolithic microwave integrated circuit technologies. The active integrated antenna (AIA), as an advanced solution to various existing problems in wireless communications, such as noise matching, power saving and size reduction, has been a growing area of research in recent years.

From a microwave engineer's point of view, an AIA can be regarded as an active microwave circuit, in which the output or input port is free space instead of a conventional 50Ω transmission line. Microstrip patch antennas are extensively used in commercial and military communication systems. Advantages of using microstrip patch antennas over conventional antennas are their light weight, low profile and volume, and low cost of fabrication [4]. However, in comparison to other types of microwave antennas, their disadvantages include narrow bandwidth, relatively high loss, low gain, only radiate in half space, and narrow design tolerance.

The low noise amplifier is an important building block in wireless receivers. It essentially determines the receiver's performance. The LNA design is full of tradeoffs between optimum gain, optimum input matching, low power consumption, lowest noise figure and high linearity [5].

The proposed AIA include two major components: the microstrip patch antenna and the low-noise amplifier. In the IInd section, a microstrip patch antenna is analyzed and designed according to requirements. It requires small size, reduced loss. In the IIIrd Section, the LNA (Low-noise Amplifier) is designed and tuned to enhance the signal, reduce power consumption as well as minimize the noise. In the IVth Sections AIA is designed and in V[th] section discussed the conclusions.

II. MICROSTRIP PATCH DESIGN

In order to improve the NF while maintaining a good gain, conjugate matching is no longer used at the input port of the transistor. Instead, transistor is tested to see which impedance gives a better NF and a high enough gain. Then the antenna is designed to have such output impedance. And it is connected directly to the transistor. In this case, the microstrip patch antenna combines the function of a regular antenna and a matching network.

The design procedure evolves from the analysis of the geometry. The ACMSA has been analyzed with different models such as transmission line model, modal expansion model, intergral equation model etc.., Of these transmission line model provides us with better intuition as to which dimension affects which parameter, but is inaccurate and the other two are more accurate and mathematically rigorous but provide us with very little design intuition
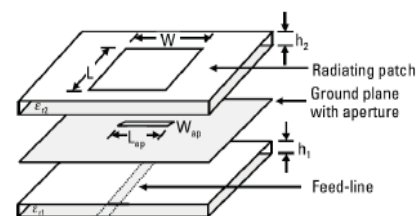
Fig.1 An exploded view of a simple aperture coupled microstrip patch antenna

The patch on the topmost substrate is the radiating element and the slot in the ground plane couples the energy from the microstrip feed line (beneath the bottom most substrate) to the patch.

In this designs air/foam(permittivity=1/1.07) has been used as antenna substrate with a thickness of 17mm. \FR4 material(permittivity=4.4 and thickness=1.58mm loss tangent=0.0023) is used for feed line substrate and material with

permittivity=2.5, thickness=1.58mm and loss tangent=0.0023 is used for the radome substrate of the antenna.

The 3D view of the design is shown below followed by the layout of the design:
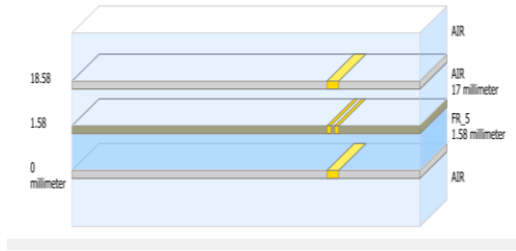
Fig.2 An exploded view of 3D View aperture coupled microstrip patch antenna layout in ADS
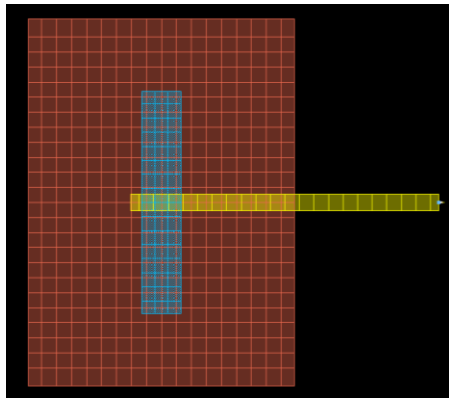
Fig.3 An exploded view of 2D View aperture coupled microstrip patch antenna layout in ADS.

Parameters:

Patch: Lp=48mm   Wp=66mm   patch substrate(radome):er=2.5   thickness=1.58mm   loss tangent=0.0023,**Aperture:** La=40 Wa=7mm antenna substrate : er=1.07   thickness=17mm   loss   tangent=0.0009,**Feed line:** width=3mm stub length=5.5mm feed line substrate: er=4.4 thickness=1.58mm loss tangent=0.0009

Simulation results:
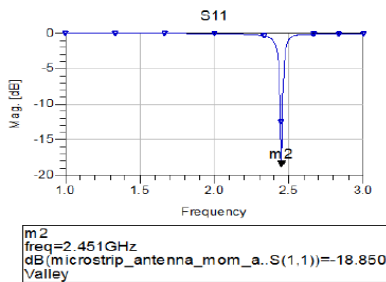
Figure 4: S$_{11}$ of microstrip patch antenna

The simulation results of the radiation pattern at 2.4 GHz are shown below:
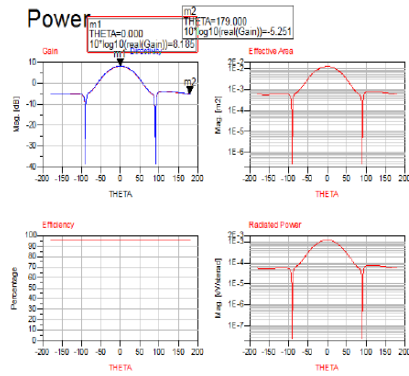
Figure 5: radiation patterns of microstrip patch antenna.
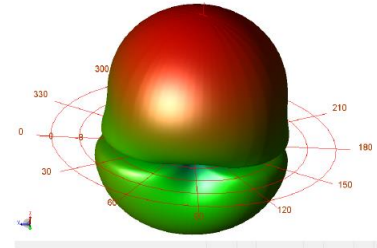
Figure 6: The 3D view of the radiation patter

III.   LNA DESIGN

LNA is an electronic amplifier used to amplify very weak signals. It is usually located very close to the detection device to reduce losses in the feed line. The growing wireless communication market has generated increasing interest in RF technologies. New technologies are developed to increase higher data rates and capacity, and to reduce the power dissipation for longer operation time. Low-voltage and low-power RF circuit design becomes a necessary requirement [5]. A block diagram of a typical AIA receiver front-end is shown in Figure 7. The main function of the LNA is to provide high enough signal gain to overcome the noise of the subsequent stages while adding the minimum possible noise.
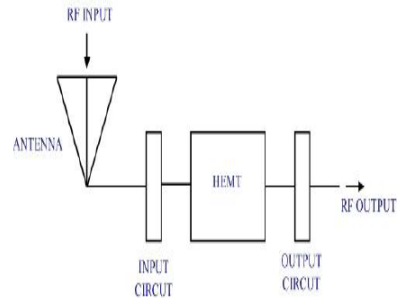
Figure 4.1: block diagram of an active integrated antenna amplifier receiver front end

Fig 7 A block diagram of a typical AIA receiver front-end

LNA Parameters:
III.(a) Noise Figure and Noise Temperature
    The noise Figure of an amplifier can be defined as:

$$NF = \frac{S_{in}/N_{in}}{S_{out}/N_{out}}$$

The noise emitted by the amplifier is expressed by its Noise Temperature . The relationship between and NF is:

$$T_e = T_0 \times (NF - 1)$$

$$F = F_1 + \frac{F_2 - 1}{G_1} + \frac{F_3 - 1}{G_1 G_2} + \cdots + \frac{F_n - 1}{G_1 G_2 G_3 \ldots G_{n-1}}$$

III.(b)Gain: There are many different definitions of gain for an amplifier. Normally, for an LNA, Power Gain refers to the gain measured when the source and load are 50 Ohms.It is defined as follows:

$$Gain = 10 \log\left(\frac{P_{out}}{P_{in}}\right) dB$$

For a single stage LNA, its noise figure is expressed as:

$$NF = NF_{min} + 4R_n \frac{|\Gamma_s - \Gamma_{opt}|^2}{(1 - |\Gamma_s|^2)|1 - \Gamma_{opt}|^2}$$

III.(c)Linearity : 1 dB compression point and third-order intercept point are two important measures for weakly nonlinear systems and devices. In the design of LNA, the IP3 of the input LNA is normally chose to be a little higher, at least 20 dB higher than the input signal, to avoid much nonlinearity.

III. (1) LNA Design Consideration

Impedance matching

Unlike the conventional design, where an antenna and amplifier are separated by a standard 50 Ohms transmission line and interconnects, in the AIA approach, an antenna is directly attached to the input of amplifier circuit. One of the main challenges in realizing AIA design is the effective impedance match of antenna element and amplifier as their impedance mismatch significantly deteriorates the performance of integrated devices. Because of the importance of both gain impedance matching, which provides the maximum gain of AIA device, and noise figure minimum impedance matching, which minimizes the NF value, an amplifier must be designed according to the impedance characteristics of antenna element [12].

DC Bias

The bias network determines the amplifier performance over temperature as well as RF drive. The DC bias condition of the RF transistor is usually established independently of the RF design. Power efficiency, stability, noise, thermal runway, and ease to use are the main concerns when selecting a bias configuration.

The most common form of biasing in RF circuits is the current mirror. This basic stage is used everywhere and it acts like a current source. It takes a current as an input and this current is usually generated, along with all other references, by a circuit called a bandgap reference generator.
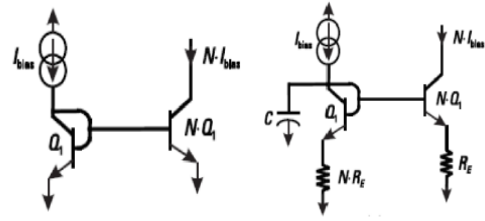
Fig 8. Current mirror circuit

In the current mirror shown in Figure 8, the bandgap reference generator produces current and forces this current through Q1. Scaling the second transistor allows the current to be multiplied up and used to bias working transistors.

In this LNA design, the transistor used is an NEC68030 NPN silicon transistor, with typical noise figure 1.76, gain 10.70, when Vce=6V, Ic=5mA. The amplifier is biased for class A operation, using current mirror method. The input and output of the transistor are conjugated matched to the source and load impedance, using microstrip stubs matching networks.

The bias circuit works by adjusting the gate voltage to maintain a particular value of drain current. Figure 9 shows the ADS schematic simulation of the LNA design with bias circuit.
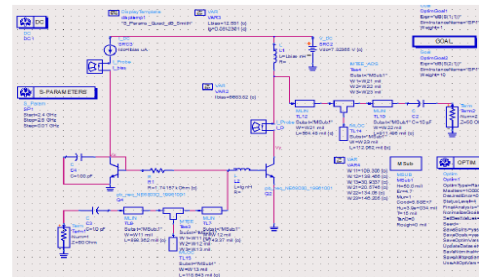
Fig 9. ADS schematic simulation of the LNA design with bias circuit.

As the figure shows, the 1dB compression point is about 1dbm, which is a satisfying result, indicates that the linearity of this LNA design is acceptable.
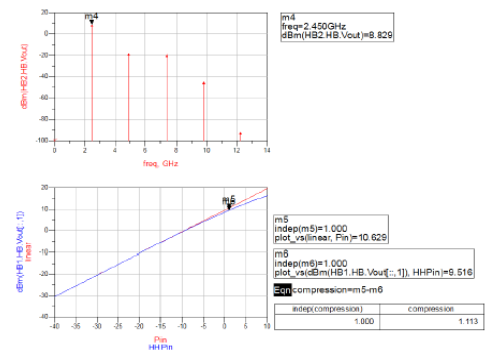
Figure 10. Linearity parameters of LNA

Parameter	Specification	Prediction	Unit
Frequency	2.4-2.5	2.4-2.5	GHz
Noise Figure	<2.7	2.6	dB
Gain	>9	9.6	dB
Power consumption	<50	50	mW
Source/load impedance	50	50	Ohms
1dB compression point	Not specified	8.829	dBm

Table(1):Summary of simulated LNA performance

IV. DESIGN OF AIA

Finally the designs of microstrip patch antenna and low-noise amplifier are combined together, tested and simulated using Agilent ADS. Figure (11) shows the schematic circuit of the complete AIA circuit, and Figure (12) display the layout design of the proposed AIA. Based on the simulation result shown in Figure (13)
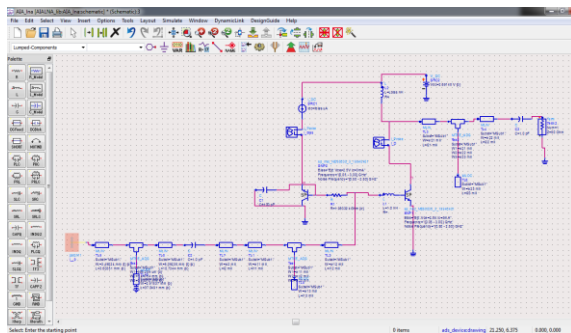
Figure 11: schematic circuit of the complete AIA design
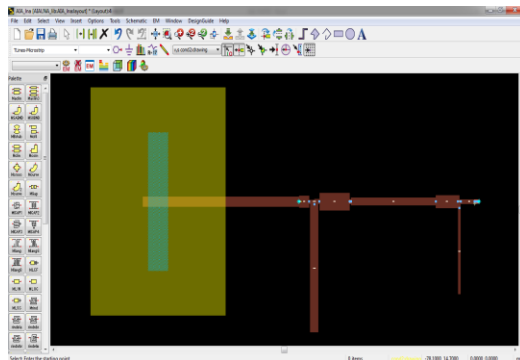
Figure 12: Layout design of the AIA
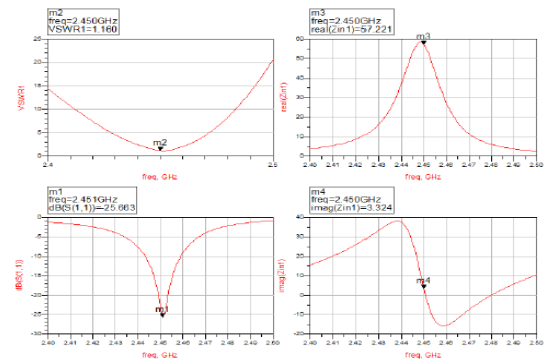
Figure 13: simulation result of the complete AIA design

V. CONCLUSION

In this paper, a design and simulation result of an active integrated antenna is presented. Compared to the conventional amplifying antenna, the new active integrated antenna leads to significant advantages such as compactness of the configuration, high power transmitting efficiency, and low noise. The antenna and the LNA performance match the specifications properly.

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AUTHORS

First Author – **Mr. Kumara Swamy K** born on 27 Oct 1986 in Warangal, Andhra Pradesh, India, Obtained his B.Tech degree in Electronics & Communication Engineering from P.R.R.M Engineering, JNTU-Hyderabad in 2007, M.E in Microwave and Radar Engineering from University College of Engineering, Osmania University, and Andhra Pradesh, India in 2009. He has been awarded with **Best Thesis Award** for his M.E. project from C.E.M.E, Osmania University , India in 2009. He was worked as Research Assistant, from R&D Department in Astra Microwave Products Limited, Hyderabad in Center for Excellence in Microwave Engineering (CEME), UCEOU, and Osmania University. He worked as a Design Engineer in Powerwave Technologies R&D India. Currently he is working as a Asst. Prof. at BIET, Hyderaad. His area of interest includes RF Systems & UWB Antennas for wireless communications, Aerospace and Missile applications.

Second Author – Manjulatha has completed her B.Tech from an affiliated college of JNTU. She has acquired her masters from Osmania university in the field of Microwave and Radar Engineering.She worked as a faculty for engineering in Osmania university.

Rido Culture: Its Impact to the Maranaos' Contemporary Educational Aspirations

Gaudencio M. Alaya-Ay, Jr[*]**, Rolando C. Cuizon**[**]**, Nida O. Branzuela**[***]**, Cherilyn M. Romarez**[****]**, Concordia S. Talaid**[*****]

[*] Lourdes College, Cagayan de Oro City, Philippines
[**] St. Peter's College, Iligan City, Philippines
[***] St. Peter's College, Iligan City, Philippines
[****] St. Peter's College, Iligan City, Philippines
[*****] Miguel Obach Memorial School, Merila, Ubaldo Laya, Iligan City, Philippines

Abstract- The Maranaos are practicing rido, a long time bloody culture wherein their families since in the past fought among themselves because of some feuds which greatly affected their plans, ambitions, and dreams in life. This knowledge led to determine the impacts of *rido* culture among the Maranaos specifically to their contemporary educational aspirations. The study also directed to answer the questions on the causes and modes of *rido* settlement as perceived by the secondary teachers, parents, and students and was conducted in the municipality of Balo-i, Lanao del Norte, Philippines, SY 2012-2013. The descriptive research design was employed and utilized the questionnaire and interview in data gathering. Frequency counts, percentages distribution, and weighted mean were the statistical tools applied in analyzing the data. It was revealed that the respondents were very responsive and had different views to the causes of *rido* in the community but murder and theft were the most frequently cited causes. The impacts of *rido* culture to their educational aspirations were mostly negative. As to the perception of the parent-respondents, majority responded on the hindrance of education, financial burden, community relationship was highly affected, and cannot cooperate to the school activities. However, in terms of the perception of the student-respondents, majority regarded that it greatly affected them as to their academic performances, disturbed them in gathering and organizing their projects and assignments. With the above revelations, it can be concluded that the *rido* culture really can ruin one's life.

Index Terms- Social Science, *Rido* Culture, Maranao culture, educational aspirations of the Maranaos, descriptive study, Balo-i, Lanao del Norte, Philippines

I. Introduction

Rido is a Maranao term commonly used to refer to clan feuds. It is characterized by sporadic outburst of retaliatory violence between families and kinship groups, as well as between communities. It can occur in areas where there is a perceived lack of justice and security. It is considered one of the major problems in Mindanao because apart from numerous casualties, *rido* among the Maranao has brought about serious problems in their society. Loss of lives, destruction of property, economic drift and absence of peace and order are just some of crippling effects. *Rido* is a hindrance to socio-economic, political, and spiritual development of the people. It is more prevalent in Maranao society than among other Moro groups in the Philippines (Basir, 2011).

Maranaos are noted for their pride and *rido* culture which refers to self-esteem, personal dignity, honor and pride at one extreme and family feuds, conflicts, revenge, retaliatory acts on the other. Thus, they are extremely sensitive people especially when their 'amor propio' is at stake. Anent of this trait, inter-family feud, which is known as *rido* in the vernacular, occurs whenever a member of the family is verbally or physically offended. While the Philippine legal system defines it as a revenge killing as murder or homicide, the Maranaos define the act as retributive justice.

Most often *rido* is appealed to because of pride despite its violent consequences. It contributes to Maranao self-identity and sense of belongingness. The Maranaos as rank or status conscious group do everything under any circumstances only to safeguard their pride. *Rido* degrades pride in the sense that community associates pride to violence, vendetta or chaos and the tendency also of both disputants to undermine or dehumanize one another (Salerno, 2011). Considering then, the importance attached to this very distinct Maranao socio cultural value— (more precious than life itself "according to some) and the resulting consequences of *rido* have been infringed/transgressed, this study therefore seek to investigate further this cultural practice and discover its possible implications to education.

II. Framework

Conflict is viewed as inherent in any human group. It is a process that either sets the tone or expresses the stresses and strains that accompany change or transformation in social groups or collectivities. As Simmel (2001) believed, conflict has beneficial functions for social stability and thus contributes to their preservation and sustainability. This notion was further enhanced by Cosser (2000) by showing that conflict was functional in pluralistic societies where plurality of interests vis a vis conflict serves as a balancing factor that keeps them from disintegration.

With the above lines of thought, this paper is reflecting on *ridos* in Muslim communities wherein it focuses on the three characteristics which greatly affect the contemporary educational

aspirations of the Maranaos : the long duration, repetitive killings, and large scale family involvement. Like any other conflict and its settlement procedure, *rido* is embedded in a complex environment and, in the case of Mindanao, particularly in Balo-i, Lanao del Norte, and a complex conflict environment. Since any environment influences people and their behaviour, this study started with summing up the surrounding's peace and order status. Then it continued with the conflict's causes, impact and the settlement procedures. At the end, it hopes to have an output on the involvement of the stakeholders in the modern and traditional settlement procedures.

All of the stakeholders are in some way or another are expected to be involved in development projects or peace and order affairs in the area so that the educational aspirations of the residents will succeed. Hence their interests in peace and a quick and effective way of solving conflicts are the hopes to strengthen communities because this is believed as the best way to deal with inside as well as outside pressure and to bring development.

III.   OBJECTIVES OF THE STUDY

The main thrusts of this study were to determine the impact of *rido* to education as perceived by the teachers and to determine other related factors about *rido* such as the cause and its modes of settlement.

IV.   MATERIALS AND METHODS

Research Design and Respondents

This study employed the descriptive research design and the respondents were the 65 faculty members of the two public secondary schools in Balo-i, Lanao del Norte, Philippines, parents, and students. Eighty (80) females, thirty- five (35) males, and fifty (50) students were part of the one hundred sixty-five (165) respondents.

Scope and Limitations

The locale of the study was centered to all secondary schools in Balo-i, Lanao del Norte where the researchers are the professors in one of the graduate schools in Iligan City to the majority of teachers in the aforesaid schools during the second semester of the academic year 2012-2013. The respondents were the secondary teachers, parents, and students of the above-mentioned district. Moreover, accessibility, familiarity, and security aspects of the researchers during the conduct of the study were the reasons why they chose Balo-i, Lanao del Sur District, as their locale of the study. The contents of the questionnaire were on the Maranao *rido*; its causes, impact, modes of resolving it and implication to education. Concrete cases of *rido* were cited to illustrate points stressed in this paper.

Data Gathering Procedures

The researcher used the scheduled interview and structured questionnaire in data gathering the respondents. Since the researcher herself is a faculty of the chosen district where the respondents are located, she easily identified the one hundred sixty five (165) respondents of her study.

Questionnaires were personally distributed by the researchers to the respondents covered in the study and requested somebody to assist them in the administration and retrieval of the questionnaires. To facilitate the gathering of data, permissions to conduct the study were obtained first from the schools division superintendent, principals, and teachers. All the communications were signed and approved by the concerned personalities. During the distribution of the questionnaires to the respondents, the researchers explained thoroughly the importance and mechanics on how to answer some parts of it. Confidentiality of their answers was also assured by the researchers.

Research Instruments and their Validity

Scheduled interview and the structured questionnaire were applied as research instruments of the study. The main bulk of data needed for this study was gathered through the questionnaires and was supplemented by the interview at the time of its administration to the respondents.

The questionnaires were consisted of four parts: Part 1 dealt on the socio-demographic profile, Part 2 on the causes of *rido,* Part III on the modes of resolving *rido* and Part IV on the implications of *rido* to education.

Focus Group Discussion was also utilized in this study. A set of open-ended questions were prepared and served as guides in concluding the discussions. It was prepared in English and translated in Maranao by the some experts for better understanding during the discussions.

Statistical Treatment

The data gathered were tabulated and interpreted to acquire the actual information needed using descriptive statistics. All the computations were done manually and with the statistics software of an accredited statistician.

V.   RESULTS AND DISCUSSIONS

Table 1. Response of the teacher-respondents on the possible causes of *rido*

Causes of *Rido*	Frequency (n=65)	Percentage (%)	Rank
• Theft	19	29.23	1.5
• Murder	19	29.23	1.5
• Physical Injury	17	26.15	3
• Damage to property	15	23.08	4
• Grave threats	13	20.00	5.5
• Motor vehicles	13	20.00	5.5
• Illegal gambling	12	18.46	7
• Attempted parricide	10	15.38	8
• Homicide	8	12.31	9
• Car napping	7	10.77	11
• Illegal drugs	7	10.77	11
• Poverty	7	10.77	11
• Rape	4	6.15	14
• Robbery	4	6.15	14

• Secret love affair	4	6.15	14
• Sexual harassment	4	6.15	14
• Loose Firearms	3	4.63	16
• Illegal Logging	3	4.62	18
• Kidnapping	3	4.62	18
• Staffa	3	4.62	18
• Cattle rustling	2	3.08	20.5
• Others (politics)	2	3.08	20.5
• Illegal fishing	1	1.54	22

Table 1 presents the distribution of possible causes of *rido* as responded by the teacher-respondents. As shown, murder and theft were high in the list among the causes of *rido*. The findings are consistent with the statement of Rasul (2003) that *rido* is also caused by the people's desire for wealth. Those sometimes economic reasons such as stealing other properties or killing people are also associated because of the desire to be free from poverty.

Here is one murder case of *rido* which was cited by one of the respondents during the interview.

A simple incident which could not have resulted in killings. Sam (not her real name) felt insulted and humiliated by a driver of a passenger jitney on which she was riding. It was getting dark and she was bringing with her some groceries from Iligan City and she was requesting the driver (Magdalena, 2000) to deliver her to her house about a kilometer from the highway. The driver refused by saying that he is not under obligation to deliver passengers right to their own homes except along the highways or to their usual route. What complicated the situation was that the driver was not diplomatic enough to state his point or his refusal to consider the plight of the pleading woman passenger. He shouted and fretted…

At last, he was prevailed upon by the other passengers to give in to the request of the pleading woman. Upon arrival at her house, the husband saw his wife in tears and asked why? Sensing the exchanges of words between her and the driver, the husband turned to his house, got his armalite, loaded it, returned and open fire/pumped bullets into the head of the driver. This has resulted into a full-blown *rido* until now between the families of the driver and the woman passenger.

Table 2. Responses of the teacher-respondents on
"*Any attempt to settle the rido in which your family is involved*"

Responses	Frequency	Percentage (%)
• Yes	45	69.23
• No	20	30.77
Total	**65**	**100.00**

Table 12 shows the respondents' answers when they were asked if there had been any attempts to settle the *rido* with which their family was involved. Forty-five (45) teachers or 69.23% of

the teacher-respondents answered *yes*. Twenty (20) or 30.77% of the respondents answered *no*. These findings implied that most of the respondents signified and expressed that they rendered efforts in settling *rido*. In these attempts, those who were mostly involved in settling *rido* include religious leaders of the community and the local officials (Ali, 2004).

Table 3. Responses of the teacher-respondents on
"*Their suggestions of the rido resolution*"

Responses	Frequency	Percentage (%)
• Amicable settlement	37	56.92
• Judiciary process	27	41.54
• No response	1	1.54
Total	**65**	**100.00**

Table 13 shows that 37 teachers or 56.92% of the teacher-respondents answered the amicable settlement. Twenty seven (27) or 41.54% answered judiciary process. The findings implied that majority of the respondents settled the *rido* through amicable settlement with the help of the government officials or mediators. These go-betweens or mediators could be common friends or relatives, government officials and community leaders. Most *rido* were settled at the residence of those who have been killed or harmed. In cases where there are deaths in both families, *ridos* were settled in places where both parties agreed on (Abdullah, 2002).

According to Vago (2002) the Philippines judiciary system are seen as corrupt and slow, sometimes dragging on four years and still not achieving reconciliation. That is one of the reasons why Maranao groups returned to customary laws through amicable settlement.

Table 4. Responses of the teacher-respondents on
"*In settling rido, who are the authorities involved in the resolution?*"

Responses	Frequency (n=65)	Percentage (%)
• Educator	10	15.38
• Politician	25	38.46
• Religious Leader	21	32.31
• Traditional Leader	18	27.69
• Military/PNP	23	35.38
• Others	0	0.00

The findings disclosed the relatively high involvement of the politician and Philippine National Police (PNP) in settling *rido*. Perhaps, politicians were able to raise the blood money and can hardly be dispensed with by the offended party. It is thus further implied here that people hold respect to both the religious leaders and political local leaders (Durante, 2005).

Table 5. Responses of the teacher-respondents on
"*Whenever there's rido what are its impact on the education of the students*"

Responses	Frequency (n=65)	Percentage (%)
• It decreases the enrollees	32	49.23
• Students are afraid to go to school	24	36.92
• It minimizes the school activities	28	43.08
• Lack of cooperation	14	21.54
• Lack of development	17	26.15
• Lack of social interaction	14	21.54
• Lack of community dialogues	10	15.38
• Others	2	3.08

Table 15 shows the responses of the teacher-respondents as to the impact of *rido* to the education of the students. It shows that 32 teachers or 49.23% answered it decreases the enrollees; twenty eight (28) or 43.08% answered it minimizes the school activities; twenty four (24) or 36.92% answered students are afraid to go to school.

The findings implied that the educational aspect of the students is being affected since students could not attend class regularly because of unpredictability of security. Also, socializing among them would be restricted for fear that they would be included in the *rido*. Other times, the people are forced to evacuate for fear of their lives (Torres, 2007).

Table 6. Responses of the teacher-respondents on
"*What settlement method did you use when a conflict is reported to you?*"

Responses	Frequency (n=65)	Percentage (%)
• Advice is given to the students to amicably settle their disputes.	32	49.23
• Appropriate case is filed against the offender before an appropriate authority.	19	2.23
• Fine is imposed to the persons/groups found guilty.	11	16.92
• The guilty one or both parties are suspended when they are all unreasonable.	13	20.00
• Disputes are referred to the traditional leaders of the locality for their dispositions.	11	16.92

Table 16 reveals the responses of the teachers as to what settlement methods will they use when conflict is reported to them. Thirty two teachers (32) or 49.23% answered the method on giving an advice to the students to amicably settle their disputes. Nineteen (19) or 22.23% answered appropriate case is filed against the offender before an appropriate authority.

The findings signified that advice to the students to amicably settle their disputes had often used in settling conflict when reported to the teachers. They believe that it is a shame on their honor and dignity that they cannot settled conflict in their own hands. That is why they do not submit it to the higher official in their locality (Matuan, 2004).

Table 7. Responses of the teacher-respondents on
"*How often a community rido is brought in your office?*"

Responses	Frequency	Percentage (%)
• Daily	1	1.54
• Once a week	11	16.92
• Once a month	39	60.00
• Others (1 year)	14	21.54
Total	**65**	**100.00**

Table 7 presents the frequency distribution of the responses of teacher-respondents in terms of how often a community conflict/*rido* is brought in their office. The said table shows that 39 or 60% of the respondents said that a *rido* was reported to their office once a month. The finding may indicate that *rido* are not rampant in the community implying relative peace in that area. However, *rido* still occur since there were reported as shown in the table. Thus, education is still relevant in promoting a sustainable peaceful community (Durante, et al., 2005).

Table 8. Distribution of teacher-respondents responded on
"*Had your office successfully settled conflict/rido among the students?*"

Responses	Frequency	Percentage (%)
• Yes	49	75.38
• No	16	24.62
Total	**65**	**100.00**

Table 8 presents distribution of responses of the teachers as to capability of their office to settle *rido* among students. The table shows that majority of the teacher-respondents, forty-nine (49) or 75.38% responded "yes" which means they are capable to settle *rido* among their students. Sixteen (16) or 24.62% responded that they did not have the capability to settle *rido* among their students. This implied that teachers have the strong influence in convincing the negative notions of their students not to get involved with *rido*. Further, they can be termed as ambassadors of goodwill to their students anent to the detrimental effects of it to their lives. (Baradas, 2003).

Table 9. Responses of the teacher-respondents on
"What are your reasons why do you want to settle/resolve rido in your school?"

Responses	Frequency (n=65)	Percentage (%)
• To stop the feud	17	26.16
• For peace and order	19	29.23
• For the development of the students performances	33	50.77
• Political reasons	6	9.23
• To have a better future of the children	26	40.00
• Others	1	1.54

Table 9 reveals that 33 teachers or 50.77% of the teacher-respondents answered "they wanted to resolve *rido* in their school for the development of the students' performances".

Twenty six (26) or 40% answered "to have a better future of the children". This may further imply that majority of the teachers want their students to perform better in school (Gowing, 2001).

Table 10. Responses of the teacher-respondents on
"Do you find it difficult to keep from thinking about having a rido if any?"

Responses	Frequency	Percentage (%)
• Yes	45	69.23
• No	19	29.23
• No response	1	1.54
Total	**65**	**100.00**

As shown in Table 10, majority of the respondents respond "yes" with a percent of 69.23. In another study, Saber (2001) stressed that people who have *rido* have to restrict their movements to avoid unexpected encounters. Instead of buying food and other amenities of life, one has to spend for arms and bullets to protect oneself from enemies. One goes to a place with a company of bodyguards so that one's security will be assured.

Table 11. Responses of the teacher-respondents on
The possible Consequences of rido in the family or clan

Responses	Frequency (n=65)	Percentage (%)
• Out migration	22	33.85
• Resources diverted in the purchase of weapon	16	24.62
• So much time spent in preparing for the defense	19	29.23
• So much time spent in the negotiation	10	15.38
• So much time and resources spent for the settlement	11	16.92
• Economic activities affected	12	18.46
• Alarmed	13	20.00
• Not affected	5	7.69
• Kinship relationship destroyed	7	10.77
• Between parents	2	3.08
• Between siblings	2	3.08
• Between cousins and relatives	7	10.77
• No peace and order	7	10.77

Majority of the teacher-respondents responded that out migration is the possible consequence of *rido* in their family. The finding is also supported by Schmelcher (2007) in her study, she said that some decide to leave and migrate quickly to look for job in other places (sometimes in other countries) to escape from their *rido* and have peace of mind and heart. According to her, those involved in *rido* could not expose /develop themselves publicly for fear they might be spotted by their enemies that is why they just decided to migrate.

Table 12. Perception of the parent- respondents regarding
rido

Indicators	Weighted Mean	Description
• *Rido* is a hindrance to education.	2.34	Strongly Agree
• Parents cannot cooperate with the school activities.	2.38	Strongly Agree
• Financial burden to the parents.	2.44	Strongly Agree
• Education of the	2.48	Strongly

children gets neglected.		Agree
• It promotes unity.	2.26	Agree
• It can highlight problems and bring about solutions.	2.34	Strongly Agree
• Hindrances to socioeconomic and spiritual development in Maranao society.	2.32	Agree
• One of the reasons why most Maranao did not finish their study.	2.56	Strongly Agree
• Most of the drop-out students due to *rido.*	2.50	Strongly Agree
• It helps the community to grow.	2.12	Agree
• Community relationship is highly affected.	2.40	Strongly Agree
• Can stimulate interest, creativity and innovation by encouraging new ideas.	2.14	Agree
• I have trouble concentrating or sleeping if I think something is in danger.	2.28	Agree
Average	**2.35**	***Strongly Agree***

Note: 2.34-3.00 Strongly Agree   1.66-2.33 Agree   1.00-1.66 Disagree

Table 12 presents data on the perception of the parent-respondents' regarding *rido.* It can be gleaned that the parents "often" perceived the following indicators regarding *rido*: "as one of the reasons why most Maranaos did not finish their study"; (2.56); "most of the drop-out students are due to *rido*"; (2.50); "education of the children gets neglected"; (2.48); "financial burden to the parents"; (2.44); " community relationship is highly affected"; (2.40); "parents cannot cooperate with the school activities"; (2.38); and "*rido* is a hindrance to education"; (2.34).

Parents perceived the following as "seldom" regarding *rido*: "have trouble concentrating or sleeping if something is in danger"; (2.28); "*rido* promotes unity"; (2.26); "can stimulates interests, creativity and innovation by encouraging new ideas"; (2.14); and " it helps the community to grow"; (2.12).

The findings showed that majority of the parent-respondents perceived *rido* as hindrance to the education of the Maranao people. This finding is supported by Acuna (2009) when she said that lack of education of the people leads to

ignorance of law and other matters, will make people more destructive leading to *rido*.

Table 13. Perception of the student- respondents regarding *rido*

Indicators	Weighted Mean	Description
• I am always late in coming to school because of *rido.*	2.10	Agree
• It develops my inferiority complex.	2.36	Strongly Agree
• It encourages me to be more active in school.	2.34	Strongly Agree
• It made me stronger in decision making.	2.54	Strongly Agree
• It makes me more mature.	2.56	Strongly Agree
• I have trouble gathering and organizing my projects and assignments cause of having a *rido.*	2.62	Strongly Agree
• It inspires me to pursue my study.	2.52	Strongly Agree
• Most of the students are slow learner cause of having a *rido.*	2.68	Strongly Agree
• I have a clear picture of what I want to accomplish in my life despite of having a *rido.*	2.44	Strongly Agree
• A burden to me.	2.36	Strongly Agree
• Rido really ruins one's life.	2.40	Strongly Agree
• I have difficulty getting work done if I know something bad will happen.	2.54	Strongly Agree
• It is really a hindrance to my study.	2.58	Strongly Agree
Average	**2.46**	Strongly Agree

The data showed the perception of the students regarding *rido*. Majority of the respondents find the following indicators "often" these are: "most of the students are slow learner cause of

having a *rido*"; (2.68); "I have trouble gathering and organizing my projects and assignments cause of having a *rido*"; (2.62); "it is really a hindrance to my study"; (2.58); "it makes me more mature"; (2.56); "I have difficulty getting work done if I know something bad will happen"; (2.54); "it made me stronger in decision making"; (2.54); "it inspire me to pursue my study my study"; (2.52); "*rido* really ruins one's life"; (2.40); "a Burden to me"; (2.36); and "it develops my inferiority complex'; (2.36); "I am always late in coming to school"; with a mean of 2.10 which means "seldom".

The findings implied that the *rido culture* brought major changes in the lives of the students, and that students cannot concentrate on their education for fear that something bad will happen. But surprisingly, some students said that *rido* made them more mature and it also inspired them to pursue their study (Bartolome, 2001).

VI. CONCLUSIONS

The Maranao *rido* can be expressed in any harm such as physical violence that will require hospitalization and mostly killing that will result to counterpart retaliation. It will not be easily settled if both parties refuse to undertake measures for resolution due to their desire to revenge because of the lives lost. Conflict theory best explain the *rido*, which the more the disputants have power to exercise, the more they are eager to retaliate. Moreover, the more they are economically provided, the more they become influential to feed the *rido*. In this way, the two opposing parties could change the social order of the community because all other social institutions will be affected and could possibly result to malfunction.

Thus, `*rido* can be managed by mediator; either a political leader or traditional leader that is respected by both parties and has knowledge in resolving *rido*.   Kinship is very strong in Maranao society; yet *rido* can still exist among close or distant relatives when one's pride is involved. Therefore, Maranao people give more value to their pride than to their kin.

Conclusively, people who engage in *rido* suffered consequences like neglecting the education of their children, damage to properties and livelihood, buying of weapons for extra protection and the psychological effect which is the feeling of being unsafe all the time.

VII. RECOMMENDATIONS

In order to avoid *rido*, the feuding family and persons involved in *rido* especially the youth must be aware of the concepts of *rido,* the best way to easily understand the concepts is to educate them, like providing them reading materials and conducting peace education seminars or symposiums containing the negative effects of *rido* among the clan or in the individual. Maranao may follow/internalize the tenets of teachings of Islam based on Qur'an and Hadith. If only they go back sincerely to their faith wherein Islam means "peace" that killing someone is a mortal sin to Allah since you can never have peace if you have a *rido*. A *rido* is self-liquidating. One side kills, the other kills in return, and that is really against Islam.

It is also recommended that the role of education in the conversion of minds and hearts through formal schooling in Madrasa and the Philippine public school system will be stressed. The promotion of Islamic values, development of culture of peace and integration of peace education in schools is also recommended. The training given to religious leaders and local government officials, and the education of barangay officials is also necessary.

The proliferation of firearms is a major contributory factor in the outbreak and escalation of rido violence. Disarmament is therefore recommended through: (1) loose firearms are strictly prohibited, (2) a comprehensive campaign against illegal firearms be conducted, (3) a firearm ban be strictly imposed, so that people of the community could not easily harm their enemies by directly putting someone's and (4) the sale of guns be controlled.

Idleness, poverty, and uncertainty of the future are some of the ingredients that can induce people to engage in violent activities, either as rebels, criminals, or participants in clan conflicts. Employment has to be generated and livelihood programs and projects provided.

This study also recommends that traditional leaders and Ulama will be trained through various seminars in relation with *rido* resolution so that if the *rido* is already settled it will be totally ended.

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AUTHORS

First Author – Gaudencio M. Alaya-Ay, Jr., docjunix.alayaay2008@gmail.com, ORCID No. 0000-0002-4717-0862, Lourdes College, Cagayan de Oro City, Philippines
Second Author – Rolando C. Cuizon, roly.cuizon@gmail.com, ORCID No. 0000-0003-2233-2236, St. Peter's College, Iligan City, Philippines
Third Author – Nida O. Branzuela, nidabranz143@gmail.com, ORCID No. 0000-0002-4681-0717, St. Peter's College, Iligan City, Philippines
Fourth Author – Cherilyn M. Romarez, cherilynprincipal@gmail.com, ORCID No. 0000-0003-4984-02 St. Peter's College, Iligan City, Philippines
Fifth Author – Concordia S. Talaid, ORCID No. 0000-0002-2407-6291, concordiatalaid1955@gmail.com, Miguel Obach Memorial School, Merila, Ubaldo Laya, Iligan City, Philippines

The Implementation of Peace Education in the Feuding Areas of Lanao Zones

Gaudencio M. Alaya-ay, Jr[*]**, Milagros B. Basang**[**]**, Amparo P. Fernandez**[***]**, Farida Gracia B. Sabaduquia**[****]**,
Teresita B. Sambo[*****]**, Concordia S. Talaid**[******]

[*] Lourdes College, Cagayan de Oro City, Philippines
[**] St. Peter's College, Iligan City, Philippines
[***] Acelo C. Badelles, Sr. Memorial High School, Tipanoy, Iligan City, Philippines
[****] Iligan City SPED Center, Roxas Avenue, Mahayahay, Iligan City, Philippines
[*****] Tomas Cabili Central School, Tomas Cabili, Iligan City, Philippines
[******] Miguel Obach Memorial School, Merila, Ubaldo Laya, Iligan City, Philippines

Abstract- The implementation of peace education is practically a fulfillment of once aspiration in the quest for positive social changes. The educators who are the linkages for such function are having the possibilities in the attainment of a favorable place to live in. Hence, they are the most important elements in the quest for a serene situation then are tagged as ambassadors of goodwill. Being tasked about promoting peace, with no doubts they used the materials available, applied some teaching strategies, and invited personalities and agencies as advocates of the desired utopian environment. To build relationships and structures that will lead positive changes and human well-being are the target goals in determining the extent of implementation of peace education in Munai-Maigo District, Lanao del Norte Division for SY 2012-2013. The respondents were limited only to fifty (50) regular employed public basic education teachers. Purposive sampling procedure was undertaken based from the list of participants who previously attended seminars and trainings on peace education and its implementation. Specifically, this study answered the questions on the level of implementation of peace education in the aspects of value of non-violence and brotherhood, value of justice and equity, value of human rights and dignity, and value of building of social justice. The results revealed that these values were highly implemented by the educators.

Index Terms- Social Science, peace education, implementation of peace education, teaching strategy, descriptive design, Balo-i, Lanao del Norte, Philippines

I. Introduction

In response to the feuding zones that seems to be growing violent, the implementation of peace education program by the teachers at their schools is one of the expected ways to establish positive outputs. Since the attainment of peace and order is always a dream and in the heart of every Filipino, so the power of education is very essential in the process. The normative process of it is believed to play a vital role in the attainment of peace through directing and reforming the characters of members of the society. As evidenced, education reflects the societal norms and aspiration of the society. It changes the way people of looking at things. Given the significant task, the Department of Education initiated the program for peace and the peace education initiative. The ultimate aim of the program is to educate children about peace, the value of non violence and brotherhood, justice and equity, human right and dignities and social justice building. These will enable the learners to sharpen their human critical awareness, openness to truth and responsiveness to realities of life which is very necessary in their adult life (Montiel, 2012).

In significance to the aforesaid program, people will be aware that war is the worst enemy of development and progress of a certain dwelling place. In relation to it, a person with peace and harmony is actually a call for an inclusive approach to mutual coexistence and to a holistic way of living. A holistic way of living implies to live in peace with others and with the environment in all perspectives. Though Filipinos were used to solve their conflicts with bloodshed, the Epifanio De los Santos Avenue (EDSA) People Power Revolution in 1986 was a miracle and an eye opener for everyone since it modelled the real Filipino character in solving conflicts of ideologies. It was the beginning when Filipinos think that peace can be achieved without bloodshed and that they should start to teach children the value of being peace loving individual. Since it was a common insight that peace should start from the heart, individual members of the society should be trained to have the culture of peace. Therefore, to value peace, it requires a continuous process to create and maintain the happily and orderly state characterized by just leadership in social, cultural, economic, political and ecological realities.

Conclusively, the implementation of peace education by the public basic education teachers hopes to attain an environment where people learn forms of creating a culture of peace, analyze the causes of violence, and learn values and skills that are congruent with peaceful behaviour. Peace education is also a gateway that takes people to various avenues of learning to appreciate our differences, but honestly and sincerely addressing the imbalances.

II. FRAMEWORK

Peace Education is focused on the importance of peace and its components in the lives of people. Non-violence and brotherhood is about the settlement of conflict through peaceful ways and development of close relationship between individual justice and equity which concerned on the equality of people

with regards to opportunity and law. Human rights and dignities include the value of human being, while social justice building is the development of fairness and equality in the community. The aforesaid values of peace geared to develop an understanding of unity as a state of being and as a process characterized by an absence of direct violence and presence of well-being and just relationships in the political, social, economic, and ecological spheres.

The role of education is to give special recognition to peace education for prominent influence in the peace development efforts of the people and the government. Education is what will enable people to move from a culture of war, which they unhappily know only too well, to a culture of peace. It is how people embodied and practice the concept of peace in their own lives. Teachers therefore are given a vital role in redirecting and reforming their learners in order to become peace loving citizens.

In this study, the public basic education teachers' level of the implementation of peace education through teaching was measured. The aspects of peace education which were measured focused on the values of non-violence and brotherhood, justice and equity, human rights and dignities, and social justice building. These values were mandated and integrated in the key subject areas of the basic education curricula. These made up the independent variables. The extent of implementation of peace education program for the public basic education teachers which were rated as very highly implemented, highly implemented, moderately implemented, slightly implemented, and not implemented served as the dependent variables of the study.

III.   OBJECTIVES OF THE STUDY

This study aimed at determining the level of implementation of peace education by the public basic education teachers of Munai-Maigo District, Division of Lanao del Norte, Philippines for the SY 2012 – 2013 which desired to foster changes of culture to make the world a better and more humane place. Specifically, the aspects of peace education which were focused in this study in terms of teaching are the values of non-violence and brotherhood, justice and equity, human rights and dignities, and social justice.

IV.   MATERIALS AND METHODS

The study used the descriptive research design. The respondents were limited only to the fifty (50) regularly employed public basic education teachers and have ideas on the peace and order condition of Munai-Maigo District in the Division of Lanao del Norte, The selection was done through purposive sampling scheme which was based from the list of participants in a certain district meeting and who had the attendance of seminars and training relative to peace education and its implementation. The district was chosen since this is one of the places affected by conflict between the Moro Islamic Liberation Front (MILF) and the government forces five years ago. It is also known as the source of human resources for the MILF. The instrument used for the study was an adapted questionnaire from Castro (2009) which concepts were based from the Peace Education Initiative Module (2005).

The data were gathered following the standard protocol, i.e., permissions were secured before the administration of the questionnaire. The select teachers were guided on the procedures on how to answer the questions and were only given less than an hour to accomplish the questionnaire during vacant periods. These statistical techniques were employed in gathering the information needed: frequency count and percentage, mean value, t-test, and chi-square. All the computations were done manually and with the statistics software from an accredited statistician.

V.   RESULTS AND DISCUSSIONS

Table 1. Level of implementation of peace education on non-violence and brotherhood

Indicators	Weighted Mean	Verbal Description
(NVB1) Gives emphasis to calm and good temperament in solving or setting conflicts with family, subordinates and community members.	3.88	*Highly Implemented*
(NVB2) Models of non-violence attitudes, and behaviour in all actions and conversations with all people in any time and place.	4.12	*Highly Implemented*
(NVB3) Gives compassion, care and understanding to all people regardless of race, ethnicity, religion or belief.	3.82	*Highly Implemented*
(NVB4) Considers every fellowmen a brother or sister.	4.30	*Very Highly Implemented*
(NVB5) Strives to have peace within myself and exemplify it in behaviours.	3.78	*Highly Implemented*
(NVB6) Lives happy life with coexistence of different personalities and cultures in the community.	3.90	*Highly Implemented*
(NVB7) Promotes peace in the school and community by making close harmonious relationship with members.	4.14	*Highly Implemented*
(NVB8) Cooperates with authorities in negotiating peace process and negotiation with those who have committed or violated the law of society.	3.84	*Highly Implemented*
(NVB9) Implements what they learned in the peace education curriculum required by the Dep Ed.	3.82	*Highly Implemented*
Average	**3.96**	***Highly Implemented***

Table 1 shows the level of implementation of peace education in the aspects of non-violence and brotherhood. The average mean (3.96) is described as highly implemented. The highest mean (4.30), described as very highly implemented which pointed to the indicator, on "considers every fellowmen a brother or sister". The lowest mean (3.78) described as highly implemented is on the indicator, "strive to have peace with myself and exemplify in behaviour."

The results imply that the value of non-violence and brotherhood when associated to education was being taught by teachers to their pupil most of the time. This was given high importance by teachers in integrating peace to other subject areas. Education itself is a transformative process, in which Filipinos believe can transform behaviours into more civilized manners. Education for a Culture of Peace by Castro (2009) believes that social transformation can be attained through internalization of the value to the value of non-violence, tolerance and brotherhood against xenophobia and recession.

Whereas, considering every fellowmen a brother or sister was the highest priority of teachers in teaching peace education. This implies that teachers found it as an effective means of keeping in the mind of their pupils the love of fellowmen as a way in attaining peace through developing positive attitudes toward mankind. Claveria (2000) cited ways to achieve peace which is on developing proper attitude and intellectual knowledge that can lead to understanding individual or groups.

Striving to have peace within self and exemplifying it on one's behaviour is the last priority of public basic education teachers in the implementation of peace education. This implies that though teachers taught their children to be peace lovers within themselves and must be shown it in their behaviours, but still it is the last aspect they applied in teaching peace education. It was inferred that they did not prioritize it because they themselves do not have the true foundation of peace. In relevance to the matter, Mustafa (2000) linked it to the lives of the Tausogs who like to acquire guns which due to the fact that they were influenced by their ancestors since they were young that any man need to survive and defend themselves in which self is always in war with the need. For them, a man himself could not be able to have peace in his surroundings if he could not attain peace in himself. Thus, if peace is in the heart, then behaviour and eagerness to share could readily show it.

Table 2. Level of implementation of peace education on justice and equity

Indicators	Weighted Mean	Verbal Description
(JE1) Explains the meaning of justice and equity to their family members, school personnel and community members in the following situations like land disputes, crimes and human right violation.	3.88	*Highly Implemented*
(JE2) Shares principles of fairness and justice in terms of maintenance of peace and order.	3.76	*Highly Implemented*
(JE3) Participates in mass action like joining in the peace rally and peace camp.	3.42	*Highly Implemented*
(JE4) Acts or aides for people who are victims of injustice and inequity like filing cases in proper courts and facilitating court action.	3.16	*Moderately Implemented*
(JE5) Allows or facilitates information drives and seminar on justice and equity in school or community.	3.40	*Highly Implemented*
(JE6) Mediates with two feuding parties with fairness.	3.30	*Moderately Implemented*
(JE7) Settles conflict in the family and school personnel with fairness.	3.74	*Highly Implemented*
(JE8) Hears other people's reasons and speak for victims of injustice.	3.74	*Highly Implemented*
Average	**3.55**	***Highly Implemented***

The level of implementation of peace education in the aspects of value of justice and equity as reflected in the table shows the average mean (3.55) which indicates that the value of justice and equity was highly implemented. The highest mean (3.88) is on the indicator, "explain the meaning of justice and equity to their family members, school personnel and community members in the following situations like land disputes, crisis, and human rights violation," described as highly implemented. The lowest mean (3.16) is on the indicator, "act or aide for people who are victims of injustice and inequity in school or community", described as moderately implemented.

The value of justice and equity was highly implemented by the public basic education teachers in Munai-Maigo District, Lanao del Norte Division. This implies that the teachers taught their pupils often about the set of behaviour that are morally righteous or lawful in claiming something with fairness to others and with sense of impartiality. This is very important since most conflict that resulted to peace and order problems originated from these aspects. These are usually in the matters which are related to the dispensation of justice, agrarian claims or crimes at early age. To this purpose, justice must be taught to children so when they will grow up and will know how to seek justice and equity for themselves and for others. Further, the Peace

Education Initiatives Module by the UNESCO (2009) stated that it is the aim of education to educate children about justice and equity in such a way that learners would be able to sharpen their human cultural awareness, openness to truth and responsiveness to the realities of life which is needed most in their adult life.

Explaining the meaning of justice and equity to their family members, school personnel and community members on the following situations like land disputes crimes and human rights violation, are the priority activities of teachers in implementing peace education in aspects of value of justice and equity. This implies that teachers were very aware of the meaning of justice and equity which concerned land disputes, crimes and human rights violation. These situations are always the sources of injustice and inequity and children should know what their rights are so they can seek justice for themselves. With this, Bustos and Espiritu (2001) opined that on the top of these laws, right and responsibilities, there should have justice in order to have peace of mind which may lead to harmonious living.

Acting or helping people who are victims of injustice and inequity, like filing cases in proper courts and facilitating court action is sometimes practices by teachers. This implies that helping victims in seeking justice not the priorities of teachers since among Maranaos, this is too dangerous for oneself and to their love ones. Involving oneself in the conflicts of others is involving the whole clan in conflict that the victims are even innocent of the situation. This situation is very complicated and needs more immediate action from the community and the people concerned. However, the rule of law must prevail. Rosauro (2013) clearly emphasized in relevance to the above presentations that laws are promulgated by reason for common good since human being are creatures with attributes of reasons to recognize right or wrong. For him, reasons and justice is synonymous acts which supposedly to be observed and applied squarely.

Table 3. Level of implementation of peace education on human rights and dignities

Indicators	Weighted Mean	Verbal Description
(HRD1) Advocates human right and dignity in family, school and community.	4.04	*Highly Implemented*
(HRD2) Identifies priorities between human right, national security and public welfare.	3.98	*Highly Implemented*
(HRD3) Explains the human right standard and norms.	3.74	*Highly Implemented*
(HRD4) Explains hierarchy of rights.	3.62	*Highly Implemented*
(HRD5) Reflects on the bill of rights on the constitution.	3.54	*Highly Implemented*
HRD6 Explains that it is the right of the people to have their own language and culture among tribes.	3.94	*Highly Implemented*
(HRD7) Explains the diversity of legal system belief among people.	3.84	*Highly Implemented*
(HRD8) Explains the right of other people for self-determination, socially, economically, and culturally.	3.98	*Highly Implemented*
Average	**3.84**	***Highly Implemented***

Note:

	4.20-5.00	*Very Highly Implemented*
	1.80-2.59	*Less Implemented*
	3.40-4.19	*Highly Implemented*
	1.00-1.79	*Not Implemented*
	2.60-3.39	*Moderately Implemented*

Table 3 shows the level of implementation of peace education in the aspects of value of human rights and dignities and reflected the average mean (3.84) which indicates the value of human rights and dignities was highly implemented as part of the integration of peace education. The indicator with the highest mean (4.04) described as highly implemented is on "advocating human rights and dignities in family, school and community." The lowest mean, described as highly implemented is on the indicator, "reflect on the bill of rights on the constitution."

From the results, it can be inferred that teachers oftentimes included the value of human rights and dignities in their teaching. This implied that for the public basic education teachers, human rights and dignities was very important and should be taught to the learners so that peace and order can be sustained. It is in the acknowledgement of the right and dignities of man that the learners could understand and respect themselves and other people. This awareness of people could lead to the effort of sustaining peace in the locality, most especially by young people. This is the duty of the school, the institution delegated to prepare man to be a member of human society through laws, duties and obligation with his rights, in order to maintain social control and harmony (Training Module for Education for a Culture of Peace by the UNESCO, 2013).

Advocating human rights and dignities in family, school, and community were the priorities of teachers in implementing peace education so that peace and order can be sustained through valuing the aforesaid aspect of peace education. This is a way for the learners to recognize fellowmen as dignified and could lead to harmonious relationship. This must be taught to the learners, family members, and colleagues in school and community. Peace education is an empowering process that focuses on the transformation of Filipino minds, hearts, and behaviour for a just and humane world. Through these, the learners become creative and active participants of their own transformation in the climate that uphold the dignity of every person (Peace Education Initiatives Module by Castro, Nario-Galace, and Lesaca, 2005).

"Reflecting on the bill of rights of the constitution" was the last priority of teachers in implementing the aspects of value of human rights and dignities of peace education. This implied that this is the last priority of teachers in teaching human rights and dignities since the topic is too broad for the learners to understand at their level of maturity. Bill of rights in the constitution is seldom consulted since there is specific law on human rights. Moreover, schools seldom have the copies of the

Philippine Constitution since some schools have no formal libraries in itself. The saying, "nobody is above the law" is seldom understood since "innocence of the law" is usually actuation among citizenry. There is a need to explain the rule of law so peace can be sustained. Rules and specific interpretation of laws must be applied to various human relations and activities (Osara, 2008).

Table 4. Level of implementation of peace education on social justice

Indicators	Weighted Mean	Verbal Description
(SJ1)Acknowledges change as part of human society.	4.10	*Highly Implemented*
(SJ2)Knows that in a society diversity of culture exists and must be respected.	4.20	*Very Highly Implemented*
(SJ3)Avoids discrimination of other people's way of life. Tradition, religion and practice.	4.10	*Highly Implemented*
(SJ4)Shares knowledge about our on cultures to other people who belong to another cultural group.	4.06	*Highly Implemented*
(SJ5)Deals with tolerance, understanding and open-mindedness of people who are members of other race, culture and religion.	3.84	*Highly Implemented*
(SJ6)Acknowledges that peace and harmony are vital elements of society.	4.24	*Very Highly Implemented*
(SJ7)Explains laws and ordinance governing life in a multicultural society.	3.86	*Highly Implemented*
(SJ8)Promotes moral development in society.	4.16	*Highly Implemented*
Average	**4.07**	***Highly Implemented***

Note: 4.20-5.00   *Very Highly Implemented* 1.80-2.59 *Less Implemented*
3.40-4.19   *Highly Implemented*
1.00-1.79   *Not Implemented*
2.60-3.39   *Moderately Implemented*

Table 4 shows the results on the level of implementation of peace education in the aspect of social justice. Average mean (4.07) described the implementation of values of social justice as highly implemented. The highest mean (4.24) is described as very highly implemented which is on the indicator, "acknowledge that peace and harmony are vital elements of society". The lowest mean (3.84) is on the indicator, "deal with tolerance, understanding and open mindedness of people who are members of other race, culture or religion".

From the results it can be implied that teachers oftentimes applied to their teaching the value of social justice as a way of sustaining peace. This includes explaining to the learners about the dispensation of legal claims of individuals in community and society. Peace and order problems usually started in disparities of dispensing the community/mutual resources like parcels of land. The long standing conflicts in the Philippines specifically in Mindanao which is agrarian in nature resulted to crisis. This should be brought out to the awareness of young people so they could understand the crisis of conflict in the country and on the proper time they could prepare solutions in which at the present time Filipinos failed to give interventions. Cooper (2013) stated that the aim of education is to prepare people for responsibilities and leadership job in the government. Elements of peace education must be based on realities.

Acknowledging that peace and harmony are vital elements of society is implemented on the highest level. This implied that teachers believed that people living in a society need to have peace and understanding of each other for survival. This is very particular in a multi-cultural community like Lanao del Norte, in particular Maigo and Munai, where Maranao and Christian used to live together. This is an inevitable situation since boundaries in the world were broken by immigration and technology that results to pluralism. In the same situation; pupils should be trained to live in a multi-cultural community where there are varieties of races, culture and religions (Pachuau, 2000). They must be trained to response to balance between functions and structure of social role in the society, so they can attain social development or progress which implied change, aimed for the better life and harmony (Hunt, et al., 2002).

Dealing with tolerance, understanding and open-mindedness of people who are members of other race, culture and religion is the last priority of teachers in the implementation of peace education on aspect of value of social justice. This implied that teachers taught the learners to be tolerant, understanding and to be opened to other people with different cultural backgrounds. In the Philippines, peace is marred with problem and conflict due to varied culture, belief and religion (Kiunisala, Guiam, and Cabanlit, 2004). The lack of understanding and cultural discrimination started it all. Filipino cultures of other countries appreciate including their own but not so much so with culture of Filipinos other Filipino and being tribes. This leads to the disappearance of the precious Filipino traditions and values and being replaced by commercialism. The Filipinos always look at themselves and his fellow Filipinos as inferior being from the white race due to imperialism. They are not only enslaved economically but culturally in which education is the only way to free them from the bondage. The Constitution of the Philippines of 1987 provides the state to preserved, enriched and evolved the Filipino natural culture based on unity and diversity of different Filipinos tribes.

Table 5. Summary on the level of implementation of peace education

Indicators	Weighted Mean	Verbal Description
Non-violence and Brotherhood	3.96	*Highly Implemented*
Justice and Equity	3.55	*Highly Implemented*

Human Rights and Dignities	3.84	*Highly Implemented*
Social Justice	4.07	*Highly Implemented*
Average	**3.85**	***Highly Implemented***

Note: *4.20-5.00*   *Very Highly Implemented*
         1.80-2.59   *Less Implemented*
         3.40-4.19   *Highly Implemented*
         1.00-1.79   *Not Implemented*
         2.60-3.39   *Moderately Implemented*

Table 5 shows the summary on the implementation of peace education. The average mean (3.85) is described as highly implemented. The highest mean (4.07) is described as highly implemented in the aspects of social justice. The lowest mean (3.55) is described as highly implemented in the aspects of justice and equity.

Results show that peace education implementation was done to the highest level. This implied that aspects of values of non-violence and brotherhood, justice and equity, human rights and dignities, and social justice were being given most attention and efforts by the teachers. Based on the lines from Education for a Culture of Peace by Castro (2009) peace education is an empowering process which focuses on the transformation of the Filipino minds, heart and behaviour for a just and human world.

The highest priority of teachers was to implement social justice. This is related to the claims of individuals in the community or the society such as land resources. This is always the beginning of conflict where the few have all the resources and the majority have less. Fountain (1999) stated that this conflict occurs in all stages of nation's development and the source of poverty must be stopped through justice for all.

The end priority among the aspects of peace education implementation by teachers was justice and equity. This implied that the teaching of subjects related to law had some problem or confusions. This is due to the limited knowledge of teachers on laws and justice system. Fahin (2000) stated that students, teachers and school staff must be aware of the various approaches to constructive conflict resolution which foundation is knowledge about laws and justice.

VI. CONCLUSIONS

The results show something about the public basic education teachers' high motivation which relate to personal reasons to become peace educators. They wanted to help their learners solve problems related to violence and see they can make positive contributions by teaching conflict resolution skills. They were also seeking ways to resolve petty problems and fights in their zones.

Though it is hard to be a peacemaker in a violent society but the respondents were highly implemented the four major indicators in educating peace namely; non-violence and brotherhood, justice and equity, human rights and dignities, and social justice. Moreover, it can also be concluded that even the respondents were fully aware of the causes of the recent conflicts

in their zones through their attendance in seminars and trainings, and highly implemented the aforesaid indicators, but still not a guarantee to attain a peaceful place to live in. They still need family and administrative supports, like, cooperation among the constituents, and positive school climate. Since it is not the abstract formal content of their knowledge that motivates them to become peace educators but rather their personal experiences related to violence and peace that influence them to implement peace education techniques.

VII. RECOMMENDATIONS

Based on the findings and conclusions made, the following are the recommendations:

Peace education should not just be an add on subject to be taught by the few teachers, but rather should involve all levels of the school; teachers should be given more seminars on human rights, laws and justice system by the DepEd authorities and other stakeholders who are concerned about laws; sending of teachers to national and international level on peace education activities should be made by peace advocates and organizations; and the teaching of culture of Filipinos, both Christians, Muslims, and Lumads must be intensified by the basic education teachers.

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AUTHORS

First Author – Gaudencio M. Alaya-ay, Jr, ORCID No. 0000-0002-4717-0862, docjunix.alayaay2008@gmail.com, Lourdes College, Cagayan de Oro City, Philippines
Second Author – Milagros B. Basang, ORCID No. 0000-0002-8283-1400, milagrosbbasang @gmail.com, St. Peter's College Iligan City, Philippines
Third Author – Amparo P. Fernandez, ORCID No. 0000-0002-0827-401X, amparofernandez1952@gmail.com, Acelo C. Badelles, Sr. Memorial High School, Tipanoy, Iligan City, Philippines
Fourth Author – Farida Gracia B. Sabaduquia, ORCID No. 0000-0001-9572-2230, danjet07@gmail.com, Iligan City SPED Center, Roxas Avenue, Mahayahay, Iligan City, Philippines
Fifth Author – Teresita B. Sambo, ORCID No. 0000-0001-5428-9290, teresitasambo@gmail.com, Tomas Cabili Central School, Tomas Cabili, Iligan City, Philippines

Sixth Author – Concordia S. Talaid , ORCID No. 0000-0002-2407-629, concordiatalaid1955@gmail.com, Miguel Obach Memorial School, Merila, Ubaldo Laya, Iligan City, Philippines

Automatic Detection of Brain Tumor through Magnetic Resonance Image

Suneetha Bobbillapati[1], A.Jhansi Rani[2]

[1]ECE Department, Research scholor in Nagarjuna university, Nagrjuna university, Guntur, Andhrapradesh
[2]Professor in ECE Dept V.R Siddhardha Engineering College,Vijayawadaa, Andhrapradesh

Abstract- In this Review paper, it is intended to summarize and compare the methods of automatic detection of brain tumor through Magnetic Resonance Image (MRI) used in different stages of Computer Aided Detection System (CAD).In particular, Image Acquisition, preprocessing and enhancement, segmentation steps are studied and compared. In Preprocessing and Enhancement stage, medical image is converted into standard format with contrast manipulation, noise reduction by background removal, edge sharpening, filtering process and removal of film artifacts. Segmentation determines as the process of dividing an image into disjoint homogenous regions of a medical image. The amount of resources required to describe large set of data is simplified and selected in for tissue segmentation.

Index Terms- Magnetic Resonance Image (MRI), Preprocessing and Enhancement, Segmentation, Feature Extraction, Feature Selection, Classification**,** Receiver Operating Characteristics curve (ROC).

I. INTRODUCTION

A. BRAIN TUMOR: Brain tumor is one of the major causes for the increase in Mortality among children and adults. A tumor is a mass of tissue that grows out of control of the normal forces that regulate growth. Most Research in developed countries show that the number of people who develop brain tumors and die from them has increased perhaps as much as 300 over past three decades. The overall annual incidence of primary brain tumors in the U.S is 11 to 12 per 100,000 people for primary malignant brain tumors, that rate is 6 to 7 per 1,00,000. In the UK, over 4,200 people are diagnosed with a brain tumor every year (2007 estimates In India, totally 80,271 people are affected by various types of tumor (2007 estimates). NBTF reported highest rate of primary malignant brain tumor occurred in Northern Europe, United States and Israel. Lowest rate arised in India and Philippines. The meninges are affected by a type of tumor called meningioma.

B. CAD SYSTEM We developed Computer-Aided Diagnosis (CAD) system for Automatic detection of brain tumor through MRI. The CAD system can provide the valuable outlook and accuracy of earlier brain tumor detection. It consists of two stages. First stage has preprocessing and enhancement. Second, feature extraction, feature selection, classification, and performance analysis are compared and studied. Preprocessing and enhancement techniques are used to improve the detection of the suspicious regions in MRI. The enhancement method consists of three processing steps: first, the MRI image is acquired. Second, removal of film artifacts such as labels and marks on the MRI image and finally the high frequency components are removed. Segmentation describes separation of suspicious region from background MRI image.
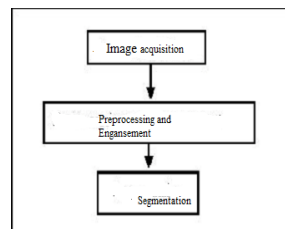
Fig.1 The outer section of CAD System.

II. DATABASE (IMAGE ACQUISITION)

To Access the real medical images like MRI, PET or CT scan and to take up a research is a very complex because of privacy issues and heavy technical hurdles. The purpose of this study is to compare automatic brain tumor detection methods through MR brain Images. The MRI data is obtained from the Brain Web Database at the McConnell Brain Imaging center of the Montreal Neurological Institute (MNI), McGill University . Brain imag can get from Web Interface (http://www.bic.mni.mcgill.ca/brainweb) [2]. All MR images were acquired on a 0.5T open interventional MRI system (Signa sp). MR Images were transformed on to a Linux network through LAN (KMCH Hospital,India). (All images had 1 mm slice thickness with $1{\times}1$ mm in plane resolution . The following figure shows the sample brain MRI.
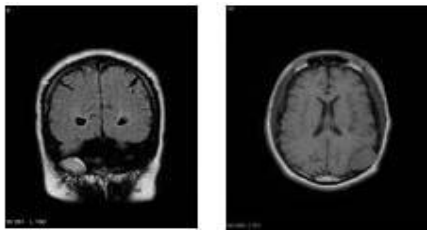
Fig. 2 The sample MRI epidermis brain tumor images.

Nowadays MRI systems are very important in medical image analysis. Detection of brain tumor requires high-resolution brain MRI. Most Medical Imaging Studies and detection are conducted using MRI, Positron Emission Tomography (PET) and Computed tomography (CT) Scan. MRI has a multidimensional nature of data provided from different sequential pulses [3]. An MRI scan can evaluate the structure of the heart and aorta, where it can detect aneurysms or tears. MRI scanners can produce 1500 images per second. Intraoperative MR imaging can acquire high contrast images of Soft tissue anatomy. MRI is the modality of choice for evaluating brain morphology because it provides superior soft-tissue contrast with flexible data acquisition protocols that highlight several different properties of the tissue.

III. PREPROCESSING AND ENHANCEMENT

Image processing and enhancement stage is the simplest categories of medical image processing. This stage is used for reducing image noise, highlighting edges, or displaying digital images. Some more techniques can employ medical image processing of coherent echo signals prior to image generation. The enhancement stage includes resolution enhancement; contrast enhancement. These are used to suppress noise and imaging of spectral parameters. After this stage the medical image is converted into standard image without noise, film artifacts and labels.

IV. PREPROCESSING

Preprocessing indicates that the same tissue type may have a different scale of signal intensities for different images. Preprocessing functions involve those operations that are normally required prior to the main data analysis and extraction of information, and are generally grouped **as** radiometric or geometric corrections. The Preprocessing aspects are surveyed and analyzed in this section. The Preprocessing Techniques such as Content Based model, Fiber tracking Method, Wavelets & Wavelet Packets, and Fourier transform technique [43; 73; 7; 54]. Olivier et al. designed a new Standard Imaging Protocol for brain tumor K radiotherapy. MRI has been acquired in the standard follow up after surgical resection.

Table 1: An overview of Preprocessing Methods

Methods	Remarks
Standard Imaging Protocol	MRIs have been acquired in the standard follow-up.after surgical resection.
Statistical Parametric Mapping, Pipe line Approach	It provides the solution of noise reduction,Inter-slice intensity variation correction,Intra-volume bias field correction,Linear & non linear alignment.
Content Based model,Shape based, Texture based technique,Histogram and Profilling Method	It showed detections of tumor with decrease in pixel count in binary images, increase in image intensity, High numbers of high intensity pixel.
Pixel Histograms, Morphological Process	It was more robust to noise and it can improve the integrity performance.
Boundary Detection Algorithm, Generalized Fuzzy operator(GFO),Contour Deformable Model, Region base technique	To obtain the fine result in the tumor consideration.
Boundary Model ,Non linear matching scheme	It represents the idealized MR intensity profile clearly.
Fiber tracking Method, Runge-Kutta method	The MR-DT1 datasets to be processed successfully.
Wavelets & Wavelet Packets, stein's unbiased Risk Estimate(SURE)[7]	It vanishes the noise coefficients by thresholding the detail components.
Fourier transform technique	Images were acquitted in the transaxial plane
Geometric prior,Bimodel	It is use to register the image
Unseeded Region Growing(URG) Algorithm	It is use to convert the MRI image into standard Formet.

Histogram based(HB),Subsecond imaging technique	Separate brain image, from head image removal of residual fragments such as sinus, cerebrospinal/fluid, dura, marrow.
Statistical Structure Analysis method	It gives 96.28% Accuracy.
PCA (Principal Component Analysis)	To minimize the artifacts present in the PET data set.
Neural Networks, Genetic Programming[30]	Large volume of data processed successfully.
Statistical Parametric Mapping Method	It is used to align the image properly and it uses left-to-right symmetry to confer robustness to areas of abnormality.
Independent Component Analysis(ICA)	Separate the components in MR images
Automatic Volume Registration method	It is used to remove artificats from MRI.
Head Model, Finite Difference Time-Domain (FDTD)	It is used to analyse different Tissue types.

V. ENHANCEMENT

Image enhancement methods inquire about how to improve the visual appearance of images from Magnetic Resonance Image (MRI),ComputedTomography(CT)scan,PositronEmissionTomography (PET) and the contrast enhancing brain volumes were linearly aligned. The enhancement activies are removal of film artifacts and labels, filtering the images. Conventional Enhancement techniques such as low pass filter, Median filter, Gabor Filter, Gaussian Filter, Prewitt edge-finding filter, Normalization Method [104; 23; 56; 93] are employable for this work.

Table 2: An overview of Enhancement Techniques

Methods	Description
Prewitt edge-finding filter	Extracts the image edges robustly and moves the vertices towards the boundaries of the desired structure.
Median filter	Low frequency image is generated and the mammogram images are enhanced using median filter; pectoral muscle region is removed and the border of the mammogram is detected for both left and right images from the binary image.
Genetic Algorithm(GA)	GA is applied to enhance the detected Border. The figure of merit is calculated to identify whether the detected border is exact or not.
Gradient-Based Method, Median Filter, Normalization Method	Shows the validity of detection of Memmographic lesions. Removes the high frequency components.
Triple Quantum Filtered Sodium MRI (TQF) Technique	blood brain barrier (BBB) breakdown develop.
Low pass Filter[95]	Takes care of local noisy fluctuations from MR images.
Triple Quantum Filtered (TQF) Sodium NMR [10]	Minimizes the effects of extra cellular fluids and Found Non-Contrast Enhancing tissue
Anisotropic Diffusio	The registered images are filtered clearly.

Edge Finding filter, Morphological operation.	Good performance compared to previous methods.
Gadolinium-Diethylenetriaminepentaacetic acid (Gd DTPA)Enhancement[6]	Provides additional independent information and improve the accuracy.
Novel image Approach[10]	Earlier detection of non-contrast enhancing tissue.
Prewitt edge-finding filter[4]	This filter enhances the tumor tissue greatly.
Morphological Filter	It is used to remove background.
Gabor Filter	HTD (Homogeneous texture descriptor) is extracted.
Gaussian Filter	Enhances image Boundaries.
Median Filter	The mammogram images are enhanced.
Gabor Filter Bank	It is used to remove the
Fuzzy C-means Clustering Method[100]	It is used to produce suspicious regions from MRI database and to improve the validity of the partitioning by splitting and merging clusters.
Hybrid level Set (HLS) Model[49]	It is used to segment edema and tumor.
Kohonen Self Organizing Map(SOM)[103]	It is used to segment the MR data in to regions that have similar characteristics.
Expectation Maximization(EM) Algorithm,	It is used to select the subsets of the expected

Multi Layer Markov Random Field(MRF)	regions efficiently.

Population-Based Tissue Maps, K Nearest Neighbor Model.	It is used to differentiate tissue types with high accuracy.
Level-Set Surface Model [1]	It is used to segment target regions from background tissue.
Support Vector machine	It is used to locate the boundary of an object quickly.
Genetic Algorithm	Segment objective region from MRI
Self organizing Map(SOM)	Segment the suspicious region.

VI. SUMMARY AND CONCLUSION

In this survey paper various automatic detection methods of brain tumor through MRI has been studied and compared for the period of more than two decades .This is used to focus on the future of developments of medical image processing in medicine and healthcare. We have described several methods in medical image processing and to discussed requirements and properties of techniques in brain tumor detection .This paper is used to give more information about brain tumor detection and segmentation. It is a milestone for analyzing all technologies relevant to brain tumor from MRI in Medical image processing. In this paper, various steps in detection of automatic detection:

    i)   The Preprocessing and Enhancement Technique

    ii)   Segmentation Algorithm and their performance have been studied and compared.

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AUTHORS

First Author – Suneetha Bobbillapati, M.Tech(Ph.D), Nagarjuna university, email address: suneetha.bobbillapati@gmail.com.
Second Author – A.Jhansi Rani, M.Tech,Ph.D, Professor ,ECE Department,V.R Siddhardha Engineering College email address: jhansi9rani@gmail.com.

Design and Implementation of Optimized Dual Port Register File Bit Cell

Prashanth Sai Manohara.S [*], **A.B.Kalpana**[**]

[*] B.I.T, Bangalore
[**] B.I.T, Bangalore

Abstract- The memory bit cell is the most important block of any memory. It defines memory specifications and occupies a major portion of the area in any memory. Power performance & Area (PPA) are industry wide parameters which are used to evaluate a memory configuration. Larger the memory size larger is its power consumption. But designing the memory bit cell effectively minimizes the area consumption of the memory and the chip.

Based on applications memories are designed to be of different types like high density, high performance, and low power. These memory flavours differ in the type of bitcell used for storing the data. In this project our aim is to design and implement Dual port Register-file memory bitcells. We later optimize the register file bit cell design for faster access time and lower chip area. These bit-cells will be characterized and the performance of this two bit-cells is compared against each other. The characterization will be done using HSPICE simulations and the schematics will be created in a schematic editor tool. BSIM4 models will be used for the transistors in the design.

Index Terms- Register file, high density, high performance, dynamic power, static noise margin, Read/Write Simulation.

I. INTRODUCTION

Register file is a key component of many processors or SoC applications. Not only its access time dominates the application speed but also its area and power occupies most part of chip in high performance processor design. In order to achieve sufficient bandwidth, designers increase the port number on bit-cell in conventional register file design [1]. However, such approaches make the bit-cell have larger area, worse noise margin, longer access time and limited operation voltage. To address these issues, many techniques were investigated to reduce the port number [2]. Increasing register file size cannot always improve the performance and in a specific size the performance improvement will be saturated [3].

Analysis and Design of High Performance, Low Power Multiple Ports Register Files [4] by et all proposes about how to analyze and design high performance low power multiple-ports register file circuitry, which is mostly used on μ-P and DSP chip. Here the basics concepts and different types of register file architectures are described. The design tradeoffs among the approaches are then analyzed and compared.

Reducing Register File Size through Instruction Pre-Execution Enhanced by Value Prediction by Tanaka Y ET all [5].TSD is is an architectural scheme, which enhances memory-level parallelism (MLP) by pre-executing instructions. Ideally, the TSD allows MLP under the unlimited number of physical registers to be exploited, and consequently only a small register file is necessary for MLP. In practice, however, the amount of MLP exploitable is limited, because there are cases where pre-execution is not performed or timing of pre-execution is delayed. This is caused by data dependencies among the pre-executed instructions. The authors propose the use of value prediction to solve the problems and reduce the use only 75% of the register file size.

A Low-Power Cell-Based-Design Multi-Port Register File in 65nm CMOS Technology Johannes Uhlig et all [6] proposes the design of a register file with 4 write and 6 read ports for an SDR multiprocessor in 65nm CMOS technology. A cell-based design (CBD) methodology is employed in which the circuit is partitioned into complex sub-cells, optimized on transistor level and layout. Each cell is completely characterized concerning timing and power for seamless integration into a semi-custom design flow. The CBD implementation shows 30% savings of power and 40% of area compared to a conventional semi-custom solution. The average power is 2.7mW from 1.0V supply and 300MHz operating frequency which is superior to previously published designs.

In this paper, we design a dual port register file bit cell and optimize the design by varying the transistor width for faster access time and lower fabrication area. The rest of this paper is organized as follows: Section II describes the architecture of Dual port Register file. Section III shows the simulations and analysis Section IV shows simulation results, and conclusions are given in Section V

There are two basic architecture of register file circuit, namely, single read/write port and multiple read/write ports.

Figure 1 shows the single read/write port architecture, which consists of three parts: the first block is the decoder. Its function is to decode the read/write address. There are two decoders, write decoder and read decoder. The second block is storage cell bank. It has bit line pre-charge circuit, memory cells and sense amplifiers. The third block is the control circuit, which has sleep control, in/out data control and flip-flops. Designing the storage element is the most critical issue in register file. It affects the performances and area of the final design

Single read/write port architecture only can read or write for one cell once. It will become a problem if the system wants to read/write for the multiple data at the same time. To solve this issue we can either add more single port cells or use multiple read/write ports architecture. For area, using multiple ports architecture is more efficient solution.

Figure 2 shows a multiple (2R1W) read/write ports architecture. Similarly, this circuit is composed of three blocks with a little difference. The 2R1W read/write register file must add a read decoder, controller, sense amplifier, and also storage cell need to add two pull down NMOS for additional read port. Therefore it can achieve the goal of multiple read/write, with a little bit of increased area. In the next section we will analyze two different read ports structures of register file.

II. DUAL PORT REGISTER FILE BIT CELL

Figure 3 shows the schematic of Dual port Register file circuit. The 8T register file bit cell consists of two ports viz., Port-A and Port-B. Register file bit cell differs from SRAM bit cell in a way that there are separate dedicated ports for read and write operations. Port-A is always used for read operation and Port-B for write operation.

In Read operation, the address decoder decodes the address line and put the address on the word line A (WLA). When this word line goes high the pass gate turns on and exposes the internal storage node (cored) to the bit line A (BLA) which is initially pre-charged to logic 1 by the bit cell pre-charge circuit.

In write operation, the data is driven by write drivers into the bit line B (BLB). When clock in enabled and write enable is activated the address decoders decode the address and turn on WLB

This pass gate when turned on exposes BLB to cored. The strength of write driver is higher than the pull down device in the bit cell. Hence the data is written onto the internal node

III. SIMULATION AND ANALYSIS

This section contains the Write and Read waveforms, Dynamic power, Leakage power and Static noise margin for faster access design and low fabrication area design.

Table 1: Transistor sizes

Transistors	Transistor Width 1	Transistor width 2
P1	3.3e-07	2.2e-07
P2	3.3e-07	2.2e-07
N1	2.25e-06	1.49e-06
N2	2.25e-06	1.49e-06
Pg1	6.3e-07	4.2e-07
Pg2	6.3e-07	4.2e-07
Pg3	6.3e-07	4.2e-07
Pg4	6.3e-07	4.2e-07
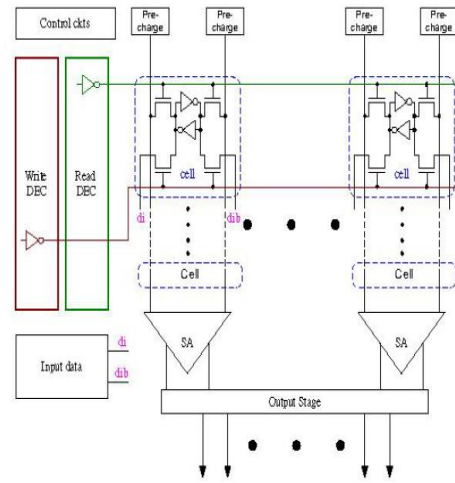
Figure 1: Single Read/Write Port Architecture
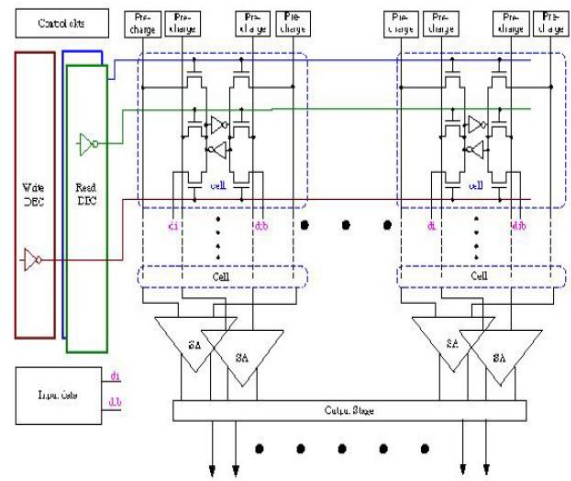
Figure 2: Multiple Read/Write Port Architecture
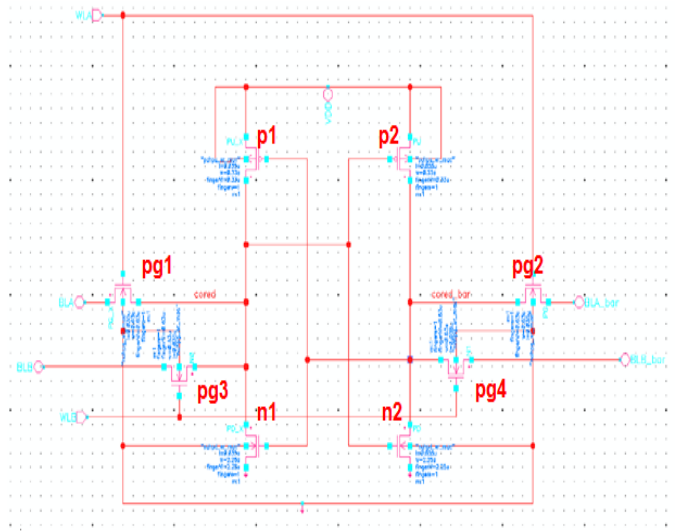
Figure 3: 8T Register File Bit Cell

Table 1 show the transistor sizes which are used to optimize the designed register file for faster access time and for low fabrication area.

IV. RF DESIGN USING TRANSISTOR WIDTH 1

i. Read Simulation

Read time is measured as the delay from word line reaching 50% of its final value to the time it takes the bit line differential to reach its threshold at power supply of 1.8V as shown in Figure 4. Tread= 5.722e-12sec, Iread=3.684e-05A.

ii. Write Simulation

Write time is measured as the time delay from word line WLB rise to the time it takes for the internal nodes to change state as shown in Figure 5. Twrite= 1.870e-10sec.

iii. Dynamic Power

Dynamic read power is the power drawn by the bitcell when the bit cell is subjected to a real-time read operation times the supply voltage. Here we model the bit cell into a read functional mode and then measure the current drawn by it from VDD. Dynamic write power is the powers drawn by the bitcell when the bit cell is subjected to a real-time write operation times the supply voltage. Here we model the bit cell into a write functional mode and then measure the current drawn by it from VDD as shown in Figure 6. Pdynamic_write= 6.6312e-05W, Ppeak_write= 1.713e-03W, Pdynamic_read= 3.51E-05W, Ppeak_read= 3.4524e-03W.

iv. Leakage Power

Leakage read power is the power drawn by the bitcell when subjected to a non-functional mode the bit cell is turned off i.e., bit lines are floating and word lines are at logic '0' times the supply voltage. Leakage write power is the power drawn by the bitcell when subjected to a non-functional mode. The bit cell is turned off i.e., bit lines are floating and word lines are at logic '0' times the supply voltage.
Leak power = 145.9pW

v. Static Noise margin

In this project we designed 8T register file which has separate read and write ports. In each RF cell design writing is done by using eight transistors and during writing data we disabling the Read port so Static Noise Margin (SNM) is not affecting during hold and Read mode. During writing we use the same writing configuration in the design so the write margin (least bitline voltage required to change the state of RF cell) is not affected by the Read port. By using the proposed design the worst case stability condition encountered in 8T RF cell is avoided and high Read SNM is retained. We modelled noise as a voltage source at the internal node of the cell and increased it gradually in the steps of 100mV. The SNM plot is shown in Figure 8.
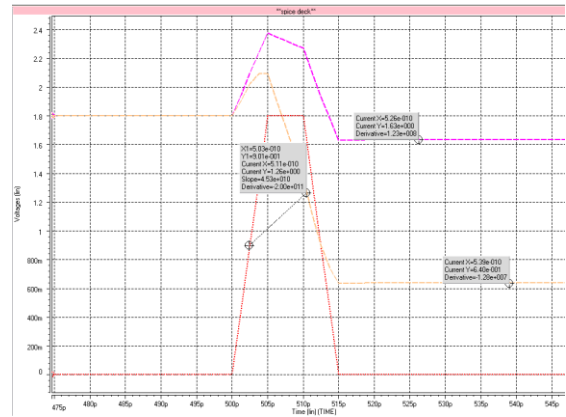
Figure 4: Read Simulation for Transistor width 1
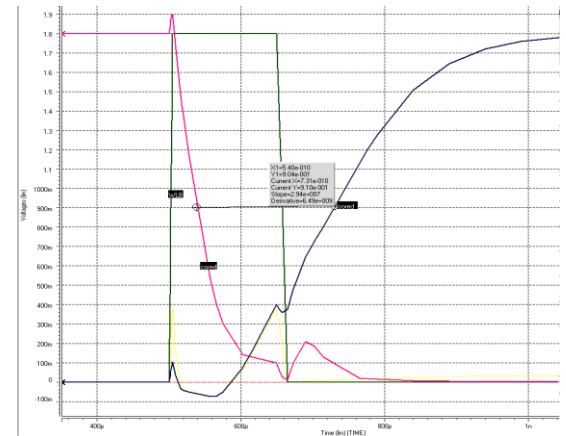
Figure 5: Write Simulation for Transistor width 1

The results show that there was no change of state of internal nodes up to a noise of 600mV but the cell changes the state when a noise of 700mV is introduced. Hence we can safely conclude that the noise margin is 600mV
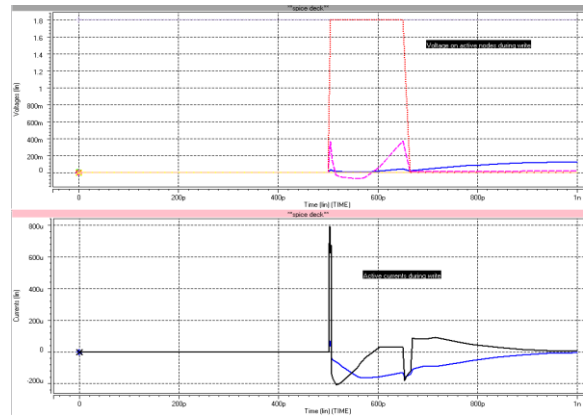
Figure.6 Dynamic Power for Transistor width 1
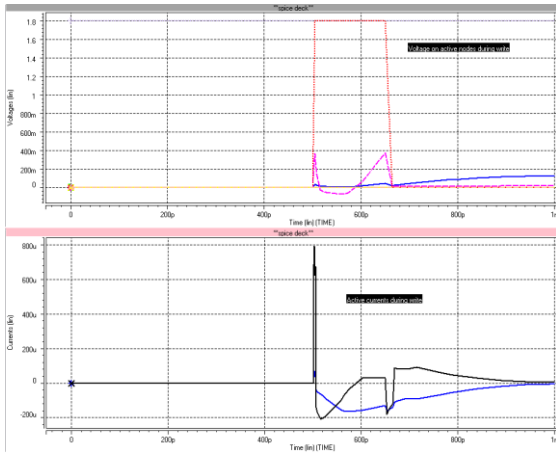
Figure 7: Leakage Power for Transistor width 1
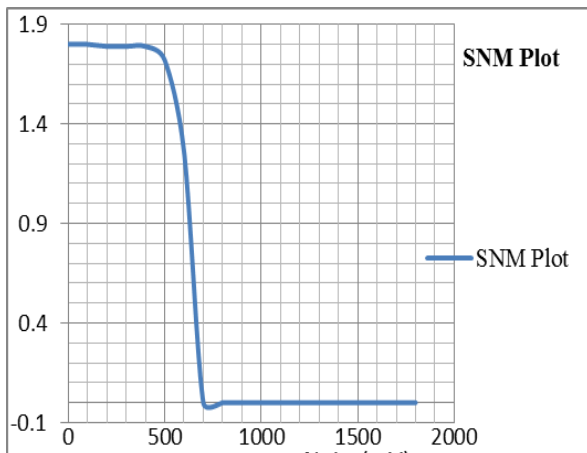
Figure 8: Static Noise margin for Transistor width 1

V. RF DESIGN USING TRANSISTOR WIDTH 2

i. Read Simulation

Read time is measured as the delay from word line reaching 50% of its final value to the time it takes the bit line differential to reach its threshold at power supply of 1.8V as showin in Figure 9. Tread= 5.603e-12sec, Iread=5.207e-05A,)
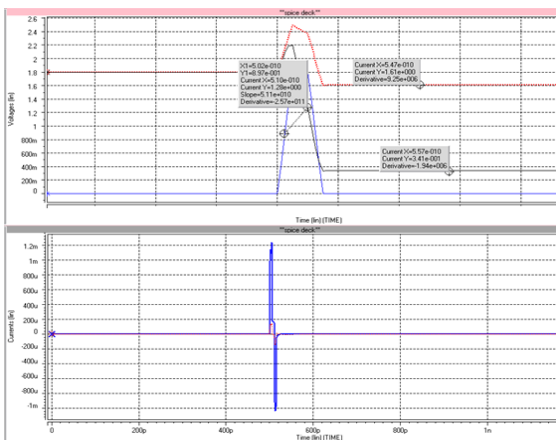
Figure 9: Read Simulation for Transistor width 2

ii. Write Simulation

Write time is measured as the time delay from word line WLB rise to the time it takes for the internal nodes to change state as shown in Figure 10.
Twrite= 1.978e-10sec

iii. Dynamic Power

Dynamic read power is the power drawn by the bitcell when the bit cell is subjected to a real-time read operation times the supply voltage. Here we model the bit cell into a read functional mode and then measure the current drawn by it from VDD. Dynamic write power is the powers drawn by the bitcell when the bit cell is subjected to a real-time write operation times the supply voltage. Here we model the bit cell into a write functional mode and then measure the current drawn by it from VDD as show in Figure 11. Pdynamic_write= 1.89e-05W, Ppeak_write= 2.3148e-03W, Pdynamic_read= 9.3726e-05W, Ppeak_read= 4.3092e-03W.

iv. Leakage Power

Leakage read power is the power drawn by the bitcell when subjected to a non-functional mode, the bit cell is turned off i.e., bit lines are floating and word lines are at logic '0' times the supply voltage. Leakage write power is the power drawn by the bitcell when subjected to a non-functional mode. The bit cell is turned off i.e., bit lines are floating and word lines are at logic '0' times the supply voltage.
Leak power = 175.3pW

v. Static Noise margin

In this project we designed 8T register file which has separate read and write ports. In each RF cell design writing is done by using eight transistors and during writing data we disabling the Read port so Static Noise Margin (SNM) is not affecting during hold and Read mode. During writing we use the same writing configuration in the design so the write margin (least bitline voltage required to change the state of RF cell)
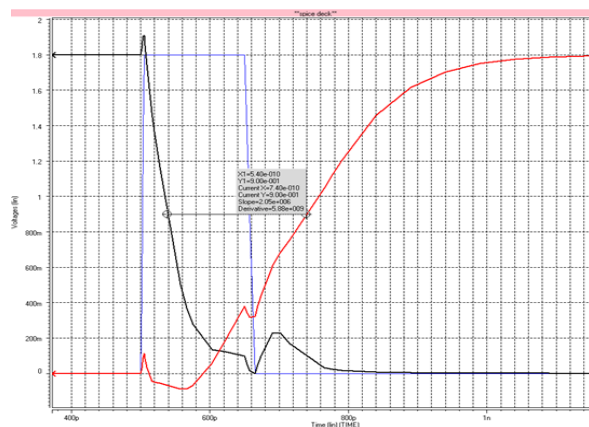
Figure 10: Write Simulation for Transistor width 2
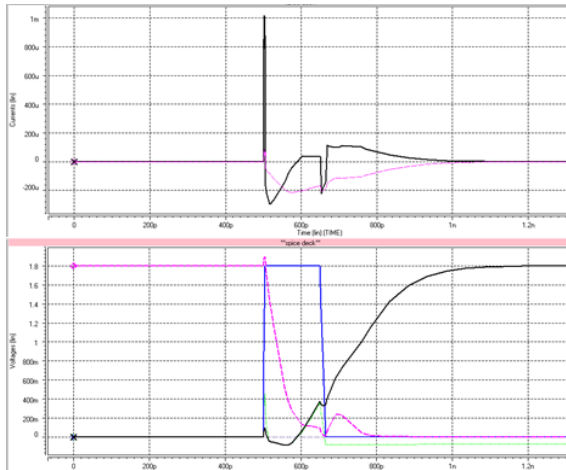
Figure 11: Dynamic Power for Transistor width 2
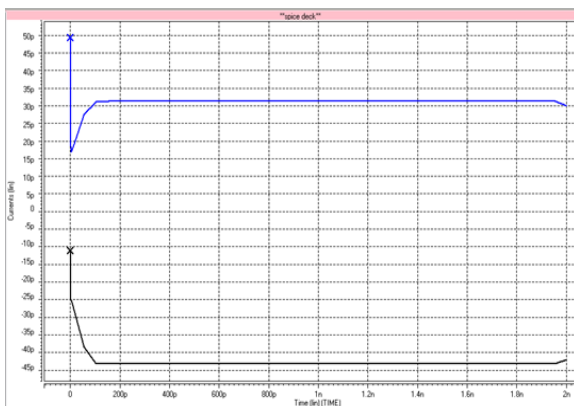
Figure 12: Leakage Power for Transistor width 2

We modeled noise as a voltage source at the internal node of the cell and increased it gradually in the steps of 100mV. The results show that there was no change of state of internal nodes up to a noise of 600mV but the cell changes the state when a noise of 700mV is introduced. Hence we can safely conclude that the noise margin is 600m. The SNM plot is showin in Figure 13.
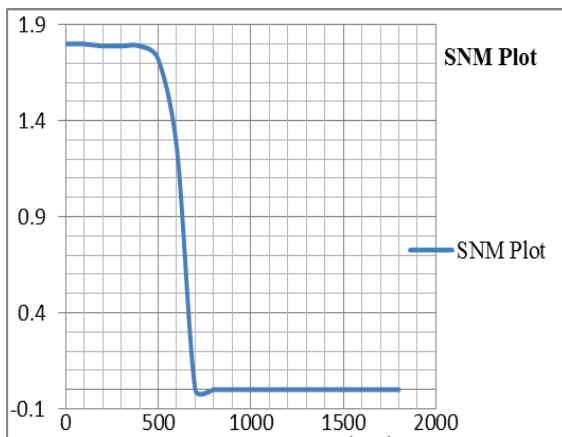
Figure 13: Static Noise margin for Transistor width 2

VI. RESULTS

Table 2: Simulation results

Parameter	RF design using Transistor width 1	RF design using Transistor width 2
Twrite (s)	1.870e-10	1.978e-10
Tread (s)	5.722e-12	5.603e-12
Iread(Amps)	3.684e-05	5.207e-05
SNM	600mV	600mV
Leakage Power (pW)	145.9	175.3
Dynamic Read Power (W)	3.51E-05	9.3726e-05
Dynamic Write Power (W)	6.6312e-05	1.89e-05
Peak Read Power (W)	3.4524e-03	4.3092e-03
Peak Write Power (W)	1.713e-03	2.3148e-03

The Table 2 shows the simulation results of the designed register file bit cells for two different transistor widths. The table indicates that the time taken for read and write operation by the register file bit cell using transistor width 1 is more than the register file bit cell using transistor width 2.

We can clearly see the trade offs resulting from the designs. Transistor Width 1design has more transistor count but it slower compared to Transistor Width 2. The design with Transistor Width 1 can be used when reducing the chip area is the motive. On the other hand Transistor Width 2 design is faster but need more power requirements and also have higher leakage currents.Transistor width 2 design can be used for when increasing the performance is the motive.

VII. CONCLUSIONS

A dual port register file bit cell is designed and implemented at 180nm technology and we observed that based on the requirement the RFs can be optimized to obtain the target parameters. If a faster access time RF is needed then the sizes of the transistors can be optimized in such a way that a high read current is achieved which reduced the access time of the memory. Alternatively if low fabrication area RF is the requirement of the application then the sizes of the transistors in the bit cell can be reduced to meet the area requirements. Reduced area of the bit cell in turn reduces the sizes of its control circuitry as well. Reducing the operating voltage is also an effective way to reduce integrated circuit power consumption but it degrades the noise margin. We then compare the two topologies in terms both write and Read operations, Leakage power, Dynamic Power (read and write power) and Static Noise margin and the measurements are tabulated.

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AUTHORS

First Author – Prashanth Sai Manohara.S, B.I.T, Bangalore, prashanthsms@gmail.com

Second Author – A.B.Kalpana B.I.T, Bangalore, abkalpana@gmail.com

DTMF based Smart Notice Board System

Adil Bashir[1], Sama Qazi[2], Shoeib Amin Banday[1], Liyaqat Nazir[1], Bisma Shah[2]

[1]Department of Electronics & Communication Engineering, National Institute of Technology, Srinagar, J&K India
[2]Department of Electronics & Communication Engineering, Islamic University of Science and Technology, J&K India

Abstract- The mobile phone technology like Dual Tone Multi Frequency (DTMF) and Global System for Mobile communication (GSM) have pushed us to control the things around us with mobile phones and the world is going mobile. Whatever appliances we are dealing with, in our daily life, we want to control them without physically moving to the control unit. As we see in our schools and colleges, we are using manual notice boards that require enough time and man power to change the notices every time we wish to change. As an advancement, the concept of programmable display boards was introduced. But these boards need to be reprogrammed each time. This makes them inefficient for immediate information transfer. In this paper, we have designed a smart notice board by which we can update the notice to be displayed from any part of the world in no time and it is advantageous during emergencies when we want to display alert messages or changed schedule speedily. Our system consists of three main modules viz DTMF module, Liquid Crystal Display (LCD) module, Microcontroller module and a mobile phone attached to display system. The DTMF based smart notice board system can be used at different parts of the city and the messages like Advertisements, News can be instantly displayed and updated. The user presses different numbers which correspond to different dial tones, which are then coded and sent from user mobile phone to display on the system wirelessly and accordingly the stored message for a code is displayed on LCD.

Index Terms- Dual Tone Multi Frequency (DTMF), Liquid Crystal Display (LCD), Smart Notice Board System (SNBS)

I. INTRODUCTION

The inclination of making the manually controlled things automatic has become a common practice these days. The process of making the things automatic is being exploited in almost all the major fields of life. Making things automatic reduces burden on the humans. The time utilized and the effort used in manually controlled processes is much higher than the automated systems. Considering the commonly used notice board system in our schools, colleges and universities and the advancement in technology, there occurs a gap between the two. In these institutes, we still use manual way of putting the important notices, class and examination schedules, results, etc in the notice boards. This manual system needs more effort and time to get the written announcements from the faculty and then put it on the notice board. In this paper, we have developed a Smart Notice Board System (SNBS) which is automatic in nature and provides us the means by which we can update the notices, changed schedules, display results quickly on the display system without the intervention of other person. The advancements in technology has been put together to make an effort to automate the process of manually publishing notices. One of the modules in our system is Dual-tone multi-frequency (DTMF) that is used for telecommunication signaling over analog telephone lines in the voice-frequency band between telephone handsets and other communications devices and the switching center. The version of DTMF that is used in push-button telephones for tone dialing is known as Touch-Tone [1]. This DTMF module is put together functionally with microcontroller and LCD modules to complete the task of automating and providing mobile control to notice boards.

II. SMART NOTICE BOARD SYSTEM

We designed a method for automating the notice display process in an efficient way in order to reduce the time and effort needed to get the notice from any faculty member and then to put in notice board. Figure 1 shows the block diagram of our design. In our approach, we divided the overall Smart Notice Board System into four sub-modules viz DTMF, LCD, power module and Microcontroller. Also, a mobile phone is attached to the LCD system which acts as a modem for receiving the incoming calls. All these sub-modules work collaboratively, intelligently and in coordination to automate the entire process of displaying notices speedily, as and when required. Kiel software is used to program the microcontroller and then interface it accordingly with LCD and DTMF [3]. SNBS provides an easy way to display notices in institutes, shopping centers, airports etc. we need not to go there & connect it to the laptop but we can change the messages using our mobile phone. The important feature of this project is that we are using a GSM network by which we can control LCD display from any part of the globe. It is one of the new technologies in the embedded field to make the communication between microcontroller and mobile. This project is a remote notice board with MODEM connected to it in the form of a mobile phone. We have designed a notice board that would avoid the usage of man power & reduces wastage of time. Also, it would be wireless and fast.
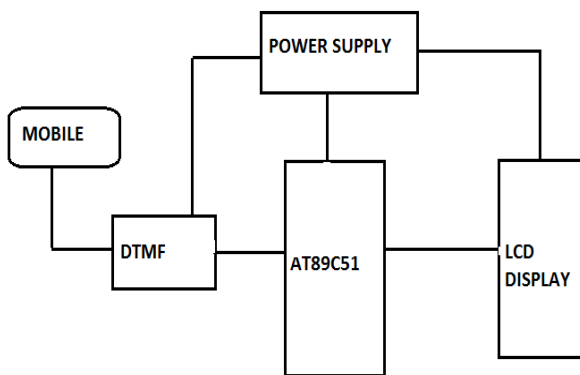
Fig 1: Block diagram of SNBS

A. Power Supply Module

This is the most prominent module which is used to drive all other hardware modules. The AC source is available in 220V and 50Hz. As such a step down transformer is used to lower the voltage level from 220V to a limit that can be easily converted to DC. The reduced AC voltage is then converted to DC voltage using a bridge rectifier. But to operate the various components like ICs, transistors, etc, a regulated DC voltage is required whose value should be no more than 5 volt. Thus, a voltage regulator IC 7805 is used for this purpose. The snapshot of the power module after it is made is shown in the figure 2 below.
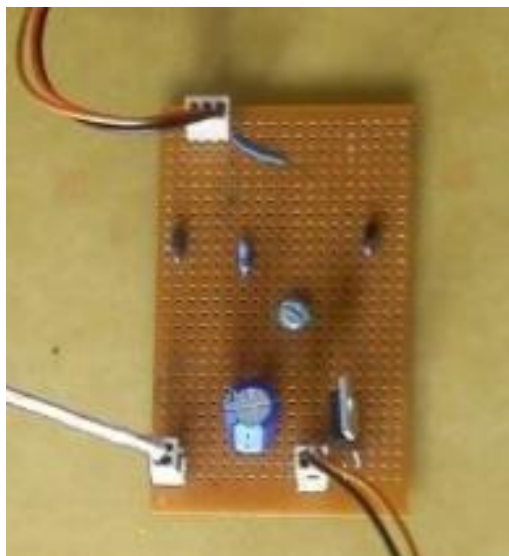
Fig 2: Layout of Power Supply Module

B. Microcontroller Module

It is the heart of this project as it controls the functioning of LCD depending on the input obtained from the user via DTMF. A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals [2]. In our proposed system, we have used AT89C51 as it suited the overall requirements. The AT89C51 provides 4K bytes of flash, 128 bytes of RAM, 32 I/O lines, two 16 bit timer/counter, five vector

two level interrupt architecture, a full duplex serial port. It is connected to the DTMF via four-line bus and controls the messages to be displayed on LCD. Figure 3 below shows the microcontroller module.

Fig 3: Layout of Microcontroller Module

C. DTMF Module

Dual tone multi frequency signaling controls the Smart Notice Board System by a mobile phone. A cell phone is attached to this module that is used to receive the calls from mobile phones of faculty. The DTMF input is fed to MT8870D which is 20 DIP IC. The DTMF circuitry converts the particular DTMF tone into a 4 line output which is fed to microcontroller. Depending upon the key pressed, a particular 4 line output (i.e. Q4, Q3, Q2, Q1) is generated by the decoder which is shown below in a table I.

Table I: Output from Various Key Tones

KEY TONE				
	Q4	Q3	Q2	Q1
1	1	1	1	0
2	1	1	0	1
3	1	1	0	0
4	1	0	1	1
5	1	0	1	0
6	1	0	0	1
7	0	1	0	0
8	0	1	1	1
9	0	1	1	0
0	0	1	0	1
*	0	1	0	0
#	0	0	1	1

The snapshot of the DTMF module is presented in figure 4 below.
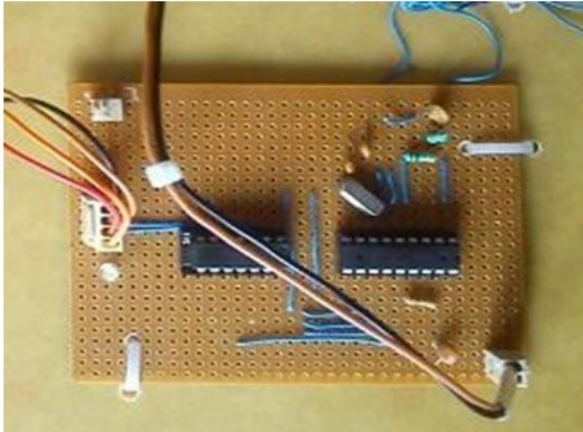
Fig 4: Layout of DTMF Module

D. LCD Module

A liquid-crystal display (LCD) is a flat panel electronic visual display that uses the light modulating properties of liquid crystals. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. We have used 16x2 LCD which means it can display 16 characters per line and there are two such lines. The function of this module is to display the stored messages depending on the decoded logic of dtmf tone by the microcontroller. Figure 5 below shows LCD module.

Fig 5: Layout of LCD Module

III. OPERATION

Since the SNBS consists of four sub-modules and the main module on which the others work is the DTMF module. It is connected to the mobile phone which is used to receive the calls from the cell phones of faculty who wish to change/update the notice. During the ongoing call, a DTMF tone is generated which is decoded into its equivalent binary by the decoder. This binary equivalent of the tone is then sent to the microcontroller which is preprogrammed to take a decision for any given input. Any mobile which makes a call to the mobile phone attached to the board will act as remote device. This feature of SNBS makes it controllable from any part of the world, which means we just have to call to the phone attached to SNBS and accordingly the notice and any new updates can be displayed automatically and speedily. The DTMF input (i.e. tone) is fed to the MT8870D via a speaker of headset attached to mobile phone. The DTMF circuitry converts the particular DTMF tone into a 4 line output which is fed to microcontroller. Depending upon the key pressed,

a particular 4 line output (i.e. Q4, Q3, Q2 and Q1) is generated by the decoder. This 4 line binary output is sent to microcontroller. The microcontroller has different messages to be outputted depending on the combinations of input signals received from DTMF. For each combination of DTMF output pins, a separate message is activated in microcontroller which is then sent to LCD to be displayed.

IV. RESULT

The diagram of the overall hardware implementation after the integration of the various modules is shown in figure 6 below:
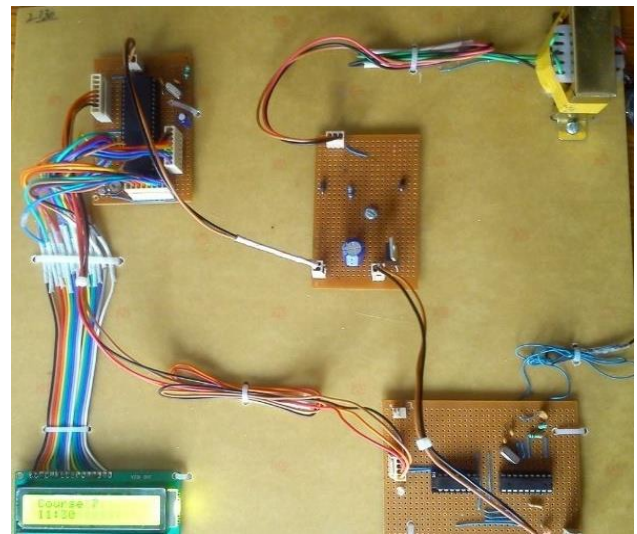
Fig 6: Layout of overall hardware architecture

Result I: On pressing "5" from the mobile phone, the message displayed on LCD is shown in figure 7 below.

Fig 7: LCD output for Result I

Result II: On pressing "6" from the mobile phone, the result obtained at LCD is shown in figure 8 below.

Fig 8: LCD output for Result II

V. CONCLUSION

The Smart Notice Board System is a step forward to make the manual process of displaying the important notices, class time tables, results, etc automated in nature. The developed system integrated by using four sub-modules the DTMF, LCD, power module and Microcontroller in which it would pioneer work for displaying the notices in an advanced and technological way. This proposal for the automation of producing notices is efficient and time saving process than the currently employing method in which a person has to get the hardcopy of the notice and the put in the notice board, which is complex and time consuming process. This automation of producing and displaying the notices also reduces the human effort and consequently the cost of the whole process. This system can be implemented at any place with ease and within reasonable amount of time. The implementation costs for the automation is also affordable. The SNB system also makes it easy to display messages during critical times when we want to update the notices by being far away and in quick time.

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AUTHORS

First Author – Adil Bashir, Department of Electronics & Communication Engineering, National Institute of Technology, Srinagar, J&K India

Second Author – Sama Qazi, Department of Electronics & Communication Engineering, Islamic University of Science and Technology, J&K India

Third Author – Shoeib Amin Banday, Department of Electronics & Communication Engineering, National Institute of Technology, Srinagar, J&K India

Fourth Author – Liyaqat Nazir, Department of Electronics & Communication Engineering, National Institute of Technology, Srinagar, J&K India

Fifth Author – Bisma Shah, Department of Electronics & Communication Engineering, Islamic University of Science and Technology, J&K India

Utilizing Heat which is Being Dissipated by Condenser of Refrigerator

Vaibhav Sharma, Vivek Sheel Yadav, Vinay Kasana

Research scholar Mechanical department Uttaranchal institute of technology/ India
Research scholar Mechanical department Uttaranchal institute of technology/ India
Research scholar Mechanical department Uttaranchal institute of technology/ India

Abstract- As we know refrigerator is a device use to keep items at respective temperature, generally at low temperature to preserve items and it is its main function. We have tried to make this device more versatile and efficient, by adding heat chamber. Heat chamber is an external chamber which is installed over our convectional chiller with the help of insulated pillars. We have installed an aluminium chamber over our chiller with the help of insulated pillars and we have wrapped this chamber via refrigerant flow tubes which are coming directly from compressor. Our study have found that refrigerant is compressed up to temperature 30-40 degree Celsius and this hot refrigerant is then allowed to flow through fins which are set at back side of refrigerator for lowering the temperature of refrigerant which is further expanded and allowed to flow through evaporator (chiller). In this process, this HEAT ENERGY is wasted because of dissipation in atmosphere our experiment involve utilization of this heat in most useful channel.

What we are doing is we are allowing this hot refrigerant to flow through this chamber which is wrapped by the flow tubes by allowing hot refrigerant to flow through this chamber give its heat energy to this chamber making that chamber warm say up to temp 30 degree Celsius. And now this chamber will serve as hot chamber to keep our items warm as per our requirement.

Essentially, the main aim of this review paper is to throw light on the research which can be done on the above explained concept.

I. INTRODUCTION

Refrigerator as all of us are familiar with this device, the refrigerator is a device used for preserving several products, food preservation, used for cooling water and also used by many industries for preserving many materials etc. Hybrid refrigerator is a refrigerator which utilises maximum amount of energy as compare to earlier refrigerator. The main aim of making this kind of refrigerator is to utilising maximum amount of energy. In this refrigerator we utilise heat energy which is being wasted during the time cooling of refrigerant at the condenser section.
This is a conceptualized idea of utilization of the heat of the refrigerator that is transfer in atmosphere and gone waste during cooling of a refrigerant.

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II. WHAT IS NEW IN HYBRID REFRIGERATOR

In earlier refrigerator, the high pressure vapour refrigerant gets converted into the low pressure vapour refrigerant when it flows through the condensing coil. This condensing coil are in contact with the air and when the refrigerant flow through these coils by the convection process it become cool and converts into liquid refrigerant. During this process the heat is lost in the surrounding. So, in hybrid refrigerator we utilises this energy by introducing the new aluminium cabin and wrap the condensing coil on this cabin just like the evaporator section so that the heat remains entrap in the cabin and is utilise for keeping items at higher temperature.

III. PROBLEM OCCUR DURING EXPERIMENT AND ITS SOLUTION

When we were performing this experiment we saw that the work done by the compressor of hybrid refrigerator is increased because we wrapped the condensing coil completely in the new cabin and due to this the work done by the compressor is increased and also the cost and weight of the refrigerator is increased because now we have replace this compressor with larger compressor. But our aim is to make energy efficient refrigerator without increasing it cost and weight also. So after doing many experiment we come to a conclusion that by keeping half of condensing coil wrap on the new cabin and half open as in earlier done in refrigerator the work done by the compressor is not increased and our hybrid refrigerator works good.

IV. COMPONENT IN HYBRID REFRIGERATOR

1) EVAPORATOR(COOLING SECTION)
2) HEATING CABIN.
3) EXPANSION VALVE.
4) COMPRESSOR.

FIG. 1 shows the newly introduced heating cabin in the refrigerator
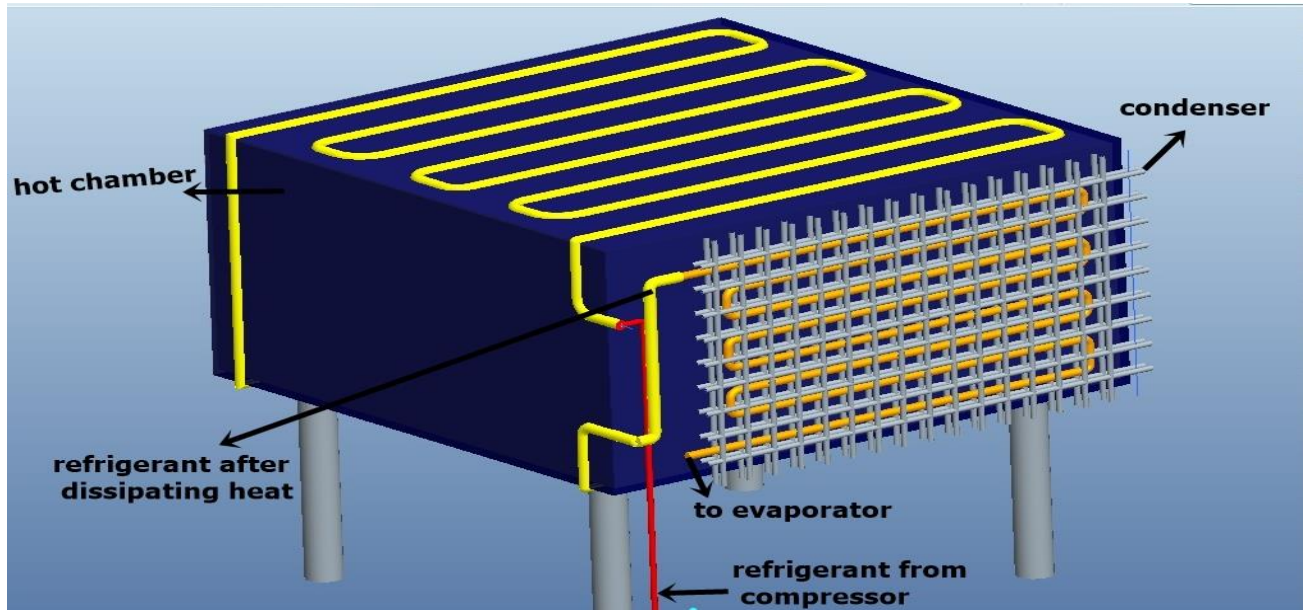
FIG.2 shows the complete assembly of our conceptualized refrigerator
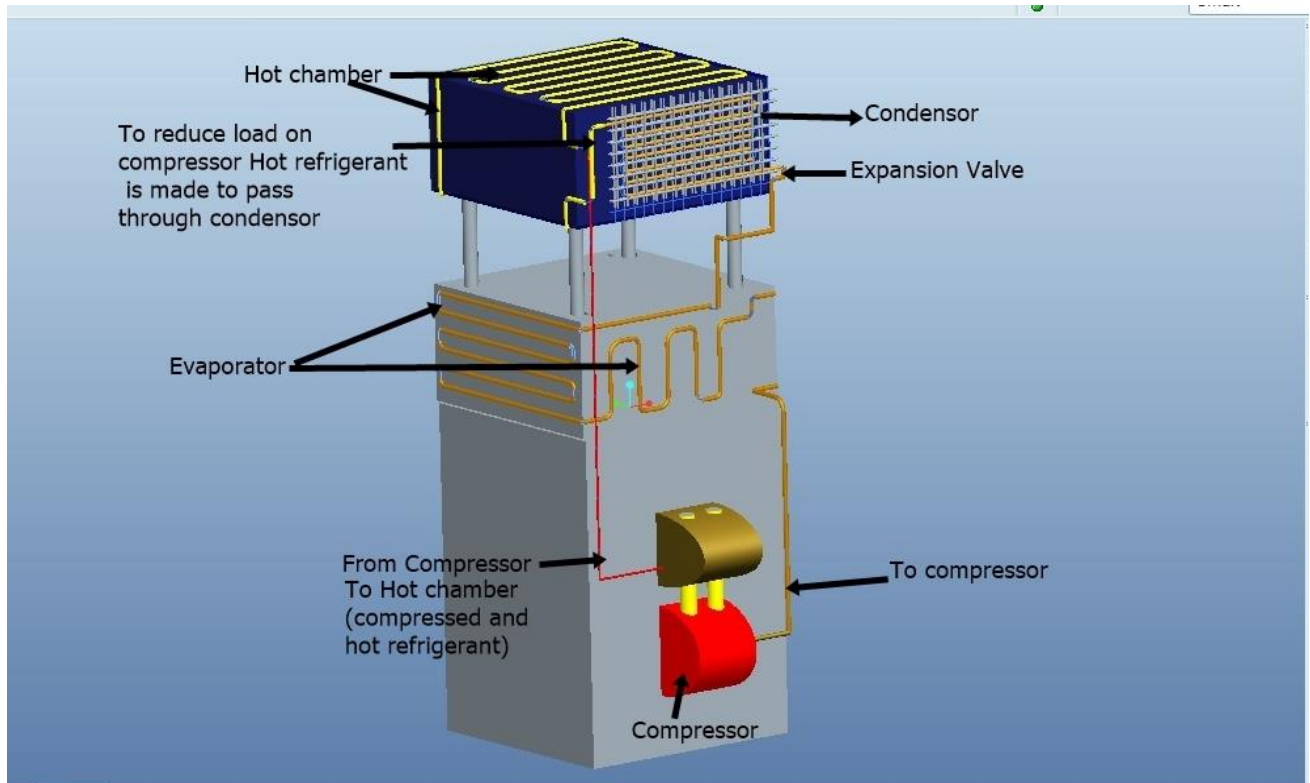
V.   WORKING OF HYBRID REFRIGERATOR

- EVAPORATOR:-   The low pressure and low temperature liquid refrigerant enter the evaporator section where it absorb the heat from the substance kept in the evaporator and make the substance cool and refrigerant converted   into low pressure and high temperature vapour refrigerant . Hence this process is constant pressure process.

- COMPRESSOR: - Then this low pressure vapour refrigerant enter the compressor. The compressor compressed this low vapour refrigerant into high pressure vapour refrigerant at this section the temperature is also further increases due to the compression of refrigerant. Now at the end of compression the refrigerant is high pressure high temperature vapour refrigerant.

- CONDENSOR UNIT:- Now in hybrid refrigerator this can be done in two stages which are as
    - o   Follows:
    - o   NEW CABIN: First of all this high pressure high temperature vapour refrigerant enter this newly introduce cabin where it flows into the coil which is wrapped around this cabin while flowing through this cabin it makes this cabin warm and the cool substance which is placed in this cabin absorbs this heat and become warm .
    - o   OPEN COIL SECTION: Now after going through this new cabin, this refrigerant is now allow to flow through the open coils section where it come in contact with the air for further cooling and high temperature vapour refrigerant converts into low temperature vapour refrigerant.

- EXPANSION VALVE: Now this low temperature vapour refrigerant enter into expansion valve where it expand adiabatically, basically the capillary tube uses for expansion as it reduces the cost of refrigerator. In this drop of pressure, is done from high to low as at low pressure refrigerant can better absorb energy.

VI.   APPLICATION

This type of refrigerator are very useful due to their versatile characteristics as they can be used both for heating and cooling purposes as well as they completely utilize the waste heat which is being rejected at time of cooling of refrigerant.

AUTHORS

First Author – Vaibhav Sharma, Research scholar Mechanical department Uttaranchal institute of technology/ India
Second Author – Vivek Sheel Yadav, Research scholar Mechanical department Uttaranchal institute of technology/ India
Third Author – Vinay Kasana, Research scholar Mechanical department Uttaranchal institute of technology/ India

Review on OFDM a Brief Survey

Vishal Pasi[*], Prateek Nigam[**], Dr. Vijayshri Chaurasia[**]

* Digital Communication Scholar RKDF Ist Bhopal
** Electrical Engineering Scholar AISECT University Bhopal

Abstract- Orthogonal frequency-division multiplexing (OFDM) effectively mitigates intersymbol interference (ISI) caused by the delay spread of wireless channels. Therefore, it has been used in many wireless systems and adopted by various standards. In this paper, we present a comprehensive survey on OFDM for wireless communications. We address basic OFDM and related modulations, as well as techniques to improve the performance of OFDM for wireless communications, including channel estimation and signal detection, time- and frequency-offset estimation and correction, peak-to-average power ratio reduction PAPR, intercarrier interference (ICI) and multiple-input–multiple-output (MIMO) techniques. We also describe the applications of OFDM in current systems and standards.

Index Terms- Channel estimation , frequency-offset estimation, intercarrier interference (ICI), multicarrier (MC), multiple input–multiple-output (MIMO) orthogonal frequency-division multiplexing (OFDM), peak-to-average power reduction, timeoffset estimation, wireless standards.

I. INTRODUCTION

Orthogonal frequency division multiplexing (OFDM) is a multicarrier multiplexing technique, where data is transmitted through several parallel frequency sub channels at a lower rate. It has been popularly standardized in many wireless applications such as Digital Video Broadcasting (DVB), Digital Audio Broadcasting (DAB), High Performance Wireless Local Area Network (HIPERLAN), IEEE 802.11 (WiFi), and IEEE 802.16 (WiMAX). It has also been employed for wired applications as in the Asynchronous Digital Subscriber Line (ADSL) and power-line communications.
 The ever increasing demand for very high rate wireless data transmission calls for technologies which make use of the available electromagnetic resource in the most intelligent way. Key objectives are spectrum efficiency (bits per second per Hertz), robustness against multipath propagation, range, power consumption and implementation complexity. These objectives are often conflicting, so techniques and implementations are sought which offer the best possible trade off between them. The Internet revolution has created the need for wireless technologies that can deliver data at high speeds in a spectrally efficient manner. However, supporting such high data rates with sufficient robustness to radio channel impairments requires careful selection of modulation techniques. Currently, the most suitable choice appears to be OFDM (Orthogonal Frequency Division Multiplexing). One of the main reasons to use OFDM is to increase the robustness against frequency selective fading or narrowband interference. In a single carrier system, a single fade or interferer can cause the entire link to fail, but in a multicarrier system, only a small percentage of the subcarriers will be affected. Error correction coding can then be used to correct for the few erroneous subcarriers. The concept of using parallel data transmission and frequency division multiplexing was published in the mid-1960s [1, 2].

OFDM is a special case of multi-carrier modulation. Multi-carrier modulation is the concept of splitting a signal into a number of signals, modulating each of these new signals to several frequency channels, and combining the data received on the multiple channels at the receiver [3]. In OFDM, the multiple frequency channels, known as sub-carriers, are orthogonal to each other [4].

II. BASIC OFDM

Let $\{s_{n,k}\}^{N-1}_{k=0}$ with $E/s_{n,k}/^2 = \sigma^2_s$ be the complex symbols to be transmitted at the nth OFDM block, then the OFDM modulated signal can be represented by

$$s_n(t) = \sum_{k=0}^{N-1} s_{n,k} e^{j2\pi k\Delta ft}, \qquad 0 \leq t \leq T_s$$

where T_s, Δf, and N are the symbol duration, the sub-channel space, and the number of sub-channels of OFDM signals, respectively. For the receiver to demodulate the OFDM signal, the symbol duration should be long enough such that $T_s\Delta f = 1$, which is also called the orthogonal condition since it makes $e^{-j2\pi k\delta ft}$ orthogonal to each other for different k. With the orthogonal condition, the transmitted symbols $s_{n,k}$ can be detected at the receiver by

$$s_{n,k} = \frac{1}{T_s} \int_0^{T_s} s_n(t) e^{-j2\pi k\Delta ft} dt$$

if there is no channel distortion.

The sampled version of the baseband OFDM signal $s(t)$ in (1) can be expressed as

$$s_n\left(m\frac{T_s}{N}\right) = \sum_{k=0}^{N-1} s_{n,k} e^{j2\pi k\Delta fm\frac{T_s}{N}} = \sum_{k=0}^{N-1} s_{n,k} e^{j\frac{2\pi mk}{N}}$$

which is actually the inverse discrete Fourier transform (IDFT) of the transmitted symbols $\{s_{n,k}\}^{N-1}_{k=0}$ and can efficiently be calculated by fast Fourier transform (FFT). It can easily be seen that demodulation at the receiver can be performed using DFT instead of the integral in (5).

A cyclic prefix (CP) or guard interval is critical for OFDM to avoid interblock interference (IBI) caused by the delay spread of wireless channels. They are usually inserted between adjacent OFDM blocks.
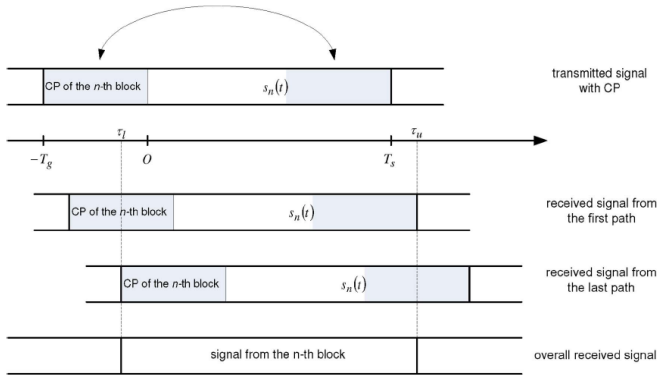
Fig. 1 shows the function of the CP.

Fig. 1 shows the function of the CP Without the CP, the length of the OFDM symbol is Ts, as shown in (1). With the CP, the transmitted signal is extended to $T = Tg + Ts$ and can be expressed as

$$\tilde{s}_n(t) = \sum_{k=0}^{N-1} s_{n,k} e^{j2\pi k \Delta f t}, \qquad -T_g \le t \le T_s.$$

It is obvious that $\tilde{s}n(t) = sn(t + Ts)$ for $-Tg \le t \le 0$, which is why it is called the CP.
The impulse response of a wireless channel can be expressed by [6].

$$h(t) = \sum_i \gamma_i \delta(t - \tau_i)$$

where τi and γi are the delay and the complex amplitude2of the ith path, respectively. Then, the received signal can be expressed as

$$x_n(t) = \sum_i \gamma_i \bar{s}_n(t - \tau_i) + n(t)$$

where $n(t)$ represents the additive white Gaussian noise (AWGN) at the receiver. As demonstrated in Fig. 1, $xn(t)$ consists of only the signal component from the nth OFDM block when $\tau l \le t \le \tau u$, where $\tau l = -Tg + \tau M$, $\tau u = Ts + \tau m$, $\tau m = \min i\{\tau i\}$, and $\tau M = \max i\{\tau i\}$; otherwise, the received signal consists of signals from different OFDM blocks.
If $\tau l \le 0$ and $\tau u \ge Ts$, then

$$x_{n,k} = \frac{1}{T_s} \int_0^{T_s} x_n(t) e^{-j2\pi f_k t} dt$$

$$= \frac{1}{T_s} \int_0^{T_s} \left\{ \sum_i \gamma_i \bar{s}_n(t - \tau_i) + n(t) \right\} e^{-j2\pi f_k t} dt$$

$$= H_k s_{n,k} + n_k$$

for $0 \le k \le N - 1$ and all n, where Hk denotes the frequency response of the wireless channel at the kth subchannel and is defined as

$$H_k = \sum_i \gamma_i e^{-j2\pi k \Delta f \tau_i}$$

It can be proved that nk are *independent identically distributed* complex circular Gaussian with zero mean and variance $\sigma 2n$. With Hk, transmitted symbols can be estimated. For single carrier systems, the received signal is the convolution of the transmitted sequences or symbols and the impulse response of wireless channels in addition to AWGN, whereas the impact of the channel is only a multiplicative distortion at each sub channel
for OFDM systems, which makes signal detection in OFDM systems very simple and is also one of the reasons why OFDM is very popular nowadays.

III. CHANNEL ESTIMATION

In OFDM systems, CSI can be estimated using training symbolsknown at both the transmitter and the receiver. The training symbols may be inserted at different subchannels of different OFDM blocks, as shown in Fig. 2(a). These training symbols are more often called pilots. The CSI corresponding to the pilot subchannels is first estimated, and then, that corresponding to the data-bearing subchannels is obtained by interpolation.

This is called pilot-aided channel estimation (PACE) [7]–[9].
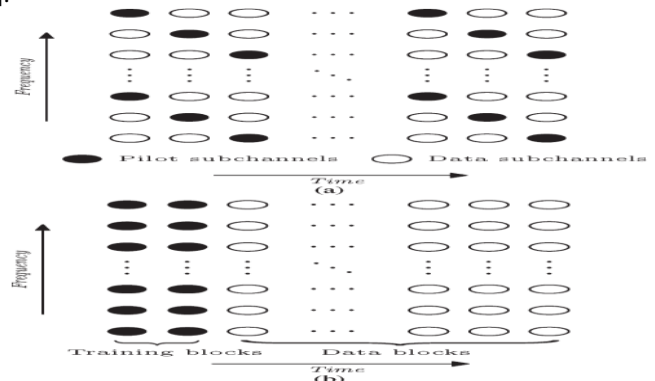
Fig. 2. Typical training blocks and comb pilots. (a) Comb pilots. (b) Preamble.

In addition to interleaving the training symbols and the informative symbols by such frequency-division multiplexing, they may also be superimposed, which can be regarded as a special form of pilots [10]. This kind of training symbols are usually called superimposed pilots, which were first proposed to phase synchronization and originally called spread-spectrum pilots [48] and were later applied for channel estimation. On the other hand, all training symbols may be arranged at the first (or couple of) OFDM blocks, as shown in Fig. 2(b). The training blocks in this case are sometimes called preamble. The CSI corresponding to the training blocks are first estimated, and that corresponding to the subsequent data blocks can be tracked and further improved with the help of the demodulated data. This is called decision-directed channel estimation (DDCE) [11], [12].

1)*Pilot-Aided Channel Estimation:* Using pilot tones to estimate channel coefficients was first proposed in [13]. The two major issues of pilot-aided channel estimation are pilot design and interpolation.

2) *DDCE:* For DDCE, CSI at the preamble block(s) is first estimated and then used to demodulate and detect the symbols at the next data block. CSI can be tracked by using detected symbols or data, either hard decision or soft decision, as shown in [14]–[16]. For systems with error-correction coding, redundancy in coding can be exploited by iteratively performing soft symbol decision and channel estimation [15], [17].

3) *Comparison:* DDCE methods fit in systems operating in static or quasi-static channels. It particularly fits in systems in a slot transmission mode, such as wireless cellular systems. Initial channel estimation is provided with the training blocks and is then followed by tracking or prediction. Their major advantage is that they are able to provide high spectrum efficiency by using detected data as pilots. However, error propagation will be induced in fast fading channels [18].

IV. TIME ANDFREQUENCY VARYING IMPAIRMENT MITIGATION

In this section, we will address time- and frequency-varying impairment mitigation. Frequency-varying impairments are caused by the timing offset between the transmitter and the receiver or the delay spread due to a multipath of wireless channels. As shown in (5), the impact of delay spread is a multiplicative channel distortion on the demodulated signal if the CP or guard interval is long enough, which can easily be mitigated once CSI is estimated. The impact of timing offset is much simpler than that of delay spread. If the timing offset τ is less than the CP, then it will cause a phase rotation of $2\pi k \Delta f \tau$ to the symbol at the kth subchannel [4]. If the timing offset exceeds the CP, then IBI will be generated, in addition to the phase rotation. The phase rotation due to the timing offset is different for different subchannels. This property can be exploited to estimate the timing offset. We will address how to estimate the timing offset and compensate for its impact later on in this section.

1) *Timing-Offset Estimation and Correction:* The timing offset can be estimated with pilot- and nonpilot-aided techniques. After the timing offset is estimated, its integer part, which is a multiple of the sampling interval, is used to adjust the starting position of the FFT window, and its (residual) fractional part will generate a phase offset and can be compensated at each subchannel when we cancel the impact of the delay spread of wireless channels [16].

2) *Frequency-Offset Estimation and Correction:* From the perspective of its impact and signal processing, the CFO can be divided into integer and fractional parts. The integer part of the CFO is a multiple of the subchannel space Δf, which will cause a symbol or subchannel shift, that is, the transmitted symbol in one subchannel is shifted to another at the receiver. The fractional part results in the loss of orthogonality among

subchannels and generates ICI. Once the CFO is estimated, its impact can completely be canceled in the time domain by multiplying the received signal $x(t)$ by the frequency shift factor $e{-}j2\pi\delta ft$.[19]

3) *Mitigation of ICI Caused by the Doppler Spread:* ICI may be caused by the CFO, phase noise, timing offset, and Doppler spread [20], [21], [22], [23]. However, ICI induced by the first three impairments can completely be compensated or corrected. Since the Doppler spread or shift is random, we can only mitigate its impact. The existing ICI mitigation techniques include frequency equalization, ICI self-canceling, time-domain windowing, coding, extanded kalman filter, unscaned kalman filter etc.

As we can see from (8), ICI in the frequency domain in OFDM systems is similar to ISI in the time domain in singlecarrier systems. Consequently, those approaches dealing with ISI in single-carrier systems can immediately be used here. It is well known that matrix inversion is required to calculate the coefficients of an equalizer. To reduce its high complexity, various methods have been developed. In [24], the channel matrix is partitioned into block diagonal matrices by exploiting the fact that the frequency response within a symbol duration will linearly vary with time when the duration of an OFDM symbol is much less than the channel coherence time. In [25], a time domain successive interference cancellation (SIC) detector is presented to remove ICI, which is similar to SIC widely used in multiuser detection.

4) PAPR Reduction: As indicated before, the OFDM signal has a large PAPR. A traditional method dealing with the large PAPR is to back off the operating points of nonlinear power amplifiers; however, it severely reduces the efficiency of the power amplifiers. Therefore, by exploiting the special characteristics of the OFDM signal, various approaches have been proposed to cope with the issue. They include clipping and filtering [26], [27], selected mapping (SLM) [28]–[30], partial transmit sequence (PTS) [31], etc. To reduce the PAPR of an OFDM signal, a clipper can directly be used. However, such nonlinear processing will cause in-band distortion and out-of-band radiation . If the out of band interference is filtered out, then the PAPR of the clipped signal will regrow [26]. Therefore, if clipping and filtering are repeated several times, then both the PAPR and out-of-band radiation will be reduced, as proposed in [27]. However, the clipping and filtering techniques are unable to remove the inband distortion. The technique is improved in [31] by limiting the distortion of each subchannel.

V. OFDM-RELATED MODULATION AND ACCESS TECHNIQUES

There are many other modulation or access techniques related to OFDM. MC modulation is a general category of modulation to which OFDM belongs. A single-carrier system with frequency-domain equalization (SC-FDE) and energy

spreading transform (EST)-based modulation are two block transmission schemes that exploit the CP to mitigate the delay spread of wireless channels, which share the same spirit as OFDM. Furthermore, based on OFDM, many access techniques have been developed. MC-CDMA and OFDM access (OFDMA) are two of the examples. In this section, we will briefly describe MC modulation, SC-FDE, EST-based modulation, MC-CDMA, and OFDMA.

VI. MIMO TECHNIQUES IN OFDM

MIMO techniques or space–time processing can be used in wireless communications for diversity gain and capacity improvement [32]–[33]. Recent books [34]–[35] have given a comprehensive introduction of MIMO techniques. Here, we focus on special issues when MIMO techniques are used with OFDM. Most of MIMO techniques are developed for flat fading channels. However, multipath will cause frequency selectivity of broadband wireless channels. Therefore, MIMO-OFDM, which has originally been proposed to exploit OFDM to mitigate ISI in MIMO systems, turns out to be a very promising choice for future high-data-rate transmission over broadband wireless channels. The earliest work in MIMO-OFDM can be found in [36] and [37]. Since that time, MIMO-OFDM has become a very popular area in wireless communications, particularly in the past several years [38]. In this section, we only very briefly provide an introduction of the topic.

VII. APPLICATIONS

During the past decade, OFDM has been adopted in many wireless communication standards, including European digital audio broadcasting, terrestrial digital video broadcasting, and satellite–terrestrial interactive multiservice infrastructure in China. In addition, OFDM has been considered or approved by many IEEE standard working groups, such as IEEE 802.11a/g/n, IEEE 802.15.3a, and IEEE 802.16d/e.

The applications include wireless personal area networks, wireless local area networks, and wireless metropolitan networks. Currently, OFDMA is being investigated as one of the most promising radio transmission techniques for LTE of the *3rd Generation Partnership Project* (3GPP), International Mobile Telecommunications—Advanced Systems. Before introducing the major features of several OFDM applications, we briefly describe the design guideline of OFDM for wireless communications.

VIII. CONCLUSION

In this paper, we have briefly described OFDM for wireless communications. We start with the basic principle of OFDM and techniques to deal with impairments in wireless systems, including channel estimation, timing- and frequency-offset estimation, ICI mitigation, and PAPR reduction. Then, we introduced related modulation and access schemes, such as OFDM, SC-FDE, EST-based modulation, MC-CDMA, and OFDMA.

We have also summarized the MIMO techniques for OFDM and the wireless applications of OFDM. The OFDM-related technique has been invented over 40 years ago. OFDM for wireless communications has intensively been an active research area in the past 10 years. It is not our intention and is impossible either to provide an exhaustive literature search in the area through this paper. Due to page limit, we do not include performance optimization in OFDM systems, techniques on joint channel, time- and frequency offset estimation, or applications other than wireless.

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AUTHORS

First Author – Vishal Pasi, Digital Communication Scholar
RKDF Ist Bhopal, pasivishal@yahoo.in

Second Author – Prateek Nigam, Electrical Engineering Scholar
Aisect University Bhopal
Third Author – Dr.Vijayshri Chaurasia,Manit Bhopal.

Anti-Fuzzy Lattice Ordered M-Group

M.U.Makandar [*] **, Dr.A.D.Lokhande**[**]

[*] Assistant professor, PG, KIT's IMER. Shivaji University, Kolhapur.
[**] HOD, Department of Mathematics, Y.C.Warana Mahavidyalaya, Warananager,Kolhapur.

Abstract- In this paper we introduce the notion of anti fuzzy lattice ordered m-groups and investigated some of its basic properties. We also study the homomorphic image, pre-image of anti fuzzy lattice ordered m-groups, arbitrary family of anti fuzzy lattice ordered m-groups and anti fuzzy lattice ordered m-groups using T-norms. We introduce the notion of sensible anti fuzzy lattice ordered m-groups in groups and some related properties of lattices are discussed.

Index Terms- Lattice ordered group, anti fuzzy lattice ordered m-group, Sensible fuzzy lattice , pre-image, direct product.

I. INTRODUCTION

The notion of fuzzy sets was introduced by L.A. Zadeh [5].Fuzzy set theory has been developed in many directions by many researchers and has evoked great interest among mathematicians working in different fields of mathematics, such as topological spaces, functional analysis, loop, group, ring, near ring, vector spaces, automation. In 1971, Rosenfield [8] introduced the concept of fuzzy subgroup. Motivated by this, many mathematicians started to review various concepts and theorems of abstract algebra in the roader frame work of fuzzy settings. N. Ajmal and K.V. Thomas [1] initiated such types of study in the year 1994. It was latter independently established by N. Ajmal [1] that the set of all fuzzy normal subgroups of a group constitute a sub lattice of the lattice of all fuzzy sub groups of a given group and is Modular. In [2], Biswas introduced the concept of anti- fuzzy subgroups of groups. Palaniappan. N and Muthuraj**,** [7] defined the homomorphism, anti-homomorphism of a fuzzy and an anti-fuzzy groups. G.S.V. Satya Saibaba [3] initiate the study of L-fuzzy lattice ordered groups and introducing the notice of L-fuzzy sub l- groups. J.A. Goguen [4] replaced the valuation set [0,1] by means of a complete lattice in an attempt to make a generalized study of fuzzy set theory by studying L-fuzzy sets. A Solairaju and R. Nagarajan [10] introduced the concept of lattice valued Q-fuzzy sub-modules over near rings with respect to T-norms. Dr.M.Marudai & V. Rajendran[6] modified the definition of fuzzy lattice and introduce the notion of fuzzy lattice of groups and investigated some of its basic properties. Gu [11] introduced concept of fuzzy groups with operator. Then S. Subramanian, R Nagrajan & Chellappa [9] extended the concept to m fuzzy groups with operator. In this paper we define a new algebraic structure of an anti fuzzy lattice ordered m-group and study some related properties.

II. SECTION-2 PRELIMINARIES

Definition 2.1: Let μ: X to [0, 1] be a fuzzy set & G ϵ þ(X) = Set of all fuzzy sets on X. A fuzzy set μ on G is called an anti fuzzy subgroup if i) μ (x y) $\leq$ max {μ (x), μ(y)} ii) μ (x $^{-1}$) $\leq \mu$ (x), for all x, yϵ G .

Definition 2.2: Let μ: X to [0, 1] be a fuzzy set & G ϵ þ(X). A fuzzy set μ on G is called a normal fuzzy subgroup if μ (x^{-1} y x) $\leq \mu$(y) for all x, yϵ G

Definition 2.3: An anti lattice ordered group is a system (G,.,$\leq$) if i) (G, ·) is a group ii) (G,$\leq$) is a lattice . iii) x $\leq$ y implies a x b $\leq$ a y b (compatibility) for a, b, x, yϵ G

Definition 2.4: Let μ: X to [0, 1] be a fuzzy set & G is a lattice ordered group, G ϵ þ(X). A function μ on G is said to be an anti fuzzy lattice ordered group if
i) μ (x y) $\leq$ max {μ (x), μ(y)} ii) μ (x $^{-1}$) $\leq \mu$ (x) for all x, yϵ G

Definition 2.5: Let G be a group, M be any set if
i)m x ϵ G. ii) m (x y) = (m x) y = x m y for all x, yϵ G, m ϵ M. Then G is called a m group.

Definition 2.6: Let μ: X to [0, 1] be a fuzzy set & G be a M group G. A fuzzy set on G, G ϵ þ(X)) is called an anti fuzzy m group if i) μ (m(x y)) $\leq$ max {μ (m x), μ (my)} ii) μ (mx^{-1}) $\leq \mu$ (m x)
for all x, yϵ G, m ϵ M

Definition 2.7: μ: X to [0, 1], G ϵ þ(X), M C X.
A function μ on G is said to be an anti fuzzy lattice ordered m-group if
i) (G, ·) is a M-group.
ii) (G,·, $\leq$) is an anti lattice ordered group.
iii) μ (m(x y)) $\leq$ max {μ (m x), μ(my)}
iv) μ ((m x) $^{-1}$) $\leq \mu$ (m x)
v) μ (m x v my) $\leq$ max {μ (m x), μ(m y)}
vi) μ (m x $\wedge$ my) $\leq$ max {μ (m x), μ(my)}
      For all x, y ϵ G

III. SECTION-3   PROPERTIES OF ANTI FUZZY LATTICE ORDERED M-GROUP

Proposition 3.1: Let G and G' be two anti fuzzy lattice ordered m-groups and ɵ:G→G' be a m-homomorphism defined by ɵ (m x)= m ɵ(x) .If B is an anti fuzzy lattice ordered m-group of G' then the pre-image ɵ$^{-1}$(B) is an anti fuzzy lattice ordered m-group of G.
Proof- Assume B is an anti fuzzy lattice ordered m-group of G'. Let x, y ϵ G
i)$^{\mu_{ɵ^{-1}}}$ (B) (m(x y)) = $^{\mu_B}$ ɵ (m(x y))
= $^{\mu_B}$ (m ɵ (x y))

$= \mu_B(\, m \, \theta(x) \, \theta \, (\, y))$

$\leq \max \{ \, \mu_B(\, m \, \theta \, (x)), \, \mu_B(\, m \, \theta \, (\, y))\}$

$\leq \max \{ \, \mu_B \, (\, \theta \, (m \, x)), \, \mu_B(\, \theta \, (m \, y))\}$

$\leq \max \{\mu_{\theta^{-1} \, (B)} \, (m \, x), \mu_{\theta^{-1} \, (B)} \, (m \, y)\}$

ii)$\mu_{\theta^{-1} \, (B)} \, (m \, x)^{-1} = \mu_B \, \theta \, ((m \, x)^{-1})$

$= \mu_B \, (\theta \, (m \, x))^{-1}$

$= \mu_B \, (m \, \theta \, (\, x \,))^{-1}$

$\leq \mu_B \, (m \, \theta \, (x))$

$\leq \mu_B \, (\, \theta \, (m \, x))$

$\leq \mu_{\theta^{-1} \, (B)} \, (m \, x)$

iii)$\mu_{\theta^{-1} \, (B)} \, (m \, x \vee my) \qquad = \mu_B \, \theta \, (m \, x \vee m \, y)$

$= \mu_B \, \theta(m \, x) \vee \theta(my)$

$\leq \max \{ \, \mu_B \, \theta(\, m \, x), \, \mu_B \, \theta(\, m \, y))$

$\leq \max \{\mu_{\theta^{-1} \, (B)} \, (m \, x), \, \mu_{\theta^{-1} \, (B)} \, (m \, y)\}$

iv)$\mu_{\theta^{-1} \, (B)} \, (m \, x \wedge my) \qquad = \mu_B \, \theta \, (m \, x \wedge m \, y)$

$= \mu_B \, \theta(m \, x) \wedge \theta(my)$

$\leq \max \{ \, \mu_B \, \theta(\, m \, x), \, \mu_B \, \theta(\, m \, y))$

$\leq \max \{\mu_{\theta^{-1} \, (B)} \, (m \, x), \mu_{\theta^{-1} \, (B)} \, (m \, y)\}$

Therefore $\theta^{-1}(B)$ is anti fuzzy lattice ordered m-group of G.

Proposition 3.2: Let G and G' be two anti fuzzy lattice ordered m-groups and $\theta:G \to G'$ be a
m-epimorphism. B is a fuzzy set in G'. If $\theta^{-1}(B)$ is an anti fuzzy lattice ordered m-group of G then B is an anti fuzzy lattice ordered m group of G'.

Proof- Let x , y ϵ G', therefore there exist an element a, b ϵG such that $\theta(a)$ = x and $\theta(b)$ = y.

i)$\mu_B \, (m(x \, y)) \qquad = \mu_B \, (m(\theta(a) \, \theta(b))$

$= \mu_B \, (m \, \theta \, (a \, b))$

$= \mu_B \, \theta \, (\, m \, (a \, b))$

$= \mu_{\theta^{-1} \, (B)} \, (m(a \, b))$

$\leq \max \{ \, \mu_{\theta^{-1} \, (B)} \, (ma)), \, \mu_{\theta^{-1} \, (B)} \, (m \, b))\}$

$\leq \max \{ \, \mu_B \, \theta \, (\, m \, a), \, \mu_B \, \theta \, (\, m \, b)\}$

$\leq \max \{ \, \mu_B \, m \, \theta \, (\, a), \, \mu_B \, m \, \theta \, (\, b)\}$

$\leq \max \{ \, \mu_B \, (\, m \, x), \, \mu_B \, (\, my \,)\}$

ii)$\mu_B \, (\, (m \, x)^{-1}) \qquad = \mu_B \, (m \, \theta \, (\, a) \,)^{-1}$

$= \mu_B \, (\, \theta \, (m \, a) \,)^{-1}$

$= \mu_B \, (\theta \, (m \, a)^{-1})$

$= \mu_{\theta^{-1} \, (B)} \, (m \, a)^{-1}$

$\leq \mu_{\theta^{-1} \, (B)} \, (m \, a)$

$\leq \mu_B \, \theta \, (m \, a)$

$\leq \mu_B \, m \, \theta(a)$

$\leq \mu_B \, (m \, x)$

iii)$\mu_B \, (m \, x \vee m \, y) = \mu_B \, (m \, \theta \, (\, a) \, \vee m \, \theta \, (\, b))$

$= \mu_B \, (\, \theta \, (m \, a) \, \vee \, \theta \, (m \, b))$

$= \mu_B \, (\, \theta \, (m \, a \vee m \, b))$

$= \mu_{\theta^{-1} \, (B)} \, (m \, a \vee m \, b)$

$\leq \max \{\mu_{\theta^{-1} \, (B)} \, (ma), \, \mu_{\theta^{-1} \, (B)} \, (m \, b)\}$

$\leq \max \{ \, \mu_B \, \theta(\, m \, a), \, \mu_B \, \theta(\, m \, b))$

$\leq \max \{ \, \mu_B \, m \, \theta(\, a), \, \mu_B \, m \, \theta(\, b))$

$\leq \max \{ \, \mu_B(\, m \, x), \, \mu_B(\, m \, y)\}$

iv)$\mu_B \, (m \, x \wedge m \, y) = \mu_B \, (m \, \theta \, (\, a) \, \wedge m \, \theta \, (\, b))$

$= \mu_B \, (\, \theta \, (m \, a) \, \wedge \, \theta \, (m \, b))$

$= \mu_B \, (\, \theta \, (m \, a \wedge m \, b))$

$= \mu_{\theta^{-1} \, (B)} \, (m \, a \wedge m \, b)$

$\leq \max \{\mu_{\theta^{-1} \, (B)} \, (ma), \, \mu_{\theta^{-1} \, (B)} \, (m \, b)\}$

$\leq \max \{ \, \mu_B \, \theta(\, m \, a), \, \mu_B \, \theta(\, m \, b))$

$\leq \max \{ \, \mu_B \, m \, \theta(\, a), \, \mu_B \, m \, \theta(\, b))$

$\leq \max \{ \, \mu_B(\, m \, x), \, \mu_B(\, m \, y)\}$

B is an anti fuzzy lattice ordered m group of G'.

Proposition 3.3: If $\{A_i\}$ is a family of an anti fuzzy lattice ordered m-group of G then U A_i is an anti fuzzy lattice ordered m-group of G where U $A_i = \{ \, x \, , v \, \mu_{Ai} \, (x) \, / \, x \, \epsilon \, G \, \}$

Proof- x, y ϵ G

i)$(U \, \mu_{Ai} \,) \, m(\, x \, y \,) = v \, \mu_{Ai} \, m \, (x \, y)$

$= v \, \mu_{Ai} \, (m \, x \, m \, y)$

$\leq v \max \{ \, \mu_{Ai} \, (m \, x), \, \mu_{Ai} \, (m \, y) \, \}$

$\leq \max \{ \, (U\mu_{Ai}) \, (m \, x), \, (U \, \mu_{Ai}) \, (m \, y) \, \}$

ii)$(U \, \mu_{Ai} \,) \, (m \, x)^{-1} = v \, \mu_{Ai} \, (m \, x)^{-1}$

$\leq v \, \mu_{Ai} \, (m \, x)$

$\leq (U \, \mu_{Ai} \,) \, (m \, x)$

iii)$(U \, \mu_{Ai} \,) \, (m \, x \vee m \, y \,) = v \, \mu_{Ai} \, (m \, x \vee m \, y)$

$\leq v \max \{ \, \mu_{Ai} \, (m \, x), \, \mu_{Ai} \, (m \, y) \, \}$

$\leq \max \{ \, (U\mu_{Ai}) \, (m \, x), \, (U \, \mu_{Ai}) \, (m \, y) \, \}$

iv)$(U \, \mu_{Ai} \,) \, (m \, x \wedge m \, y \,) = v \, \mu_{Ai} \, (m \, x \wedge m \, y)$

$\leq v \max \{ \, \mu_{Ai} \, (m \, x), \, \mu_{Ai} \, (m \, y) \, \}$

$\leq \max \{ \, (U\mu_{Ai}) \, (m \, x), \, (U \, \mu_{Ai}) \, (m \, y) \, \}$

Proposition 3.4: If A is a fuzzy set in G such that all nonempty level subset U (A ; t) is an anti fuzzy lattice ordered m-group of G then A is an anti fuzzy lattice ordered m-group of G.

Proof- Let x, y ϵ U (A ; t) , we have A(m x) $\leq$ t and A (m y) $\leq$ t. So that A (m(x y)) $\leq$ t

i)A (m(x y)) $\leq$ t

$\leq \max \{ \, t \, , t \, \}$

$\leq \max \{ \, A(m \, x), \, A(my)\}$

ii)A $((m \, x)^{-1}) \leq t = A(m \, x)$

iii)A(m x $\vee$ my) $\leq$ t

$\leq \max \{ \, t \, , t \, \}$

$\leq \max \{ \, A(m \, x), \, A(my) \, \}$

iv)A(m x $\wedge$ my) $\leq$ t

$\leq \max \{ \, t \, , t \, \}$

$\leq \max \{ \, A(m \, x), \, A(my) \, \}$

Therefore A is an anti fuzzy lattice ordered m-group.

Proposition 3.5: Let A be an anti fuzzy lattice ordered m-group of G. Let A* be a fuzzy set in G defined by A* (x) = A(x) + 1 $-$A (e) for all x ϵG. Then A* is an anti fuzzy lattice ordered m-group of G containing A.

Proof – Let x, y ϵ G

i)A* (m(x y)) = A (m (x y)) +1- A (e)

$\leq \max\{A(m \, x), A(my)\} +1 \, -A(e)$

$\leq \max \{A(m \, x) +1-A(e), \, A(m \, y \,)+1 \, -A(e)\}$

$\leq \max \{ \, A^*(m \, x), A^*(my) \, \}$

ii)A*$((m \, x)^{-1})$= A ($(mx)^{-1}$) + 1 $-$ A(e)

$\leq A(mx) + 1 - A(e)$

$\leq A^*(mx)$

iii)$A^*(mx \vee my)) = A(mx \vee my)) + 1 - A(e)$

$\leq \max\{A(mx), A(my)\} + 1 - A(e)$

$\leq \max\{A(mx) + 1 - A(e), A(my) + 1 - A(e)\}$

$\leq \max\{A^*(mx), A^*(my)\}$

iv)$A^*(mx \wedge my)) = A(mx \wedge my)) + 1 - A(e)$

$\leq \max\{A(mx), A(my)\} + 1 - A(e)$

$\leq \max\{A(mx) + 1 - A(e), A(my) + 1 - A(e)\}$

$\leq \max\{A^*(mx), A^*(my)\}$

Also $A(x) \leq A^*(x)$ for all $x \in G$.

Therefore A^* is a fuzzy lattice ordered m-group of G containing A.

Proposition 3.6: If A is an anti fuzzy lattice ordered m-group of G and θ is a m-homomorphism of G then the fuzzy set $A^\theta = \{ < mx ; \mu_{A^\theta}(mx) >, x \in G \}$ is an anti fuzzy lattice ordered m-group.

Proof- Let x, y $\in$ G

i)$\mu_{A^\theta}(m(xy)) = \mu_A \theta(m(xy))$

$= \mu_A \ m\theta(xy)$

$= \mu_A \ m(\theta(x)\theta(y))$

$\leq \max\{\mu_A \ m\theta(x), \mu_A \ m\theta(y)\}$

$\leq \max\{\mu_A \theta(mx), \mu_A \theta(my)\}$

$\leq \max\{\mu_{A^\theta}(mx), \mu_{A^\theta}(my)\}$

ii)$\mu_{A^\theta}(mx)^{-1} = \mu_A \theta(mx)^{-1}$

$= \mu_A(\theta(mx))^{-1}$

$= \mu_A(m\theta(x))^{-1}$

$\leq \mu_A(m\theta(x))$

$\leq \mu_A \theta(mx)$

$\leq \mu_{A^\theta}(mx)$

iii)$\mu_{A^\theta}(mx \vee my)) = \mu_A \theta(mx \vee my)$

$= \mu_A \theta(mx) \vee \theta(mx)$

$\leq \max\{\mu_A \theta(mx), \mu_A \theta(my))$

$\leq \max\{\mu_{A^\theta}(mx), \mu_{A^\theta}(my))$

iv)$\mu_{A^\theta}(mx \wedge my)) = \mu_A \theta(mx \wedge my)$

$= \mu_A \theta(mx) \wedge \theta(mx)$

$\leq \max\{\mu_A \theta(mx), \mu_A \theta(my))$

$\leq \max\{\mu_{A^\theta}(mx), \mu_{A^\theta}(my))$

Therefore A^θ is an anti fuzzy lattice ordered m-group of G.

Proposition 3.7: Let T be a continuous t-norm and let f be a m-homomorphism on G. If μ is an anti fuzzy lattice ordered m-group on G then μ^f is an anti fuzzy lattice ordered m-group of f (G).

Proof- Let $A_1 = f^{-1}(my_1), A_2 = f^{-1}(my_2)$,

$A_{12} = f^{-1}(m(y_1 y_2)$

Consider $A_1 A_2 = \{mx \in G / mx = mx_1 \ mx_2 \ \text{for } mx_1 \in A_1, mx_2 \in A_2\}$

If $mx \in A_1 A_2$ then $mx = mx_1 mx_2$ &

$f(mx) = f(mx_1 mx_2) = f(mx_1) f(mx_2)$

$= my_1 \ my_2 = m(y_1 y_2)$

$mx \in f^{-1}(m(y_1 y_2)$ therefore $A_1 A_2 \subset A_{12}$

i)$\mu^f(m(y_1 y_2)) = \sup\{\mu(mx)/mx \in f^{-1}(m(y_1 y_2)\}$

$= \sup\{\mu(mx) / mx \in A_{12}\}$

$\leq \sup\{\mu(mx) / mx \in A_1 A_2\}$

$\leq \sup\{\mu(mx_1 \ mx_2) / mx_1 \in A_1, mx_2 \in A_2\}$

$\leq \sup\{T(\mu(mx_1), T(\mu(mx_2)) / mx_1 \in A_1, mx_2 \in A_2\}$

$\leq T[\sup\{\mu(mx_1)/mx_1 \in A_1\}, \sup\{\mu(mx_2) / mx_2 \in A_2\}]$

$\leq T[\sup\{\mu(mx_1) / mx_1 \in f^{-1}(my_1)\}, \sup\{\mu(mx_2)/ mx_2 \in f^{-1}(my_2)\}]$

$\leq T\{\mu^f(my_1), \mu^f(my_2)\}$

ii)$\mu^f((my)^{-1}) = \sup\{\mu(mx)^{-1} / (mx)^{-1} \in f^{-1}(my)^{-1}\}$

$= \sup\{\mu(mx)^{-1} / (mx) \in f^{-1}(my)\}$

$\leq \sup\{\mu(mx) / (mx) \in f^{-1}(my)\}$

$\leq \mu^f((my))$

iii)$\mu^f(my_1 \vee my_2)) = \sup\{\mu(mx)/mx \in f^{-1}(my_1 \vee my_2)\}$

$= \sup\{\mu(mx) / mx \in A_{1\vee2}\}$

$\leq \sup\{\mu(mx) / mx \in A_1 \vee A_2\}$

$\leq \sup\{\mu(mx_1 \vee mx_2) / mx_1 \in A_1, mx_2 \in A_2\}$

$\leq \sup\{T(\mu(mx_1)), T(\mu(mx_2)) / mx_1 \in A_1, mx_2 \in A_2\}$

$\leq T[\sup\{\mu(mx_1)/mx_1 \in A_1\}, \sup\{\mu(mx_2) / mx_2 \in A_2\}]$

$\leq T[\sup\{\mu(mx_1) / mx_1 \in f^{-1}(my_1)\}, \sup\{\mu(mx_2)/ mx_2 \in f^{-1}(my_2)\}]$

$\leq T\{\mu^f(my_1), \mu^f(my_2)\}$

iv)$\mu^f(my_1 \wedge my_2))$

$= \sup\{\mu(mx) / mx \in f^{-1}(my_1 \wedge my_2)\}$

$= \sup\{\mu(mx) / mx \in A_{1\wedge2}\}$

$\leq \sup\{\mu(mx) / mx \in A_1 \wedge A_2\}$

$\leq \sup\{\mu(mx_1 \wedge mx_2) / mx_1 \in A_1, mx_2 \in A_2\}$

$\leq \sup\{T(\mu(mx_1)), T(\mu(mx_2)) / mx_1 \in A_1, mx_2 \in A_2\}$

$\leq T[\sup\{\mu(mx_1/mx_1 \in A_1\}, \sup\{\mu(mx_2) / mx_2 \in A_2\}]$

$\leq T[\sup\{\mu(mx_1) / mx_1 \in f^{-1}(my_1)\}, \sup\{\mu(mx_2)/ mx_2 \in f^{-1}(my_2)\}]$

$\leq T\{\mu^f(my_1), \mu^f(my_2)\}$

Therefore μ^f is an anti fuzzy lattice ordered m-group of f (G).

Proposition 3.8: Let T be a t-norm. Then every sensible anti fuzzy lattice ordered m-group is an anti fuzzy lattice ordered m-group of G.

Proof- A is sensible anti fuzzy lattice ordered m-group then we have

i)$A(m(xy)) \leq T[A(mx), A(my)]$

ii)$A((mx)^{-1}) \leq A(mx)$

iii)$A(mx \vee my) \leq T[A(mx), A(my)]$

iv)$A(mx \wedge my) \leq T[A(mx), A(my)]$

i)$\max\{A(mx), A(my)\} =$

$T[\max\{A(mx), A(my)\}, \max\{A(mx), A(my)\}]$

$= \max\{T[A(mx), A(my)], T[A(mx), A(my)]\}$

$= T[A(mx), A(my)]$

$\leq A(m(xy))$

ii)$A((mx)^{-1}) \leq A(mx)$

iii)$\max\{A(mx), A(my)\} =$

$T[\max\{A(mx), A(my)\}, \max\{A(mx), A(my)\}]$

$= \max\{T[A(mx), A(my)], T[A(mx), A(my)]\}$

$= T[A(mx), A(my)]$

$\geq A(mx \vee my))$

iv)$\max\{A(mx), A(my)\} =$

$T[\max\{A(mx), A(my)\}, \max\{A(mx), A(my)\}]$

$= \max\{T[A(mx), A(my)], T[A(mx), A(my)]\}$

$= T[A(mx), A(my)]$

$\geq A(mx \wedge my))$

Therefore A is an anti fuzzy lattice ordered m-group of G.

Proposition 3.9: An onto m-homomorphic image of an anti fuzzy lattice ordered m-group with sup property is an anti fuzzy lattice ordered m-group.

Proof: Let f : G → G' be a onto m-homomorphism of G and let A be an anti fuzzy lattice ordered m-group of G with sup property.

Let m x', my' ϵ G'

Let $mx_0 \epsilon$ f^{-1}(m x'), $my_0 \epsilon$ f^{-1}(m y')   be such that

A (m x_0) = sup { A(m x)/ m x ϵ f^{-1}(m x') } &

A (m y_0) = sup { A(m y)/ m y ϵ f^{-1}(m y') }

i)A^f (m(x'y'))   = sup { A(z) / z ϵ f^{-1}(m (x'y'))}

= sup { A(z) / z ϵ f^{-1}(m x' my'))}

$\leq$ sup{A($mx_0 my_0$) / $mx_0 \epsilon$ f^{-1}(m x') , $my_0 \epsilon$ f^{-1}(m y') }

$\leq$ sup{A(m x_0 y_0) / $mx_0 \epsilon$ f^{-1}(m x') , $my_0 \epsilon$ f^{-1}(m y') }

$\leq$ sup {max{A(mx_0),A(my_0))/$mx_0\epsilon$f^{-1}(mx'), $my_0\epsilon$ f^{-1}(m y') }

$\leq$ max {sup{A(m x_0) / $mx_0\epsilon$ f^{-1}(m x')},sup{A(my_0) /$my_0 \epsilon$ f^{-1}(m y')

$\leq$ max { A^f (mx') , A^f (mx')}

ii)A^f ((m x')$^{-1}$)= sup{A(mx_0)$^{-1}$/(m x_0)$^{-1}$ ϵ f^{-1}(m x')$^{-1}$}

= sup { A (m x_0)$^{-1}$ / (m x_0) ϵ f^{-1}(m x')}

$\leq$ sup { A(m x_0) / (m x_0) ϵ f^{-1}(m x')}

$\leq$ A^f ((m x'))

iii)A^f (m x' v my'))=sup{A(z) / z ϵ f^{-1}(m x' v m y'))}

$\leq$ sup { A(z) / z ϵ f^{-1}(m x') v f^{-1} m y'))}

$\leq$ sup{A(mx_0v m y_0) /mx_0 ϵf^{-1}(mx'), $my_0 \epsilon$ f^{-1}(m y') }

$\leq$ sup{A(mx_0vmy_0) / mx_0 ϵ f^{-1}(m x') , $my_0 \epsilon$ f^{-1}(m y')}

$\leq$ sup { max {A(m x_0),A(m y_0)) / $mx_0 \epsilon$ f^{-1}(m x'), $my_0 \epsilon$ f^{-1}(m y') }

$\leq$ max {sup{A(m x_0) /$mx_0 \epsilon$ f^{-1}(m x')},sup{A(my_0) /$my_0 \epsilon$ f^{-1}(m y')

$\leq$ max { A^f (m x') , A^f (m x')}

iv)A^f (m x'∧ my'))= sup { A(z) / z ϵ f^{-1}(m x' ∧ m y'))}

$\leq$ sup { A(z) / z ϵ f^{-1}(m x') ∧ f^{-1} m y'))}

$\leq$ sup{A(mx_0vmy_0) / mx_0 ϵ f^{-1}(m x') , $my_0 \epsilon$ f^{-1}(m y')}

$\leq$ sup{A(mx_0vmy_0)/$mx_0 \epsilon$ f^{-1}(m x') , $my_0 \epsilon$ f^{-1}(m y') }

$\leq$ sup { max {A(m x_0), A(m y_0)) /$mx_0 \epsilon$ f^{-1}(m x'), $my_0 \epsilon$ f^{-1}(m y') }

$\leq$ max {sup{A(m x_0) / $mx_0 \epsilon$ f^{-1}(m x')},sup{A(my_0) /my_0 ϵf^{-1}(m y')

$\leq$ max { A^f (m x') , A^f (m x')}

Proposition 3.10: Let f: G→G' be a lattice group m-homomorphism and A be an anti fuzzy lattice ordered m-group of G' then f^{-1}(A) is an anti fuzzy lattice ordered m-group of G.

Proof   -Let m x, m y ϵ G and A be an anti fuzzy lattice ordered m-group of G'.

i)f^{-1}(A) (m(x y))   = A f (m(x y))

= A (f(m x) f(m y))

= A (m f(x) mf(y))

= A (m f(x) f(y))

$\leq$ max { A (mf(x)), A(mf(y))}

$\leq$ max { A (f(m x)), A(f(my))}

$\leq$ max { f^{-1}(A) (m x) , f^{-1}(A) (m x) }

ii)f^{-1}(A) ((m x)$^{-1}$) = A f ((m x)$^{-1}$)

= A (f (m x))$^{-1}$

= A (m f(x))$^{-1}$

$\leq$ A (m f(x))

$\leq$ A (f(m x))

$\leq$ f^{-1}(A) (m x)

iii)f^{-1}(A) (m x v m y)) = A f (m x v m y))

= A (f(m x) v f(m y))

= A (m f(x) v m f(y))

$\leq$ max { A (mf(x)), A(mf(y))}

$\leq$ max { A (f(m x)), A(f(my))}

$\leq$ max { f^{-1}(A) (m x) , f^{-1}(A) (m x) }

iv)f^{-1}(A) (m x ∧ m y)) = A f (m x ∧ m y))

= A (f(m x) ∧ f(m y))

= A (m f(x) ∧ m f(y))

$\leq$ max { A (mf(x)), A(mf(y))}

$\leq$ max { A (f(m x)), A(f(my))}

$\leq$ max { f^{-1}(A) (m x) , f^{-1}(A) (m x) }

Therefore f^{-1}(A) is an anti fuzzy lattice ordered m-group of G.

IV.   SECTION-4 DIRECT PRODUCT OF ANTI FUZZY LATTICE ORDERED M-GROUPS

Definition: 4.1 Let A_i be an anti fuzzy lattice ordered m-group of G_i, for i = 1,2,…,n. Then the product A_i (i = 1,2,….n) is the function

A_1x A_2x …x A_n: G_1x G_2x ... x G_n → L defined by

(A_1x A_2x …….. x A_n)m(x_1,x_2,.........,x_n)

= max{A_1 (m x_1),A_2(mx_2),......,A_n(mx_n) }

Proposition 4.2:   The direct product of anti fuzzy lattice ordered m groups is an anti fuzzy lattice ordered m-group.

Proof- Let x = (x_1,x_2,.........,x_n),

y = (y_1, y_2,........,y_n) ϵ G_1x G_2x …….. x G_n

Let A_1x A_2x …….. x $A_{n=A}$

i)A(m(x y))= A (m($x_1$$y_1$, $x_2$$y_2$,.........,$x_n$ y_n))

=max{A_1(m $x_1$$y_1$),$A_2$ (m x_2 y_2),……..,A_n (m x_n y_n) }

$\leq$ max{max [A_1(m x_1), A_1 (m y_1)], max [A_2 (m x_2), A_2(m y_2)],…max[A_n (m x_n), A_n (m y_n)] }

$\leq$ max {max [A_1(m x_1), A_2 (m x_2), ... A_n (m x_n)], max [A_1(m y_1), A_2 (m y_2), ... A_n (m y_n)]}

$\leq$ max {(A_1x A_2x …….. x A_n) m (x_1,x_2,.........,x_n) , (A_1x A_2x …….. x A_n) m (y_1,y_2,.........,y_n)

$\leq$ max {A(m x) , A(m y) }

ii)A (m x)$^{-1}$ = A m($x_1$$^{-1}$, $x_2$$^{-1}$,……… , $x_n$$^{-1}$)

=max{A_1 (m $x_1$$^{-1}$), A_2(m $x_2$$^{-1}$) ,……… ,$A_n$ (m $x_n$$^{-1}$)}

$\leq$ max {A_1 (m x_1), A_2(m x_2) ,……… ,A_n (m x_n)}

$\leq$ A m(x_1, x_2 ,……… , x_n)

$\leq$ A (mx)

iii)A(m x v m y)) = A (m x_1vmy_1, m x_2 v my_2,.........., mx_n v m y_n))

= max {A_1 (m x_1v my_1), A_2 (m x_2 v my_2),………, A_n (mx_n v m y_n) }

$\leq$ max{max [A_1(m x_1), A_1 (m y_1)], max [A_2 (m x_2), A_2(m y_2)],…max[A_n (m x_n), A_n (m y_n)] }

$\leq$ max {max [A_1(m x_1), A_2 (m x_2), ... A_n (m x_n)], max [A_1(m y_1), A_2 (m y_2), ... A_n (m y_n)]}

$\leq$ max {(A_1x A_2x …….. x A_n) m (x_1,x_2,.........,x_n) , (A_1x A_2x …….. x A_n) m (y_1,y_2,.........,y_n)

$\leq$ max {A(m x) , A(m y) }

iv)A(m x ∧ m y)) = A (m x_1∧ my_1, m x_2 ∧ my_2,.........., mx_n∧ m y_n))

= max {A_1 (m x_1∧ my_1), A_2 (m x_2 ∧ my_2),………, A_n (mx_n ∧ m y_n) }

$\leq$ max{max [A_1(m x_1), A_1 (m y_1)], max [A_2 (m x_2), A_2(m y_2)],…max[A_n (m x_n), A_n (m y_n)] }

$\leq$ max {max [A_1(m x_1), A_2 (m x_2), ... A_n (m x_n)], max [A_1(m y_1), A_2 (m y_2), ... A_n (m y_n)]}

$\leq$ max $\{(A_1 x\ A_2 x\ \ldots\ldots\ x\ A_n)\ m\ (x_1, x_2, \ldots\ldots, x_n)\ ,\ (A_1 x\ A_2 x$
$\ldots\ldots\ x\ A_n)\ m\ (y_1, y_2, \ldots\ldots, y_n)$
$\leq$ max $\{A(m\ x)\ ,\ A(m\ y)\}$

V. CONCLUSION

In this paper we studied the notion of an anti fuzzy lattice ordered m-groups and investigated some of its basic properties. We also studied the homomorphic image, pre-image of an anti fuzzy lattice ordered m-groups, arbitrary family of anti fuzzy lattice ordered m-groups and anti fuzzy lattice ordered m-groups using T-norms.

Applications: Lattice structure has been found to be extremely important in the areas of quantum logic, Erogodic theory, Reynold's operations, Soft Computing, Communication system, Information analysis system, artificial intelligences and physical sciences.

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AUTHORS

First Author – M.U.Makandar, Assistant professor, PG, KIT's IMER. Shivaji University, Kolhapur.
Second Author – Dr.A.D.Lokhande, HOD, Department of Mathematics, Y.C.Warana Mahavidyalaya, Warananager, Kolhapur.

Investor's preferences towards Mutual Fund and Future Investments: A Case study of India

Y Prabhavathi, N T Krishna Kishore

Abstract- The advent of Mutual Funds changed the way the world invested their money. The start of Mutual Funds gave an opportunity to the common man to hope of high returns from their investments when compared to other traditional sources of investment .The main focus of the study is to understand the attitude, awareness and preferences of mutual fund investors. Most of the respondents prefer systematic investment plans and got their source of information primarily from banks and financial advisors. Investors preferred mutual funds mainly for professional fund management and better returns and assessed funds mainly through Net Asset Values and past performance.

Index Terms- Mutual Funds, Investors

I. INTRODUCTION

India is undoubtedly emerging as the next big investment destination, riding on a high savings and investment rate, as compared to other world economies. In today's volatile market environment, mutual funds are looked upon as a transparent and low cost investment vehicle, which attracts a fair share of investor attention leading to growth of the industry. The landscape of the financial sector in India is continuously evolving, accredited to regulatory changes being undertaken, which is leading market participants like the asset management companies (AMCs) and distributors to restructure their strategies and adopt business models which will yield sustainable benefits. The advent of Mutual Funds changed the way the world invested their money. The start of Mutual Funds gave an opportunity to the common man to hope of high returns from their investments when compared to other traditional sources of investment. The mutual fund industry is spread all over the world with US alone accounting for over 50% of it. The schemes offered all over the world are similar in their basic structure though they differ in numbers and with some countries having specialized schemes.

Mutual Funds in India

Since the 1990's when the mutual fund space opened up to the private sector, the industry has traversed a long path, adapting itself continuously, to the changes that have come along. The Indian mutual fund industry is passing through a transformation. On one side it has seen a number of regulatory developments, while on the other the overall economy is just recovering from the global crisis of 2008. Growth in Assets under Management (AUM) experience has been unprecedented, growing at a CAGR of 28% over the last four years, slowing down only over the last two years, as fallout of the global economic slowdown and financial crisis.

According to Association of Mutual Funds in India (AMFI), a body that is dedicated to develop mutual fund industry on professional, healthy and ethical lines in India, at present, there are 43 Asset Management Companies (AMCs) functioning in India, which comprises of 32 domestic and 11 foreign fund houses. The Assets Under Management (AUM) of the Indian mutual fund industry as on March 31, 2011 (as per AMFI Monthly data) has witnessed a decrease of 3.54% to Rs. 5,92,250 crores on a year on year basis, on account of substantial outflows from equity, liquid and income schemes. The total number of schemes under operation is 4051 with ICICI Prudential Mutual Fund at the top with 394 schemes and Motilal Oswal Mutual Fund at the lowest with two schemes.

Objectives of the Study

An attempt was made in the present study entitled " Analysis of Mutual Fund Investors" to understand the attitude, awareness and preferences of mutual fund investors, along with the factors influencing the investors in selection of fund and their preferences for various investment avenues. To be specific following are the main objectives of the present research study:
1. Preference of respondents towards mutual funds
2. Investor's preference for future investment avenues

II. METHODOLOGY

Hyderabad city of Andhra Pradesh, Bangalore city of Karnataka state and Chennai city of Tamil Nadu forms the study area. Considering the time and other resource constraints of the researcher, total sample size of the mutual fund investors was fixed as 90 i.e 30 per each city. Personal interview method was employed for collecting the needed information.

The most commonly used tools to analyze the mutual fund investors were Percentage analysis, Garrett ranking.

III. FINDINGS AND DISCUSSIONS

i) Preference of Respondents towards Mutual Funds

S.NO	Variable	Category	Per cent
1	Scheme	Equity fund Debt fund Balanced fund	65.00 16.25 18.75
2	Scheme	Open – ended Close – ended	72.50 27.50
3	Mode of Investment	One time Investment Systematic Investment Plan (SIP)	27.50 72.50
4	Levels of Investment	Rs.1000 Rs.2000	38.75 37.50

		(monthly)	Rs.3000	8.75
			Rs.5000	15.00
5	Tenure of Investment	Below 1 year		13.75
		1-2 year		30.00
		2-5 year		38.75
		Above 5 years		17.50
6	Preferred Scheme	New Fund Offer		23.75
		Existing schemes		76.25
7	Source of Information	Advertisement		17.50
		Information from friends		18.75
		Bank		28.75
		Financial Advisors		23.75
		Canvassing by agents		11.25
8	Type of AMC preferred	SBI MF		15.00
		UTI AMC		13.75
		HDFC AMC		12.50
		Reliance AMC		26.25
		ICICI Prudential AMC		21.25
		Other AMCs		11.25

As per the investor preferences, about 65 per cent of investors preferred equity funds followed by balanced funds (18.75 per cent) and that indicated that more than sixty percent of the respondents were risk takers interested in investment growth. Nearly 72.50 per cent of investors preferred open - ended funds with systematic investment plans (SIP) having a tenure period of two to five years and 38.75 per cent of investors preferred to invest Rs 1000 per month followed by Rs 2000 (37.50 per cent). Thus it is inferred that middle aged, married long term investors preferring having a family size 3-5 preferred SIP. These investors wanted their investments on piece meal basis to meet their need for money in future.

About 28.75 per cent of the investors knew about mutual funds from banks followed by financial advisors (23.75 per cent) as they had access to banking facilities and advice from financial advisors. As per the study 26.25 per cent of respondents preferred Reliance Mutual Fund followed by ICICI Prudential Mutual Fund (21.25 per cent).Transparency of investment and other services provided made investors to prefer the Reliance, ICICI AMCs.

ii) Investor's Preference for Future Investment Avenues

The respondents were asked to rank their investment preferences for various investment avenues they were willing to invest in future. The reasons were analysed using Garrett ranking technique and the results are presented in the table below:

Investor's Preference for Future Investment Avenues

S. No	Kind of Investments	Garrett score	Rank
1	Gold	89.92	1
2	Shares	84.37	2
3	Real estate	79.45	3
4	Mutual funds	74.34	4
5	Fixed deposits	71.27	5
6	Post office Saving	68.63	6
7	Insurance	60.27	7
8	Debentures/bonds	53.76	8
9	ULIPS	51.09	9
10	Commodity market(metals)	49.56	10
11	Commodity market(agri)	47.89	11
12	Currency market	41.64	12
13	National Saving Certificate	40.35	13

It could be seen that investment in gold ranked first, followed by investment in shares, real estate, mutual funds, fixed deposits, post office savings, debentures, ULIPS, commodity market. The least preference was given to investment in National Saving Certificate (NSC). The respondents gave their first preference to gold, because it is not a perishable product and can be bought and sold at any time and preference towards shares is because they are most liquid compared to any other investment vehicle

Respondent's interest towards investment in fixed deposits is increasing not only due to hike in policy rates but also believe that their investment is risk free. The respondent's investment towards commodity and currency market is very low because of lack of knowledge towards it and moreover it is highly risky asset to invest, though the returns are high.

Suggestions

- Comparative performance of various mutual fund schemes offered by different companies should be considered before deciding on the investment in mutual funds.
- Scientific appraisal of professional expertise of fund managers could help the investors in understanding the performance of mutual fund schemes.
- Investors in mutual funds should be aware of status of different sectors like power, infrastructure, banking, pharmaceuticals and health before selecting a scheme.
- Investor's should be aware not only the updates of the scheme selected but also should know the latest SEBI guidelines.

Conclusion

The aggressive market that can tap any individual is financial services. Investors have their individual risk appetite and believe in the market they are entering in. In this volatile market environment mutual funds play an active role not only in promoting a healthy capital market but also increase liquidity in the money market. They have been identified as one of the important factor pushing up the market prices of securities .The analysis of the above study helps us to understand the attitude and behaviour of the investor based on their preferences. Based on the above approach, it can be noted that investors ought to be cautious in selecting the schemes, sectors and various asset management companies. Mutual fund industry which has enormous growth, if better controlled by market regulators with their strict regulations, the resources can be better allocated in an emerging market economy.

AUTHORS

First Author – Y PRABHAVATHI, MASTER OF AGRIBUSINESS MANAGEMENT,
prabhayanduri@gmail.com.

Second Author – N T KRISHNA KISHORE, MASTER OF AGRIBUSINESS MANAGEMENT.
tarakakishore999@gmail.com

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THE RISING SUN RISES - CASE STUDY OF BANK OF BARODA

Dr. Lily Bhushan*

Principal, KES Shroff College , Mumbai

Abstract- Branding has emerged as a top management priority in the last decade due to the growing realization that brands are one of the most valuable intangible assets that firms have. Driven in part by this intense industry interest, academic researchers have explored a number of different brand-related topics in recent years, generating scores of papers, articles, research reports, and books. This paper identifies some of the influential work in the branding area of Bank of Baroda, highlighting what has been learned from the change in the logo of the bank and what is its impact on the financial perforce before and after rebranding . The paper also outlines some gaps that exist in the research of branding of the Bank and the significance of new logo of Bank of Baroda. Choice modeling implications of the branding concept and the challenges of incorporating main and interaction effects of branding as well as the impact of competition are discussed.

I.   Introduction

Change is the law of life. And those who look only to the past or present are certain to miss the future. – Robert F. Kennedy

The success of a product, service, individual, business, organization, or even a city is based on being perceived as unique. Look at any market leader and you'll find they each own a place in the consumer's mind. They have positively differentiated themselves from the rest of the competition. Branding is creating that individual niche in the consumer's psyche and owning it. To understand branding, it is important to know what brands are. A brand is the idea or image of a specific product or service that consumers connect with, by identifying the name, logo, slogan, or design of the company who owns the idea or image. Branding is when that idea or image is marketed so that it is recognizable by more and more people, and identified with a certain service or product when there are many other companies offering the same service or product. In the case of Bank of Baroda it was the need to refresh brand image and create a more contemporary persona as the old identity was not well recalled or liked so a dramatic transition was called for through rebranding the brand. The Baroda Sun created a sense of pride in people.

II.   Objective of the study

❖ To highlight the significance of the new logo

❖ To study the marketing and branding strategy.

❖ To study the financial performance pre and post rebranding of Bank of Baroda.

❖ To highlight areas for the development of further interventions.

III.   Research methodology

Primary survey of through Interview was conducted with the branch manager of Bank of Baroda (Kandivali – West) Branch

Secondary surveywas done from the books, journals, news articles and electronic media.

Limitation of the Study

 The hypothesis are not tested on the basis of 'F' or't' or chi square test, but tested on logical grounds.

IV.   Study of the research

The significance of new logo of Bank of Baroda.

"*Overnight success takes years*." – Tim Marks

The traditional blue letters of Bank of Baroda on a yellow background is to be replaced by a more vibrant orange colour. The new logo, with two `B' letters overlapping each other spring out from the rays of sun at the lower left corner and the logo will have a halo effect representing the sun.Since its inception in 1908 in Gujarat, the bank has the logo of an industrial and agriculture wheel with Sanskrit letters - `Akshayamte Bhavishyati' (the future is secure). A hand overlapping a wheel was also part of the original logo.Now, on the threshold of adopting new international standards, BoB clearly intends to project itself as a modern and technologically savvy bank.

 "Think the Sun is a much respected symbol and calling it the Baroda Sun created a sense of pride in people. In fact, we went to the extent of branding the Sun itself" These words were said by none other than Dr. Anil K Khandelwal, Chairman & Managing Director, Bank of Baroda in 2006. Since then, Bank of Baroda has positioned itself as the "India's International Bank" with a rising sun as its logo. While, a number of the visible components of the banks promotion strategy can be easily assessed for the targeted segment and the value proposition that it wants to propose to the customer base, its marketing & branding strategies can be analyzed on the basis of the following points:

1) Brand Ambassador -

It initially had India's former cricket team captain- Rahul Dravid as its brand ambassador (2004-07). As an icon, Rahul Dravid epitomized stability, sincerity and substance which in a way complemented to the Bank of Baroda's brand image.

2) Expansion -

Bank of Baroda has established its operations in Maldives, Sri Lanka, Singapore, UAE, Yemen, Russia, Kenya, China, Malaysia, Thailand and many other countries around the globe. Rapid integration of business with the technologies through core banking solutions, i-banking, and host of other facilities has established Bank of Baroda as the foremost PSU bank in the country.

3) Positioning –

It is the fourth largest bank in India and consists of 2.5 crore customers. Bank's latest marketing initiatives are aimed at positioning it as a financial service provider with "value proposition" and "market-driven" being the keywords. The bank has rolled out branches far and wide across the country to distribute an impressive assortment of financial products to its heterogeneous customer base.

4) Business Lines -

The bank has divided its operations in 6 distinct business lines- Corporate Financial Services, Personal Financial Services, Business Services, Treasury, International Operations and Rural Banking and is aggressively focusing on becoming No. 1 in each of these segments

A schematic representation of the banks marketing strategy is as follows:

5) Publicity –

To build its brand equity, the bank has organized hosts of seminars nationally and internationally- latest being Basel II. Bank has actively managed its public relations through media.

6) Customer Focus –

The bank has built its brand around superior customer services and international focus which are also the point of differentiation of the bank from other PSU banks.

7) Recent Marketing Initiatives –

• Communication Campaigns: ShukriyaSau Salon Kaa and Baroda Next

• Use of Sybase 365 Marketing Information System

• Launch of Baroda SwarojgarVikasSansthan

• Next Gen Branch opened in Ahmedabad

• 50 city sales offices opened

8) Advertisements –

The advertising campaigns in both print and television media emphasize on the bright orange corporate colors of the bank and the 'rising sun'. The key traits that the bank wants to highlight such as trust, competence and ease of use are reiterated in the numerous advertisements. The targeted consumer segment is clearly visible via the imagery in the advertisements like the middle-class Indian doing every-day chores, who now has numerous financial needs, not just plain and traditional banking. Another striking factor is the focus on the age segment beyond the 35-40 age bracket, people who are able easily identify with the PSU banking sector as a familiar

entity. The promotion strategy of utilizing customer awareness sessions with the display of the standard corporate visuals like the bright logo and the tagline with stills from the supporting print and television advertisements is also heavily relied on. The banners around ATMs and bank branches are easily visible entities because of the corporate colors and themes chosen.

9) Promotions Abroad –

In the promotion strategy abroad, the targeted segment is clearly the Indian who is away from home. The promotion campaign for Bank of Baroda in UK centers around the target audience of expatriate Indians. The imagery associated with the campaign has the distinct feel of the Indian bank aiming to replicate the ease and trust of an Indian entity with the efficiency of a modern and global enterprise. The location of the advertisements especially outdoors, is on buses and billboards near stations and bus-stands, typically meant for the average middle-class customer used to travelling in public transport. The tag line of "India's International Bank" also focus on the core aspect of Bank of Baroda being an Indian bank meant for the Indian community living abroad, looking for the familiarity of a known brand for a personalized service like banking.

In a short summarization, the marketing strategy of the Bank of Baroda focuses on the promotion of the values that the bank wants to portray to its customers (both prospective and current). It wants to be seen as an efficient organization meeting all the needs of the average middle-class customer in a warm and familiar setting. The accessibility of the bank in all corners and the adoption of the latest technology are some of the areas mentioned to create the feel of a bank which despite being national in origin, is up with the times and ready for the new-age customer's demands.

Financial performance pre and post rebranding of Bank of Baroda.

What came first, the chicken or the egg? Philosophers have been debating this question for years and the answer still remains a mystery. A similar but no less challenging question is unfolding in the Indian banking sector currently. Can the banking system grow without signals that GDP growth is improving? Or should banks continue lending to try and stimulate the economy? Well, the usual thumb rule is that banking sector growth is 2.5 x GDP growths. So if the economy is growing at 7%, the banking space should grow by around 17-18%. But, now with India seeing a number of GDP growth downgrades, this figure for credit growth can have a wide range.

Table No.1

Net Profit / Total Funds	------Rs. Cr.-----
March'2004	1.17
March'2005	0.77

March'2006	0.63
March'2007	0.81
March'2008	0.92
March'2009	1.12
March'2010	1.22
March'2011	1.36
March'2012	1.27

Graph No.1

Time series by semi average method

Table No 2

Years	Net profit
March'2004	1.17
March'2005	0.77
March'2006	0.63

March'2007	0.81
March'2008	**0.92**
March'2009	1.12
March'2010	1.22
March'2011	1.36
March'2012	1.27
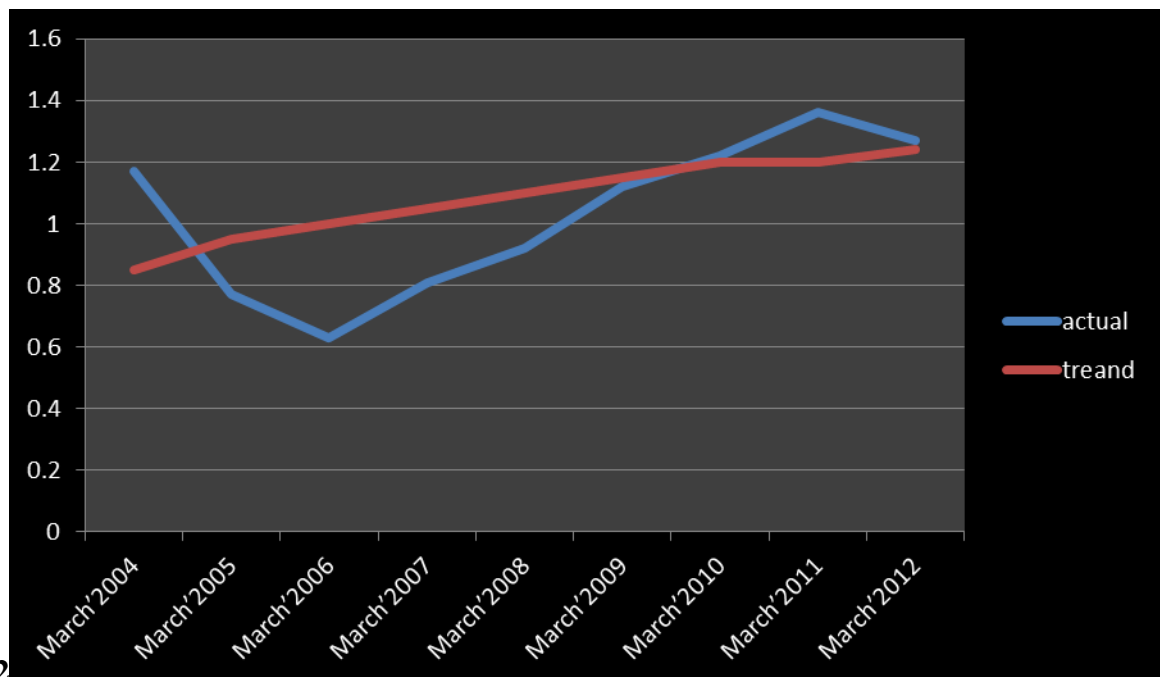
Graph No 2

Areas for the development of further interventions:

When brands undergo an overhaul, how should they ensure that consumers do not misinterpret this as a negative sign as though something is amiss and start worrying if it means the brand wasnotdoingwell before? Bank of Baroda is a comprehensive re-branding initiative that addressed issues far beyond a new logo. Public sector organizations must change in order to be relevant to India's increasingly youthful audiences. Change requires intelligent, consistent communication. As long as that is delivered, consumers will not worry with promising a level playing field to foreign banks. Indian banks have been rushing to not only bulk up efficiencies, they are also rushing to shed their staid public-sector branding. While changing public perception is one step, a new identity also helps draw new customers. Over the last two years, private sector entities such as Catholic Syrian

Bank, Jammu & Kashmir Bank and South Indian Bank have all gone for a new fascia, apart from Bank of Baroda. Hence now it too followed the league .However, this should be done without alienating its existing clientele. Banks work on trust. Thus, success of such re-branding campaigns lie in integrating a new look while retaining their earlier allure. In the fiercely competitive financial services industry, it has become imperative, if not mandatory, to rebuild a brand in order to attract and retain customers who have a wide range of alternatives.

V.   Conclusion

In the case of Bank of Baroda it was the need to refresh brand image and create a more contemporary persona as the old identity was not well recalled or liked so a dramatic transition was called for. When brands undergo an overhaul, how should they ensure that consumers do not misinterpret this as a negative sign as though something is amiss and start worrying if it means the brand was not doing well before? Bank of Baroda is a comprehensive re-branding initiative that addressed issues far beyond a new logo. Public sector organizations must change in order to be relevant to India's increasingly youthful audiences. Change requires intelligent, consistent communication. As long as that is delivered, consumers will not worry With 2009 promising a level playing field to foreign banks, Indian banks have been rushing to not only bulk up efficiencies, they are also rushing to shed their staid public-sector branding.

While changing public perception is one step, a new identity also helps draw new customers. Over the last two years, private sector entities such as Catholic Syrian Bank, Jammu & Kashmir Bank and South Indian Bank have all gone for a new fascia, apart from BoB. Hence now it too followed the league. However, this should be done without alienating its existing clientele. Banks work on trust. Thus, success of such re-branding campaigns lie in integrating a new look .

VI.   Reference

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In Vitro Antibacterial Activity and Preliminary Phytochemical Screening of Four Plants on Selected Clinical Pathogens

[1]Bamidele, F.A.,[1]Ogundipe, F.O., [2]Adebayo-Oyetoro, A.O., [3]Aromolaran,[4]Odeyemi O.A., [5]Omonigbeyin, E.A

[1]Department of Biological Science, Yaba College of Technology, Lagos, Nigeria.
[2]Department of Food Technology, Yaba college of Technology, Lagos, Nigeria.
[3]Department of Statistics, Yaba College of Technology, Lagos, Nigeria.
[4]School of Environmental and Natural Resources, Faculty of Science and Technology, National University of Malaysia
[5]Molecular Biology and Biotechnology Division, Nigerian Institute of Medical Research,Lagos Nigeria.

Abstract- Twelve preparation of the ethanol and water extracts of four medicinal plants,*Anogeissus leiocarpus(*root and bark*), Terminalia glaucescens(*root and bark*), Adansonia digitata(bark)* and *Lennea welwitschii(bark) were screened for their inhibitory effect on Escherichia coli, Salmonella typhii, Staphylococcus aureus* and *Shigella dysentriae* using the agar-diffusion method. The efficacy of the extracts was assessed by measuring the diameter of zone of inhibition around the colonies on nutrient agar medium. The result obtained showed that the ethanol extracts (root) from *T. glaucenscens* and *A. leiocarpus* were active against all the test bacteria. The ethanol and aqueous extracts of *A. digitata* did not exert any inhibitory effect on test organisms, while the other eight extracts exhibited variable antibacterial activities. The minimum inhibitory concentration (MIC) of the potent extracts ranged from 0.625 mg/ml to 5.0mg/ml while a minimum bactericidal concentration (MBC) was between 1.25mg/ml - 10.0mg/ml. Photochemical screening of the extracts revealed that they contain saponin, tannin, alkaloid and glycoside .Statistical analysis (T-test) showed that there was no significant difference between the ethanolic extract ofPurification of these active components in the extracts could enhance their antibacterial activity.

Index Terms- Antibacterial, clinical origin, phytochemical constituents, and Plant extracts.

I. INTRODUCTION

Most developing countries including Nigeria are endowed with vast resources of medicinal and aromatic plants and these plants have been used over the millennia for human welfare (Rukangira, 2001). Throughout history, plant have been the principal source of drug used in preventing and curing of disease and in the production of some drugs currently used in modern medicine. The use of higher plants and their extracts to treat infection is an age – old practice in African medicine and it is an effective practice in many third world countries (Olorundare *et al.,* 1992). Medicinal plants represent a rich source from which antimicrobial agents may be obtained. Plants are used medicinally in different countries and are a source of many potent and powerful drugs. The active components of many drugs found in plants are secondary metabolites. (Sofowora, 1982).

Traditional medicine practices in Nigeria have continued to provide remedies for various diseases (Adelakun *et al.,* 1999) and most rural dweller depends on it for their health care needs (Ekpa and Ebana, 1992). This is because of the variety of herbal preparations that can be made from plants to treat different kinds of ailment including microbial infections (Akinyemi *et al.,* 2000). The pharmaceutical potential of medicinal plants is immense and various publications have reported the antimicrobial activities of some plants extracts. Black and green tea extracts have been shown to inhibit the growth of a variety of enteric bacteria (Toda *et al.,* 1989). Alade and Irobi, (1993), indicated that the extract *of Alcalypha wilkesiana* leaves was active against bacteria and fungi such as *Staphylococcus aureus, Candida albicans* and *Aspergillus flavus. Pseudomonas aeruginosa* and *Enterococcus faecalis* are inhibited by the sawdust extract of *Mansonia altissima* (Ejechi, 1996) also *Occium gratismum* has been shown to be antidiarrhoel (Ilori *et al.,* 1996).

In the recent past, attention has been directed towards medicinal plant research to substantiate the claims of cure made by traditional healers and thus providing a scientific basis for their efficacy (Sofowora, 1984).The lack of health care system in rural area has led to self-medication either by buying high cost medicine or by using medicinal plants (Rukangira, 2001).

Lannea welwitschii belongs to the family *Anacardiaceae.* The trunk bark is used for the treatment of diarrhoea, anaemia and haemorrhoids (Adjanohoum *et al.,* 1991).*Anogeissus leiocarpus* belongs to the family *Combretaceae.* The plant is a deciduous tree 15-20m high with bole sometimes fluted. The trunk bark and the roots are effective against haemorrhoid. (Adjanohoum *et al.,* 1999).*Terminalia glaucescens* belongs to the family *Combretaceae.* The tree is 8m high,black gray bark with deeper cracks. The plant is spread all over tropical Africa. The bark of the trunk is anti-diarrhoeal and is used to treat haemorrhoid, the roots are used for the treatment of haemorrhoid also. (Adjanohoum *et al.,* 1991).The bark has been shown to be effective against *vibrio cholerae* (Akinsinde and Olukoya, 1995) and also against *salmonella typhi* (Akinyemi *et al.,* 2000). *Adansonia digitata* belongs to the family Malyaceae. The main stem of larger baobab trees may reach enormous proportions of up to 28m in girth.

With the current trend in biotechnology of plant tissue and with the emergence of antimicrobial resistance, it would appear that man might soon have to depend on herbs as sources of a number

of antimicrobial agents. (Babalola, 1988). The aim of this research work was to find out possible antibacterial potential in the extracts of these plants against some clinical isolates.

II. MATERIALS AND METHODS

Collection and Identification of plant sample.

The root and bark of the plant species *Anogeiossus leiocarpus* and *Terminalia glaucescens* and the bark of *Adansonia digitata* and *Lannea welwitschii* were sourced with the help of traditional herb sellers from their farms across western Nigeria.

The plants were identified and authenticated at the Botany department, University of Lagos, Nigeria.

Preparation of plant extract: The four plants were pulverized into fine powder. Their ethanol and aqueous extracts were prepared using the cold maceration and soxhlet extraction techniques. The cold extracts were dried under vacuum using the freeze drier while the hot extracts were concentrated to dryness at $50^{o}C$ in the vacuum oven. 1g portion of each dried extract was reconstituted in 100ml sterile distilled and sterilized using a 0.2µm membrane filter. The resulting sterile filtrate was transferred aseptically into a labeled sterile bottle and stored in the refrigerator at $4^{0}C$ till needed for use.

Source of clinical pathogens: Clinical bacterial isolates were obtained from the Molecular Biology and Biotechnology Division, Nigerian Institute of Medical Research, Lagos, Nigeria.The organisms included *Escherichia coli*, *Shigella dysenteriae Salmonella typhi* and *Staphylococcus aureus.* These were subcultured on Mac Conkey Agar at $37^{0}c$ for 24 hr. Bacterial colonies on Mac Conkey Agar plates for each organism was emulsified in 3mls sterile saline and adjusted to obtain a concentration of 1.5×10^{6} cells/ ml.

Sensitivity test: Agar well diffusion method was used to determine the antibacterial activity of the extracts. Wells of 7mm diameter were made into previously seeded Nutrient agar plates. Each well was filled with 0.1ml of each plant extract. The control experiment was setup using sterile distilled water and 75% ethanol. The plates in duplicated were incubated at $37^{0}C$ for 24 hrs. The diameter of zones of inhibition was measured and expressed in millimeter (mm).The transparently cleared zones showed bactericidal activity while the cleared zones containing micro colonies showed bacteriostatic activity.

Determination of Minimum Inhibitory Concentration (MIC) AND Minimum Bactericidal Concentration (MBC)

The minimum inhibitory concentration of the active extracts was determined by diluting the extracts in nutrient both to give concentrations of 10.0, 5.0, 2.5, 1.25, 0.625 and 0.313. While 2ml of sterilize extract was added to the first tube containing 2ml of nutrient broth. The tube was shaken and 2ml transferred aseptically to the next tube containing the same quantity of broth. This was done until serial dilution was achieved in the last tube i.e. the sixth tube. An aliquot of 1ml of bacterial suspension (1.5×10^{6}) was inoculated into each tube .The control tubes were inoculated with same quantity of sterile distilled water and 75% ethanol respectively .All tubes were incubated at $37^{0}C$ for 24 hours. The minimum inhibitory concentration was regarded as the lowest concentration of the extract that did not permit any visible growth when compared with the control tube. The minimum bactericidal concentration was determined by culturing the content of the tubes, which had no visible growth on MacConkey Agar, the plates were incubated at $37^{0}C$ for 24 hours. The lowest concentration of the extract, which did not produce any bacterial colony, was regarded to be the minimum bactericidal concentration (Alade and Irobi, 1993).

Phytochemical screening of plant extracts:The reconstituted extracts were evaluated for the presence of alkaloid, tannin, glycoside, flavonoid and saponin using the procedure described by Okerulu and Chinwe,2001.

III. RESULTS

SENSITIVITY TEST

Two extracts were able to produce clear zones against all the test organisms indicating bactericidal activity. These are the ethanol extracts of *A. leiocarpus* (Fig 1) and *T. glaucescens* (Fig 1). Two extracts were not inhibitory to all the test organisms, i.e. the ethanol and water extract of *Adansonia digitata*, however, eight of the extracts exhibited bacteriostatic properties.

Determination of MIC and MBC

The minimum inhibitory concentration of the extracts varied between 0.625 mg/ml - 5.0 mg/ml while a range between 1.25 mg/ml - 10.0 mg/ml was recorded for the minimum bactericidal concentration (Table1).

Phytochemical properties of plants extracts: The screening revealed that flavonoid was not detected in any sample while Some of the extracts showed the presence of glycoside, alkaloid, saponin and tannin (Table2).

TABLE1: Minimum inhibitory concentration (MIC) and Minimum bactericidal concentration (MBC) expressed in mg/ml

Sample	Ec MIC	MBC	Sa MIC	MBC	St MIC	MBC	Sd MIC	MBC
F	0.625	1.25	0.625	-	*		1.25	2.5
D	0.625	1.25	1.25	2.5	2.50	5.0	5.0	10.0
H	1.25	2.5	1.25	-	0.625	1.25	0.625	2.5
L	2.5	-	*		2.50	5.0	-	-

Ec = *Escherichia coli*; Sa = *Staphylococcus aureus;* St = *Salmonella typhi*
Sd = *Shigella dysenteriae; - =* No MIC/ MBC; *= Not tested

TABLE 2: Result of Phytochemical properties of the plant extracts

Extract	Tannin	Flavonoid	Alkaloid	Saponin		Glycoside
	FeCl$_3$			Frothing	Emulsion	
A	-	-	-	+	+	+
B	-	-	+	-	-	+
C	-	-	-	+	+	+
D	-	-	+	+	+	+
E	+	-	-	+	+	-
F	+	-	+	+	+	-
G	+	-	-	+	+	-
H	+	-	-	+	+	-
I	-	-	-	+	+	-
J	-	-	+	+	+	+
K	-	-	-	+	+	+
L	-	-	+	+	+	+

+ = present; - = absent

Figure 1: Antibacterial Activity of the Medicinal Plants Used Against the Test Organisms

B =*Anogeissus leiocarpus* (Bark) Ethanol extract; D = *Anogeissus leiocarpus* (Root) Ethanol extract; F = *Terminalia glaucessens* (Bark) Ethanol extract; G = *Terminalia glaucessens* (Root) Water extract; H = *Terminalia glaucessens* (Root) Ethanol extract; L = *Lannea welwitschii* (Bark) Ethanol extract

IV.   DISCUSSION

    Results obtained in this study showed that ethanol extracts of *A. leiocarpus* and *T. glaucescens* clearly showed that the extracts were inhibitory to all the test isolates in varying degrees. It was shown in this study that the ethanolic extract is more potent than aqueous extract. The relatively high potency of the ethanol extract may be attributed to the dissolving power of alcohols over water. (Majorie, 1999). This can also be deduced to the ability of the ethanol to extract more secondary plant metabolites which are believed to exert antibacterial activity on the test isolates (Nwinyi *et al.,* 2009).It had earlier been reported by several investigators that these plants contain antimicrobial substances (Adjanohoum *et al.,* 1999, Ilori *et al*., 1996, Akinyemi *et al*.,2000, and Okujaga, 2005). Eight of the extracts were weakly inhibitory to almost all the test isolates, while two extracts were not inhibitory to all the test isolates used i.e. the ethanol and aqueous extracts of *A. digitata*. This conforms to the report of Kubmarawa *et al.,* 2007.Failure of these extracts to exert antibacterial effect on the test isolates is not enough to conclude that the plant does not contain substances that can exert antibacterial activity against the test organisms because the potency of the extract depends on the method used to obtain the extract(Unaeze *et al*.,1986).Sofowora,1982 reported that the age of plant and the season of harvest determine the amount of active

constituents and this varies in quality and quantity from season to season. The active components usually interfere with growth and metabolism of microorganisms in a negative manner and are quantified by determining the minimum inhibitory concentration and minimum bactericidal activity. These values are used as guide for treatment of most infections. Result obtained showed that the minimum inhibitory concentration values of the four extracts that showed the most sensitivity where lower than the minimum bactericidal concentration suggesting that the plant extracts were bacteriostatic at lower concentration but bactericidal at higher concentration. Phytochemical screening of the plant extracts showed the presence of saponin, alkaloids, glycoside and tannin, but flavonoids were not detected at all. Several phenolic compounds like tannin present in the cells of plants are potent inhibitors of many hydrolytic enzymes such as pectolytic macerating enzymes used by plant pathogens. Other preformed compounds like saponins also have antifungal properties.(Aboaba *et al.*,2006).

The results obtained indicated the presence of antibacterial compounds in these plants and some also showed a good correlation between the claims of the traditional healers and the use of these plants in traditional medicine against clinical isolates.

Purification, identification, quantification, stability and toxicological studies should be carried out on the active components of these plants. These plants whose antibacterial activities have been demonstrated in this study could be used as raw materials in pharmaceutical industries.

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AUTHORS

First Author – A Bamidele, F.A, Department of Biological Science, Yaba College of Technology, Lagos, Nigeria

Second Author – Ogundipe, F.O, Department of Biological Science, Yaba College of Technology, Lagos, Nigeria

Third Author – Adebayo-Oyetoro, A.O, Department of Food Technology, Yaba college of Technology, Lagos, Nigeria.

Fourth Author – Aromolaran, Department of Statistics, Yaba College of Technology, Lagos, Nigeria.

Fifth Author – Odeyemi O.A, School of Environmental and Natural Resources, Faculty of Science and Technology, National University of Malaysia

Sixth Author – Omonigbeyin, E.A, Molecular Biology and Biotechnology Division, Nigerian Institute of Medical Research, Lagos Nigeria

Correspondence Author – floxykunmi2010@yahoo.com

Genotoxic Potential Index of Some Selected Sawdusts of Different Woodtypes in African Catfish (Clarias gariepinus)

Ashade, O. O., Odunlade, A. K., Kumoye, E. A., Ogundipe, F.O and Oki, O.

Department of Biological Science, Yaba College of Technology, Yaba, Lagos Nigeria

Abstract- Sawdusts are major by-product of wood processing with diverse uses. Extracts of sawdust of different wood type differ due to the different chemical composition inherent in them. The aim of this work was to utilize micronuclei test as a standard system to monitor toxicity using *C. gariepinus* as a bioindicator. For this, the fish were exposed for 21 days to extracts of five species of woodshavings /sawdusts collected from Okobaba Timber depot, Lagos. Extracts of *Populus euphratrica* oliver, *N. dendiirichi, Eucalyptus botryoides, Acacia seberiana, Raphia hookeri mann* were used. Micronucleus genotoxic studies were carried out at graded concentrations of the extracts. Genotoxic procedure was done through collection of blood from the peripheral caudal fin. Sublethal analysis shows that for all the test organisms, the genotoxic frequency per 1000 erythrocytes evaluated varies with range from 0 – 15, 0 – 11, 0 – 15 and 1 – 24 for AERN, AEND, AEPE, AEAS and AEEB respectively over a period of 21 days. ANOVA shows significant genotoxic difference ($P < 0.05$) in the micronuclei of *C. gariepinus* exposed to different wood extracts. Clearly, different woodtypes exude varied chemicals with attendant relative toxicity.

Index Terms- Extracts, Woodshavings, Micronucleus, Genotoxic, Bioindicator

I. INTRODUCTION

Sawdust is a by product of cutting, grinding or otherwise pulverizing wood with a saw or other tools. It is composed of fine particles of wood. Woods are of economic importance to the country thereby creating revenue and of great medical importance, help in the manufacturing industries, cosmetics, pesticides, agriculture, etc. (Atkinson 2005). Mostly in Africa, the use of trees plant basically all plant are use for the treatment of various aliment and diseases. (Kuniyin 2008). In England, cider plant has been use to manufacture vinegar for treating infectious diseases and also use as the simple antiseptic (disinfectant). (Brenda 1999). Cinchona tree specifically the leaves is used to cure malaria and stop shivering and also relaxation of muscles. Birch tree the leaves, buds, bark and sap are used for easing headache produced by allergies and for detoxifying the nervous system. Neem tree, the seed, bark and leaves contains compound with proven antiseptic, antiviral, antipyretic, and anti inflammatory, anti ulcer and anti fungi uses. (Atkinson 2005). Trees are transported in Nigeria via water course of Lagos lagoon from different state in Nigeria viz Ondo state, Osun state, Delta to Okobaba, Ebute-metta Lagos. The

transportation of tree on water are of dangerous effect to the aquatic life. (Nwankwo and Okeowo 2006). Wood contains poisonous compound that are presume to protect the plants against insect, bacteria etc. which are the same time effect change the water quality, affect surface dweller organism and bottom dwellers i.e. benthic organism at any concentration depending on the organism's tolerance level (Kusemiju 2001). The location of sawmill at any point close to the lagoon posses dangerous effect on man and its environment. (Abu et al 2000). According to Nwankwo 2001, sawmill located in the western part of the Lagos lagoon at Oko-baba, Ebute–metta, present a major source point of pollution. The wood waste (sawdust, wood shavings and leacheates) are deposited on the shore of the lagoon from where they eventually find their way or drain into the lagoon which alter the aquatic food web and pose hazard to aquatic organisms.

Genotoxicity studies using cytogenetic analysis in fish have demonstrated the sensitivity of this organism (Al-sati and Metcalfe, 1995), among the currently available test organisms, the micro nucleus assay is the most widely applied method due to its proven suitability for fish species (Al-Sabti 1991). The test of genetic change widely use micro nucleus test to detect both mutagenic effect and clastogenic effect and can detect the genotoxicity of a wide range compound.

The processed bark of *Populus enphratica oliver* because of its high tannic acid, it is used for tanning leather and it is treating rheumatism and also to relieve the pain of menstrual cramps. *Nauclea diderichii* known as opepe in Nigeria i.e. cheese wood, the bark is used to treat fever and stomach problem (Brown 1978). *Eucarlyptus botryoides* known as odogbo (cider mahogany) is used for treating lungs problems and nasal congestants and anti-bacterial. *Raphia Hookerii mann* known as akun (Raphia palm) is used to treat wound and also taps palm wine which is left to ferment and then taken for easy digestion. Lastly Acacia sieberiana known as irugba (Africa locust beans) is used to treat colds, cough and child hood fever. The root is used to treat stomach ach. The bark, leaves and gums are used to treat tapeworm, bilharzias, haemorrphage, orchitis, gonorrhorrea, kidney problems, syphilis, rheumatism and disorder of circulatory system, oedemadropsy (Bamowo 2001).

The species mostly used in the present bioassay is *Clarias gariepinus* (catfish). *Clarias* sp mostly inhabit fresh water and are widely distributed in Africa and Asia *clarias gariepinus* is common in Nigeria. Catfish is available all round the pool and water logged, marshy area. *C. gariepinus* is mostly used because

of the strength it exhibit to stress and environmental condition (Akpata 2002).

According to Bamowo (2001), the micronucleus test is majorly a key role/ investigator in checking the composition of pollutant in a water body which brings about changes in genetic composition either by affecting it or by forming a normal genetic trait. In other words, the micronucleus frequency may vary according to the season, the kind of pollutant involved and the species of fish.

Aim:

To investigate the genotoxic potential of *P. enphratica oliver N. dendiirchi, E. botryoides, A. seberianai and R. hookeri* using micronucleus induction of peripheral erythrocytes from caudal fin region of *C. gariepinus*.

II.   MATERIALS AND METHOD MATERIALS

Slides
EDTA bottle
Blade
Rectangular plastic tank
Fish
Bioassay bowl
Net
Paper tape
Measuring cylinder
Equipment
Homogenizer
Thermometer
PH meter
Microscope
Centrifuge
Spectrophotometer
Weighing balance

Test organisms

The test organisms for this research are fingerlings of African catfish [Clarias *gariepinus*]. C. *gariepinus* was purchased at Oloruntobi fish farm at Ayobo Ipaja in Lagos and transported in an oxygenated gallon. C. *gariepinus* has a total length of 5-8 cm and was taken to the environmental biology laboratory of the department of biological science, Yaba College of Technology. They were acclimatized for 7 days in a big rectangular plastic tank filled with borehole water (No chlorine). Feeding was administered using coppens twice daily. Changing of water was done every day to avoid pollution and oxygen content reduction by fish exudes and food remnants.

Test compound

The test compound are the aqueous extract of *Populus euphratica* oliver, *Nauclea diderichii, Eucalyptus botryoides, Raphia Hookeri Mann* and *Acacia sieberiana* were obtained at Okobaba saw mill, Ebute Metta Lagos. Extraction of the aqueous from each sawdust was done separately.

Aqueous extraction preparation

100g of each powdered wood [sawdust] were separately soaked in litre dechlorinated water for 2 days to ferment. After the 2 days of soaking the solution was filtered using a muslin cloth to separate the aqueous extract from the residue. Then the solution was kept in plastic containers at room temperature in the laboratory.

Genotoxic slide procedure

Blood smear was made on a slide and allow to dry .the slide are then washed with ethanol.10% Gieshma solution was poured in a glass cup raker and the slides were arranged in it. It was left for 30mins and then washed with water. It was allow to dry and then viewed under oil immersion microscope.

Acute toxicity bioassay

A static bioassay procedure was adopted for all the toxicity tests. A given volume of dechlorinated water was measured using a measuring cylinder into bioassay plastic tank and a predetermined volume of aqueous extract of *Populus euphratica* oliver, *E. botryoides, Raphia hookerii mann* and *Acacia seiberiana* was added to the water to make it up to 2000ml (total volume of test media) to achieve the desired test concentration.

Ten active fishes were introduced into the test medium containing the aqueous of AEPE, AEND, AEAS, AEEB and AERH each concentration bowl and a control was also set aside.

AEPE – *Populus euphratica* oliver
AEND – *Nauclea diderichii*
AEEB – *Eucalyptus botryoides*
AERH – *Raphia hookerii mann*
AEAS – *Acacia seiberiana*

Assessment of Quantal Response [Mortality]: Mortality assessment was carried out every 24 hours over a 96 hours experimental period. Fish was assumed to be dead when there was no body movement, even when prodded with probe.

III.   STATISTICAL ANALYSIS

Acute toxicity data

The quantal response (dose-mortality response) of the 96h toxicity tests were analyze after Finney (1971). The indices of toxicity measurement derived from the analysis were;

- LC_{50}: the concentration that kills 50% of the population
- TF: Toxicity factor for relative potency measurements.

Analysis of variance (ANOVA) were used to test for significant differences (5% level) in the means mortality response of *C. gariepinus* to different concentration of AEPE, AERH, AEAS, AEEB, AEND at 24, 48, 72 and 96hrs of exposure. All analysis was carried out using SPSS 10.1 for windows.

Sublethal analysis (Genetic toxicity)

The data from micronucleus were analyzed using graphical representation, ANOVA to test for significant difference (5% level) in the mean frequency of micronucleus induction in C. *gariepinus* exposed to different sublethal concentrations.

IV. RESULTS AND DISCUSSION

Physio-chemical characteristics of the test media

The mean values for the physico-chemical parameters of the test media throughout the period of experiment were pH [7.21], dissolve Oxygen 14.34mg/l, temperature 24.5°C.

Micronucleus induction in caudal fin erythrocytes of C. Gariepinus

The result of the frequencies of micronucleus in caudal fin erythrocytes *C. gariepinus* exposed to sublethal concentrations of AEAS, AERH, AEPE, AEEB and AEND presented in table. The mean frequencies of micronucleus induction in the peripheral erythrocytes of *C. gariepinus* exposed to AERH, AEPE, AEAS, AEEB and AEND range from 0.00 to 20, 1.00 to 11.00, 0.00 to 15.00,1.00 to 24, 0.00 and 20 respectively.

In *C. gariepinus* exposed to AERH, the lowest value was 0.0 was recorded at day 4,7,14 and 21 in organism exposed 0.00g/l [control], 6.0g/l, 7.0g/l 0 and 10.0g/l and the highest value was 11 was recorded at day 14 in organisms exposed to 6.0g/l.
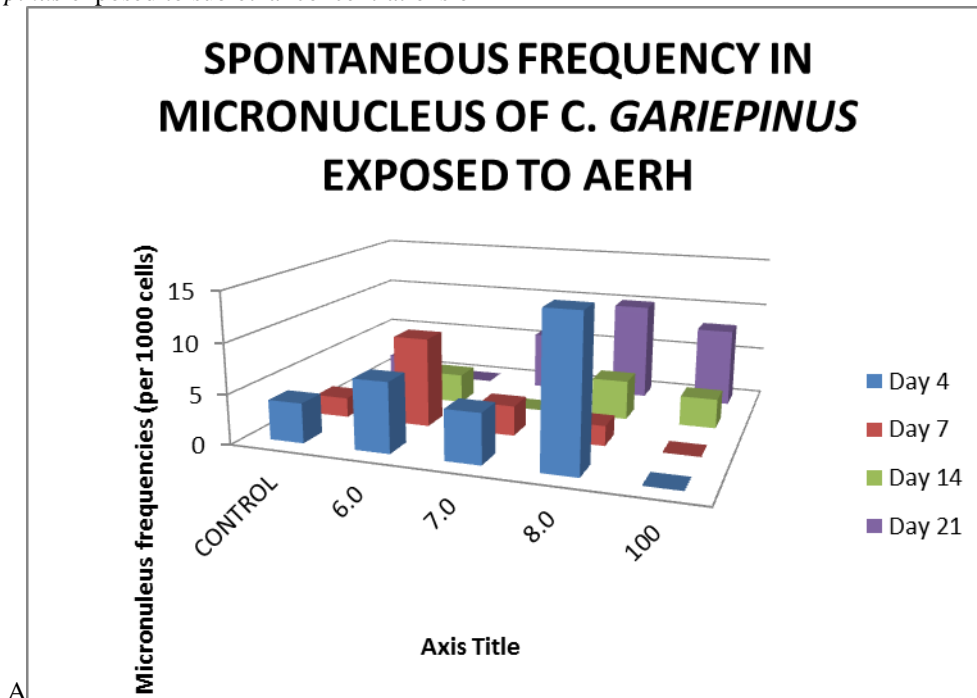
Figure 1: Micronucleus frequency of *C.gariepinus* expose to AERH

Analysis of variance Analysis of variance (ANOVA) showed that there was significant difference (P<0.05) in the mean frequencies of micronucleus in *C. gariepinus* exposed to different concentration of AERH at day 4, 7, 14 and 21.

In C. *gariepinus* exposed to AEND, the lowest value was 0.0 was recorded at day 4,7,14 and 21 in organism exposed 0.00g/l[control],6.0g/l,8.0g/l and 10.0g/l and the highest value was 11 was recorded at day 14 in organism exposed to 6.0g/l.

Analysis of variance Analysis of variance (ANOVA) showed that there was significant difference (P<0.05) in the mean frequencies of micronucleus in *C. gariepinus* exposed to different concentration of AEND at day 4, 7, 14 and 21.

Figure 2: Micronucleus frequency of *C.gareipinus* expose to AEND

In *C.gariepinus* exposed to AEPE the lowest value 1.00 was revealed at day 4,14,21 in organism exposed to 0.00g/L (control), 7.0g/l, 8.0g/l and the highest value, 11 was recorded at day 14 in organisms exposed to 8.0.mg/dl

Analysis of variance Analysis of variance (ANOVA) showed that there was significant difference (P<0.05) in the mean frequencies of micronucleus in *C. gariepinus* exposed to different concentration of AEPE at day 4, 7, 14 and 21.
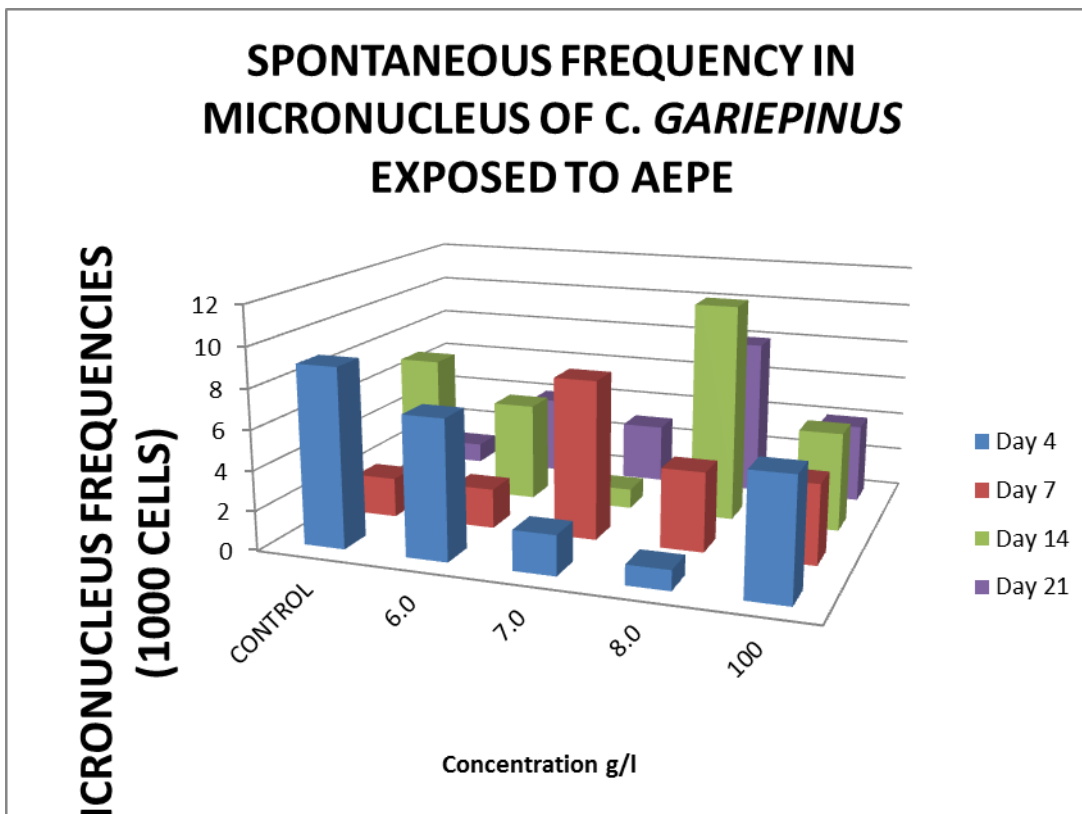
Figure 3: Micronucleus frequency of *C. gariepinus* expose to AEPE

In *C.gariepinus* exposed to AEEB the lowest value 0.00 was revealed at day 4, 7,14,21 in organism exposed to 0.00g/L (control),6.0g/l,7.0g /l and the highest value, 15 was recorded at day 4 in organisms exposed to 8.0.mg/dl

Analysis of variance (ANOVA) showed that there was significant difference (P<0.05) in the mean frequencies of micronucleus in *C.gariepinus* exposed to different concentration of AEEB at day 4, 7, 14 and 21.
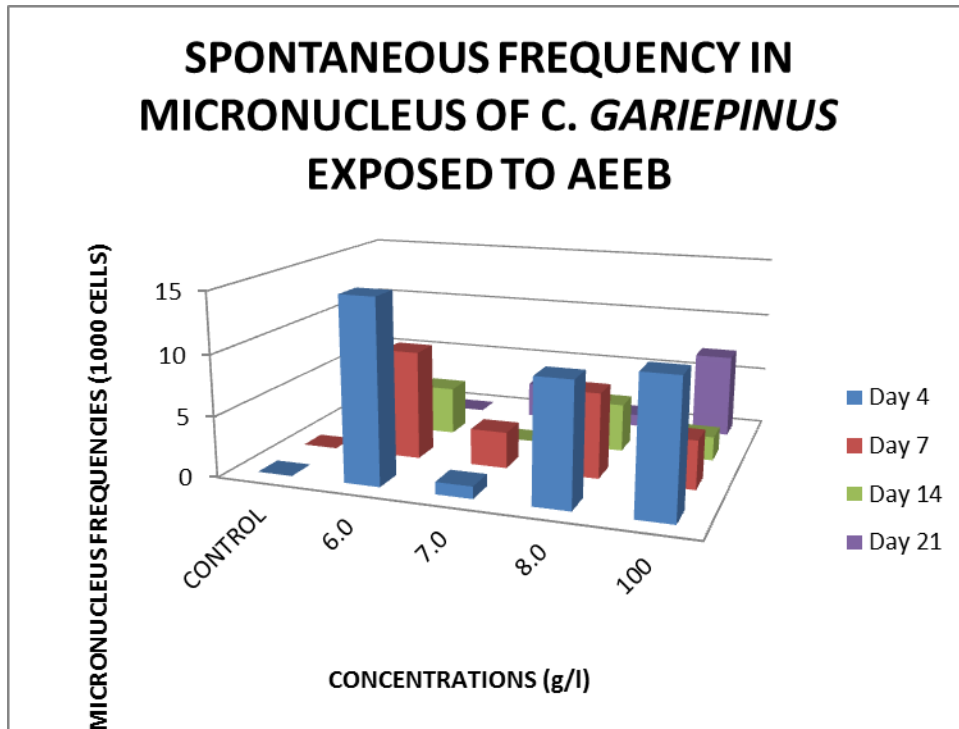
Figure 4: Micronucleus frequency of *C.gareipinus* expose to AEEB

In *C.gariepinus* exposed to AEAS the lowest value 1.00 was revealed at day 21 in organism exposed to 0.00g/L (control),6.0g/l,8.0g /l and the highest value, 24 was recorded at day 4 in organisms exposed to 8.0.mg/dl.

Analysis of variance (ANOVA) showed that there was significant difference (P<0.05) in the mean frequencies of micronucleus in *C.gariepinus* exposed to different concentration of AEAS at day 4, 7, 14 and 21.

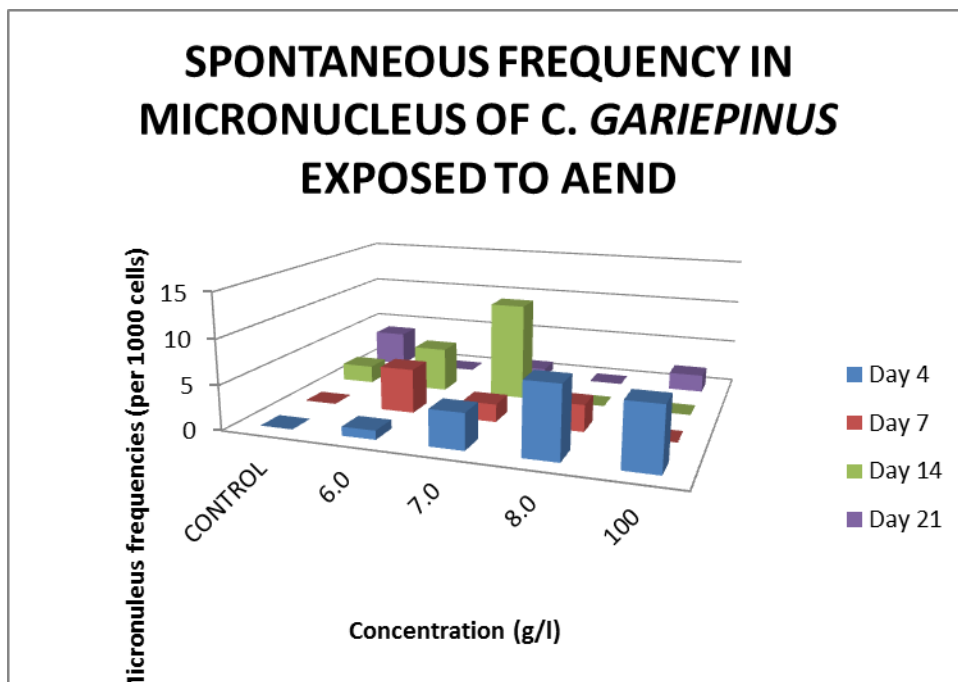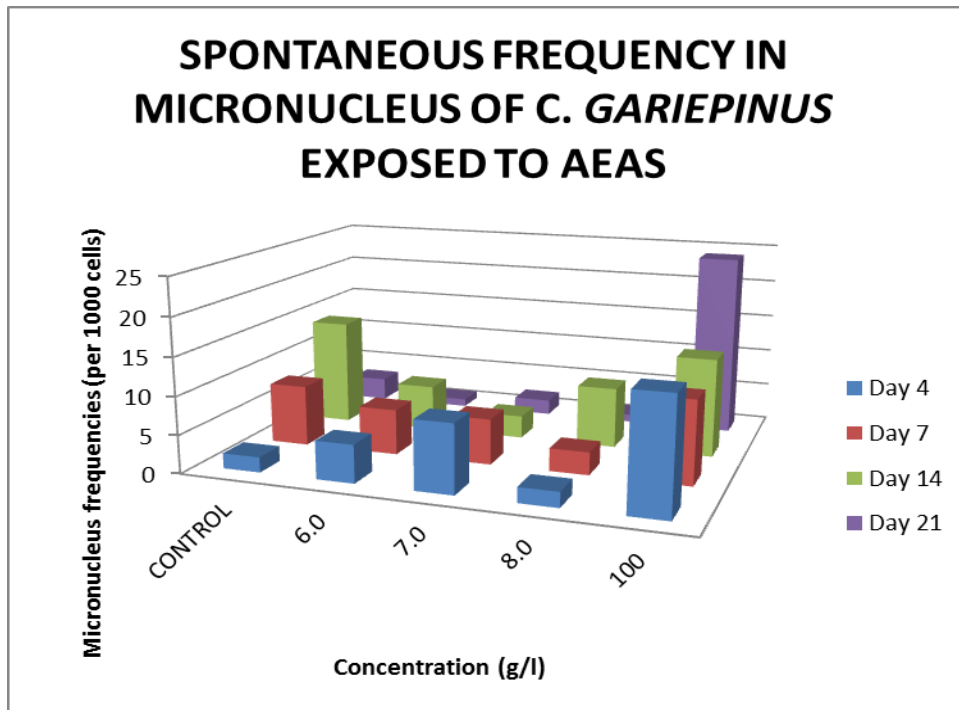**Figure 5: Micronucleus frequency of *C. gariepinus* expose to AEAS**

The reaction of *C. gariepinus* to sublethal percentage of *Populus enphratica* oliver increase with day and the micronucleus increases with increasing exposure (Bamowo, 2011). The evaluation of toxins by genotoxicity assays provides useful data for hazard identification and comparative risk assessment (Claxton et al., 1998). In this study, erythrocytes were collected by caudal puncture of the *C. gariepinus* and this was done after one 7 days of acclimatization, and 4 days, 7 days, 14 days and 21 days of exposure. Little resistance to stress were observed during blood collection as against reports on Tilapia species by Lemos et al (2005).

Akinsan (1999), Kligerman (1982) demonstrated that fish that inhibit polluted waters have greater frequency of micronuclei.

Conclusively, the rate of DNA damage is a function of concentration level and the degree of exposure.

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AUTHORS

First Author – Ashade, O. O, Department of Biological Science, Yaba College of Technology, Yaba, Lagos Nigeria

Second Author – Odunlade, A. K, Department of Biological Science, Yaba College of Technology, Yaba, Lagos Nigeria

Third Author – Kumoye, E. A, Department of Biological Science, Yaba College of Technology, Yaba, Lagos Nigeria

Fourth Author – Ogundipe, F.O, Department of Biological Science, Yaba College of Technology, Yaba, Lagos Nigeria

Fifth Author – Oki, O, Department of Biological Science, Yaba College of Technology, Yaba, Lagos Nigeria

Correspondence Author – olufemi_ashade@yahoo.com

The role of the church in strengthening the Zimbabwe's social fabric: the case of Solusi community

Christopher Ndlovu

Department of Educational Foundations, Lupane State University

Abstract- The social fabric is the force that brings the society together so that there is social cohesion and stability. It is only when the society is in a stable condition that development and the realisation of social goals are attainable, hence the need to strengthen the social fabric. Over the past decade the social fabric of Zimbabwe has been in a free fall, leading to a state of anarchy and fear. Indicators like corruption, lawlessness, violence, indiscipline to name a few have been used as evidence that our fabric is now held by few threads. A study carried out at Solusi community has found out that this community has a very strong social fabric that binds the whole community together in a harmonious way. One hundred participants picked using a stratified random sampling method was used in the study. 68% of the participants attributed a strong social fabric at Solusi community to the role played by the church. The participants strongly felt that the teachings by the church produced responsible and responsive individuals that are always there for others in this community. 15% of the participants felt that the education institution had a significant role in strengthening of the social fabric at Solusi. The participants argue that educated individuals tend to be more responsible in the societal development. 9% of the participants felt that the absence of night clubs has led to peace in the community 8% of the participants had other views on the strong social fabric in the Solusi community.This paper argues that the church as a socialisation agent should be given more space and time to influence the Zimbabwean Society. The church's teachings should permeate all the social avenues of the society so that our social fabric might be strengthened and all our developmental directions be achieved.

Index Terms- social fabric

I. INTRODUCTION

In African traditional societies cases of corruption and general moral degeneration were very rare. This was mainly because of a firm adherence to African group ethic popularly referred to as ubuntu/vunhu. Ubuntu/vunhu strongly affirms that an individual finds meaning in the community. This therefore meant that individualism was frowned at and everything was treated as a common asset. The products of these societies were morally upright people who felt for fellow community members. This strong moral fabric saw sustenance of African societies through the ages.

Over the past decades this humanistic philosophy has been given little attention, resulting in the weakening of the social fabric in Zimbabwe, leading to a state of anarchy and fear.

Social indicators like corruption, lawlessness, violence, and indiscipline, have been seen as evidence that our social fabric is now held by few threads. Horton and Hunt (1984) argue that in the absence of a strong social fabric, it becomes difficult for a society to embark on development projects that might improve the societal living standards. While it is noted that there are many institutions that can play a role in the strengthening of the social fabric of the society like the education, the family and the media, this paper submits it is largely the responsibility of the church to see that the social fabric is kept intact at all times so that all social systems are operating effective to accomplish the work of the society.

Although there is a general decay of the social fabric in Zimbabwe, there are still few places where the social fabric is still intact, enabling socio-economic development to occur in such places. One such place is Solusi, where the community seems to be enjoying a tranquil and peaceful environment largely due to the existence of a strong and vibrant social fabric. The existence of a strong fabric at Solusi is credited to the role of religion in the community. This study therefore aims at finding out the contribution of the church on the strengthening of the social fabric in communities.

II. STUDY LOCATION

The study was conducted at Solusi community which is located 43 km west of Bulawayo. The community is made up of Solusi University, Solusi High School, Solusi Primary School and people living close to these institutions. The whole community is made up of three thousand residents (2012 preliminary census results). The selection of this study area was largely influenced by the social stability that exists in this area. The area has seen several socio-economic projects succeeding as the community works in unity to achieve their common objectives.

III. REVIEWED RELATED LITERATURE

Breton (2004) posits that social fabric is that force that drives the members of the society to do what objectively is necessary for them to do. Horton and Hunt (1984) state that social fabric is the power that ensures that the society operates on the principles of orderliness, where each person accepts certain duties towards others and claims certain rights from others. In this paper the term social fabric will mean the social value system that is embedded in a given society for stability and cohesion. In this light, social fabric enables all the members of

the society to identify and share their key values and means of observing them in a systematic way with checks and balances.

The literature consulted confirmed that the church plays a vital role in the strengthening of the social fabric in various societies. Niebuhr (1996) argues that while the core business of the church is to preach the word of God in order to win souls for heaven, this is not done in isolation. The church can only exercise its calling effectively if motivated by the love of a neighbour and the community. Niebuhr (1996) further states that, only by engaging in civic work for the sake of the common good, by faithfulness in all one's social callings and being moral upright is it possible for the church to be true to the example of Christ. From the above it can be seen that it becomes mandatory for the church to teach and inculcate the moral virtues to all its members so that all its objectives are achieved. In doing this the church greatly contributes to the shaping of responsible and responsive citizens who are able to engage in developmental activities for the good of their communities and societies.

White (1995) argues tht the church by emphasising on the need for hard work for one's sustenance also contributes to the strengthening of the social fabric. "Christians and parents cannot commit a greater sin than to allow their children to have nothing to do. The children soon learn to love idleness, and they grow up shiftless, useless men and women. When they are old enough to earn their living, and find employment, they work in a lazy, droning way, yet expect to be paid as much as if they were faithful (White, 1995, 345). Such individuals tend to be involved in fraud, theft and robbery to earn a living.

The church places God in all ethics and evaluates all actions and responsibilities from this perspective. The Adventist Handbook of Theology (2000) states that for this reason the church will oppose discrimination in any form emphasising that all human beings are equal before God and should therefore live together in harmony. The church members are further encouraged to pay taxes, respect all laws and property regulations, participate in civic duties and co-operate with civil authorities in curbing or controlling crime and violence. (White 1975)

Walsh (1999) argues that in the western world the church is responsible for teaching good moral values to the people making them governable. Although there are high cases of social disharmony in the United States of America, the role of the church has been felt in reinforcing the national norms and values, making the nation governable.

Havilland (2000) maintains that in countries where the church is given adequate space and time to promote its teachings and beliefs, stability has resulted. Weber (1997) explaining the protestant ethic concept, stressed that France developed and progressed more when it embraced the church's teachings, largely the value of hard work, humility and generosity.

IV. METHODOLOGY

The research followed a mixed method design, making use of structured interviews and questionnaire surveys. A total of one hundred participants were selected using both stratified and random sampling techniques. The community had to be stratified as to capture the following dimensions, racial differences, nationality differences and occupation statuses. To cross-check the validity of the responses of the participants the researcher did some observations on the way of life within the Solusi Community and attended some of the church services to hear some of the teachings that the church promotes to the community.

V. THE FINDINGS AND DISCUSSIONS
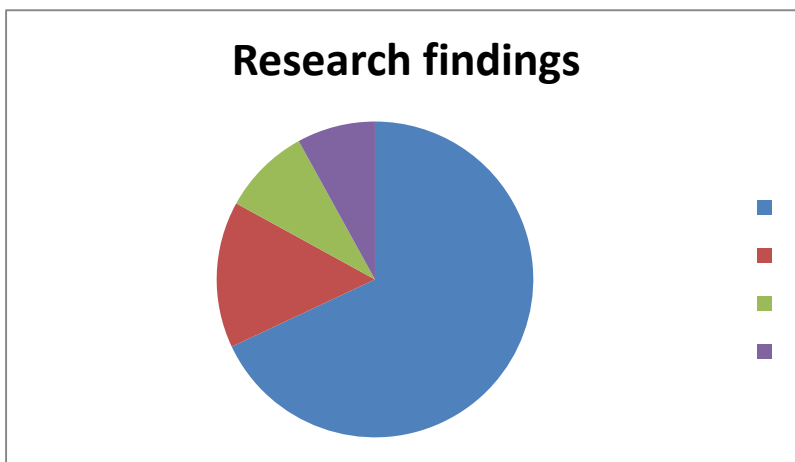
The findings conducted showed that 68% of the participants attributed the stability of at the Solusi community to the role played by the church, while 15% of the participants felt tht the education institution has a role in bringing up responsive individuals who are always working for the betterment of their communities. Few participants (9%) indicated that the absence of night clubs leads to peace and tranquillity in the community. The remaining participants (8%) had other views on the strong social fabric in the Solusi community.

The research used social stability indicators like oneness, respect, responsibility and peace. The presence of these indicators at Solusi community has been attributed to the role of the church. Most participants (80%) indicated that the Solusi community is characterised by the spirit of oneness where members are close to each other and share all their burdens. The

spirit of oneness was also observed when moving around the community as people were talking to each other in cordial format. The homes of this community are not locked or protected, the people believe that their oneness is the greatest protection to their property. So it is this social protection that leads to a thieving free community.

The other common indicator was the respect of one another in the community. A high percentage of participants (75%) indicated that the community greatly cherishes the virtue of respect. The young children in the community still respect all the elderly people derived from the Biblical teaching that mandates the children to respect all the elderly people in their community. (Ephesians 6v 1-2) Respect of the elderly by the children enables the community to practice the concept of communal parenting where all elderly people in the community are enabled and expected to disciple all children in the community. "Sonke singabazali lapha eSolusi" We are all parents here at Solusi. One of the interviewed parents confirmed. This reinforces the point of communal parent concept that is passionately promoted by the church. The Biblical teaching that state that everyone is his/her brother's keeper has kept the community intact. Members of this community are free to counsel and correct each other leading to a stable and corrupt free society. Observations showed that after the main church services members are put into small-study groups where members share views on improving their community, and their own individual lives.

The majority of the participants ascribed the social coherence to the fear and knowledge of God. The Solusi Community members strongly believe that God is in charge of their lives and as such they are all accountable to Him. It is this knowledge that drives the community members to shun all evil or sinful tendencies. The members also tend to focus on the life to come i.e the heavenly kingdom instead of worrying about the things of this world. A significant number of participants indicated that people should try and balance their views on this live and future life, so that they remain relevant to this world also.

Observations also revealed that the church has several programmes designed to make all members of the community responsible. Some of these programmes are prison ministries where church members visit the prisons to donate food and other requirements, this activates the spirit of giving and being a responsible citizen. Other programmes with the same objectives are the Women ministries and the Youth ministries.

The Church's doctrines and teaching material checked by the researcher showed that the community places high value on work and moral development of their members. All community members are encouraged to be involved in different types of vocations so as to be disciplined. The church also places great value in the development of the mental faculties, this is done by exposing the community members to various study areas so that the mind is positively cultivated.

Most of the participants (70%) credited the family life education that is practiced at Solusi as contributing to the social stability at Solusi. The church upholds the institution of marriage as ordained by God in the Bible (Genesis 2v 18). It was observed that there are many family life seminars conducted at Solusi that help to produce good and stable families that invariable lead to coherent societies. The family life seminars

teach among other issues family communication, sex education, budgeting and handling of in-laws. Most of the participants said such seminars and teachings reduce the cases of adultery and fornication which can cause community disintegration. In addition to these seminars there are also family recreational activities that bring the family members together thereby strengthening the family unity, which leads to the community unity.

Fifteen participants largely lecturers gave the education institution the role of producing a stable society of Solusi. These participants felt that educated individuals tend to be more responsive in their approach to life choosing to spend most of their time on developmental issues instead of focussing on petty and divisive issues. Solusi being largely an educational institution tends to specialise on the training of responsible citizens who act as unifying social agents. Observations taken around the community confirmed that most of the people in this community spend much of their time in their studies, leaving no time for gossip and other social ills that are a characteristic of other communities. 60% of the participants who felt education contributed much to the social stability argued that educated people do not want to be involved in any social ills as this would compromise their high status in the community, so they refrain from all unwholesome activities so as to be noble role models in the community.

Nine participants mainly from the lower levels of education, thought that the absence of night clubs contributes to the social cohesion of the society. The participants revealed that people tend to do all sorts of social evils because of drunkenness that is influenced by the night clubs. The participants made several comparisons to communities that have high social evils as a result of the presence of the night clubs. The absence of night clubs guarantees sober community members at all times in the community.

The remaining participants gave varying reasons for the stable community at Solusi. The traditional teachings that are done by the elderly in the community were credited for producing a stable environment. Participants felt that traditional teachings tended to anchor on the church's teachings and valued communal parenting thereby making a stable society. The presence of the police was also mentioned as a factor in the building of a stable community. Although the number of reported cases in the police camp was very insignificant people felt that their presence was a deterring factor worth consideration.

VI. CONCLUSION

The study recognises that the role of the church in the larger society has been relegated to irrelevancy hence a high degree of social instability leading to lawlessness, corruption and violence. From the above discussion it can be seen that the church plays a crucial role in the strengthening of the social fabric in the community of Solusi. The church provides the platform for teaching values and norms to the community members. The church meetings give the community members time to interact and share their views on the value systems of the community. The general oneness of the community makes it easy for the moral standards to be maintained as all the members are in

agreement with the values. The church also plays a crucial role in shaping responsible citizens who are eager to work for the betterment of their society.

VII. RECOMMENDATIONS

From the above conclusions, this paper therefore recommends that the church as a socialisation agent should be given more space and time to influence the Zimbabwean society. The church's value systems and teachings should permeate all the social avenues of the society so that our social fabric might be strengthened. Deliberate efforts should be put in place so that all social institutions should have time and programmes to propagate the societal values and expectations to all the members of the society.

While the school curriculum has subjects like moral education, guidance and counselling, less time and attention has been given to these subjects. The paper recommends that the schools should spend more quality time on these subjects so that the social fabric is strengthened thereby making it possible for the schools and other social institutions to accomplish their intended goals. The society should also work hard to revitalize the philosophy of ubuntu, which kept the traditional societies intact.

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AUTHORS

First Author – Christopher Ndlovu, Lupane State University, Department of Educational Foundations, chrisndlovu47@gmail.com

Optimum dilution for Phytoremediation of distillery effluent in constructed wet lands

P Bama[1]*, M Thushyanthy[1], P Alvappillai[1] and M Prabhaharan[1]

[*1]Deptartment of Agricultural Engineering, Faculty of Agriculture, University of Jaffna, Sri Lanka
Corresponding author: velauthambama@yahoo.com

Abstract- Effluent 'Coda' originating from palmyrah toddy distillery units is the major source of environmental pollution in the Jaffna district of Sri Lanka. Spent wash produced from distilleries is rich in organic material and characteristically less toxic. A research was carried out to find the optimal dilution factor of the effluent before discharge through construction of wet lands which is a new, ecofriendly, economically viable and environmentally safe strategy to manage the distillery effluent. The effluent was diluted as 5, 4, 3, 2, and 1 times with ground water. Complete failures of first series of dilution, treatments were discarded and new effluent was further diluted 5, 10 and 20 times to facilitate the optimum plant growth. The results revealed that aquatic plants, Eichhormia sp, Lemna sp, Pistia sp and Lemna minor were used successfully to treat the spent wash, after aeration, pH adjustment, and dilution. It was found that dilution factor 5. The water samples were collected from inlets and outlets of constructed and analyzed for EC, PO_4^{3-}, and NO_3^-. The removal rates of PO_4^{3-} in constructed wetland were 48.24%, 25.88%, and 51.76%,, Eichhormia sp, Lemna and Lemna minor respectively. It was found constructed wetland shows higher removal efficiency of NO_3^-. The 35.63%, 42.53%,55.17% removal rates of NO_3^- were obtained by Eichhormia sp, Lemna sp, Pistia sp and Lemna minor. It could be use the spent wash as a liquid fertilizer for cultivating field through, construction of wetlands.

Index Terms- Constructed wetland, Dilution factor, Distillery effluent

I. INTRODUCTION

Direct discharge of effluent from the toddy distillation units in to the environment is causing significant environmental pollution in Jaffna peninsula. A large and increasing volume of wastewater is produced globally by the winery and distillery industries .Considerable amount of effluent is coming from the distillery units which are situated in Jaffna at Navally and Thikkam. In the Northern part of Sri Lanka, especially in the Jaffna peninsula the distilleries are using, naturally fermented palmyrah and coconut sap called 'palmyrah toddy' and 'coconut toddy' respectively to obtain ethanol. This distillery unit generates 1.3 million liters of effluent annually and the principle waste is locally referred as "Coda"(Amara et al., 1990).

A large and increasing volume of wastewater is produced globally by the winery and distillery industries (Peter et al., 2008). The fresh acidic spent wash produced from the distilleries are of high in temperature and have high Biological Oxygen Demand (BOD), and also consisting large amount of suspended solids and high turbidity. Moreover, 88% of raw materials used in the distilleries are converted into waste and discharged into the water bodies without recommended treatments. Because of the above reasons, distillery industries have become a major source for the water pollution (Farid et al., 2010). The disposal of large quantities of biodegradable waste into the water bodies without adequate treatment has been banded through the Environmental laws. Distillery industries have become a major source of pollution, because values of constituents of distillery waste are often above the permissible standards specified by the Central Environmental Authority. Also discharge of untreated acidic spent wash can destroy aquatic organisms and natural fresh water which is the prime source for agricultural and animal production.

There is no any well sound management techniques proposed until now to overwhelm liquid waste management problem which is the major deadlock for producers. This recent study focusing new strategy to manage this problem through the construction of wet lands to treat the nutritive effluent and reuse it for agriculture as an alternative for chemical fertilizer and irrigate the crop land (Sathish et al., 2013). Moreover, constructed wetlands can also be a cost-effective and technically feasible approach for treating wastewater. Wetlands are often less expensive to build than traditional wastewater treatment options, have low operating and maintenance expenses and can handle fluctuating water levels. Additionally, they are aesthetically pleasing and can reduce or eliminate odors associated with wastewater. This experiment is seeking to find out the best dilution factor for wetland treatment.

II. METHODOLOGY

Fresh effluent samples were collected directly from the out let unit without accumulating in aerobic tank from Thikkam distillery in Jaffna. Fresh effluent samples were collected into 20 liter plastic containers. The following Aquatic plants, Eichhormia sp, Lemna sp Pistia sp and Lemna minor were selected for this study because of their fast growing habit in fresh water and high nutrient feeding. According to the study of Amara et al., 1900 Eichhormia sp, Lemna sp Lemna minor and Pistia sp were used for biological treatment

of distillery waste and stated that these plants were well survived to grow in effluent. Important chemical properties such as pH, dissolved oxygen, EC and TSS of fresh effluent were measured to identify the problematic parameter and to determine the dilution factor.

The fabricated lab scale wet land was kept above the smooth cemented place. The effluent was allowed for the sedimentation in the sediment tank for one day. After that effluent was collected from the upper region of the sediment tank. Then it was aerated by using air compressor for one hour. Again effluent was adjusted to the pH 6 by using $CaCO_3$. Finally it was diluted with groundwater. Selected aquatic plants were placed into the wet land. At the same time control was maintained as treated effluent and fresh effluent was kept as without plant to get the effect of plant. Samples from inlet and outlet of the artificial wetland were collected on two days interval for one week and analyzed in replicates for pH, PO_4^{3-}, NO_3^- and EC using standard methods.

III. RESULTS AND DISCUSSION

The pH value of the fresh spent wash was an acidic nature varying from 3.2 to 3.4. Dissolved oxygen value of spent wash was less than 1. EC values of the effluent was ranged from 1.08 - 4.02 mS/cm. Complete death of aquatic plants were observed in the dilution factor of 5, 4, 3, 2, and 1 times with groundwater due to the lower pH and dissolved oxygen value. In the series of dilution, plants were survived in dilution factor of 20, because of effluent was adjusted the pH of 7 by adding water. But 20 L of groundwater was used to dilute one 1L effluent. This dilution factor is not economical one in large industrial scale.

Further the facts were used to improve the pH and increase the DO level. Even though effluent was aerated by using air compressor for one hour, the system remains in an anaerobic condition with the DO level of less than one. The pH value of the effluent was adjusted to 6 by adding CaCO3 to the effluent. CaCO3 was selected for neutralizing the effluent because of it is more effective and low cost than KOH or NaOH. Then this effluent was diluted with groundwater in 1, 2, 5, and 10 times. Aquatic plants were survived in 5 times of dilution with water. Finally optimal dilution factor was taken as 5. But it could be further reduced to 4 times in large scale treatment. Even further it could be reduced in contracted wetland while flowing.
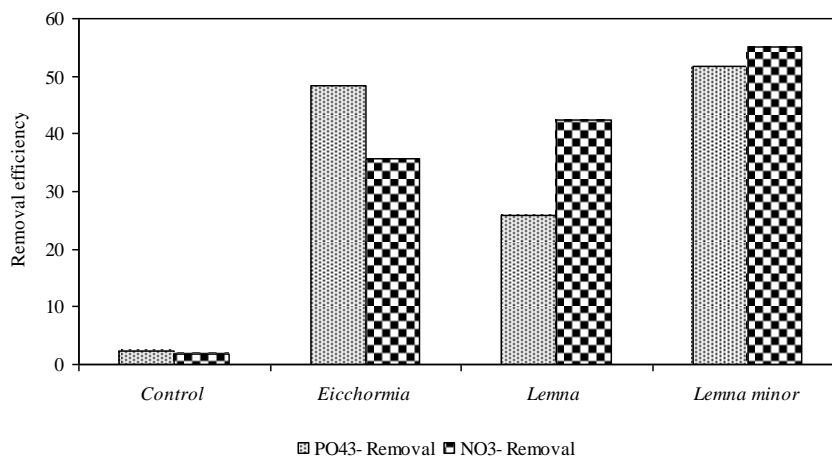
Figure 01: Removal efficiency of effluent after two days for PO43- and NO3-

Figure 01 shows the removal efficiency of the effluent with various type of plant. It was found that, Lemna minor shows higher removal efficiency compared to others. The removal rates of PO43- in constructed wetland were 2.35%, 48.24%, 25.88%, and 51.76%, respectively for control, Eichhormia sp, Lemna and Lemna minor. It was observed Eichhormia sp, Lemna and Lemna minor produced the greatest reduction in NO3-. The highly removal rate of NO3- was found in Lemna minor which was removed 55.17% of NO3- within two days. In this dilution the highest reduction of PO43- and NO3- would be achieved by Lemna minor. This experimental study, the dilution factor 5 which was gave good results. Dilution factor which is not harmful because, particular amount of water come from outlet of distillery as waste. Yala rain water harvesting is also possible in the peak season of distillation. Extensive usage of chemical fertilizers contributes largely to soil degradation. This safe strategy utilizes the distillery effluent for producing valuable liquid fertilizer that reduces environmental hazards.

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AUTHORS

First Author(Correspondence Author) – Mrs. Bama Pakeerathan (BSc in A Agricultural Engineering, University of Jaffna,Jaffna.(velauthambama@yahoo.com)

Second Author –. Dr(Mrs.)ThushyanthyMikunthan Senior Lecturer G1,Dept of Agricultural Engineering,Faculty of Agriculture,University of Jaffna.Jaffna.(tmikunthan@yahoo.co.in)

Third Author – Dr(Mr.) Ponniah Alvappillai. Senior Lecturer G1, Head of Dept of Agricultural Engineering,Faculty of Agriculture,University of Jaffna.Jaffna, (Ponalvaippillai@yahoo.com)

Fourth Author- Mr. M Prabhaharan. Senior Lecturer , Dept of Agricultural Engineering,Faculty of Agriculture,University of Jaffna.Jaffna,(aenpraba@gmail.com).

AGRICULTURE AND THE ECONOMY OF BIHAR: AN ANALYSIS

Md. Abdus Salam††††, Md. Ejaz Anwer‡‡‡‡ and Md. Safdar Alam§§§§

Abstract- The state of Bihar was reorganised on November 15, 2000 with 38 districts, 9 divisions, 101 sub-divisions, 533 blocks and 45,098 villages (Census, 2001). Bihar is the third most populous state and 12th largest state in terms of geographical area of about 94.2 thousand square kilometres (Census, 2001). It is divided by river Ganges into two parts i.e., (I) North Bihar with an area of 53.3 thousand sq. kms and (II) South Bihar with an area of 40.9 thousand sq. kms. After the bifurcation of the state, agriculture has become more important because all the rich mineral resources have gone to the state of Jharkhand. The state is left with residual natural resource endowment such as; cultivable land, fertile soil and abundant water. Due to this the economy of Bihar is mainly based on agricultural and allied sectors. After the bifurcation of Bihar, the growth rate in terms of both GSDP and NSDP showed remarkable increase in almost all sub-sectors as compared to pre-bifurcation period. However, agriculture and allied sector has accounted miserable growth rate as compared to industrial and services sector. The share of agriculture and allied sector has declined from 46.70 percent to 26.51 percent during 1990-91 to 2008-09. Despite sharp decline of its share in NSDP, agriculture still plays a vital role in the development of Bihar. The urgent need of the hour is to increase Investments in rural infrastructure for water management/soil conservation/ construction of roads to link rural area with urban area etc. With appropriate technology, infrastructure and policy support, it is possible to reverse the declining trend in food grain production and check the migration of the people from Bihar to other states.

Basic Features of the Economy of Bihar

The state of Bihar was reorganised on November 15, 2000 with 38 districts, 9 divisions, 101 sub-divisions, 533 blocks and 45,098 villages (Census, 2001)[1]. Bihar is the third most populous state and 12th largest state in terms of geographical area of about 94.2 thousand square kilometers (Census, 2001). It is divided by river Ganges into two parts i.e., (I) North Bihar with an area of 53.3 thousand sq. kms and (II) South Bihar with an area of 40.9 thousand sq. kms. After the bifurcation of the state, agriculture has become more important because all the rich mineral resources have gone to the state of Jharkhand. The state is left with residual natural resource endowment such as; cultivable land, fertile soil and abundant water. Due to this the economy of Bihar is mainly based on agricultural and allied sectors. Therefore, the proper economic development of the Bihar's economy is not possible without the growth of agriculture and allied sectors. The agriculture sector holds the key of the state's economy by contributing more than one-fourth (26.51 percent) to GDP (at 1999 constant price) in 2008-09 (CSO, 2009)[2] and providing employment to 81 percent of workforce in the state (GoI, 2008)[3]. It also assumes great importance because near about 90 percent of the population of the state living in rural areas are directly or indirectly depend on agriculture and allied

††††Associate Professor, Deptt. of Economics, AMU, Aligarh, Salam9@gmail.com
‡‡‡‡ Research Associate, NCAP, New Delhi
§§§§ Research Scholar, Deptt of Economics, AMU, Aligarh

activities for their livelihood. Bihar is the third largest producer of vegetables and 7th largest producer of fruits in the country (GoI, 2009)[4]. The gross cropped area (GCA) in Bihar is 79.57 lakh hectares. The net sown area comprises of 57.25 lakh hectares (GoI, 2008)[5]. The state has several rivers such as Ganga, Sone, Bagmati, Kosi, Budhi Gandak, Punpun, etc. Statistics reveal that about 41 percent of cultivated area is flood-prone and another forty percent is drought-prone.

As the state is endowed with appropriate climatic conditions for the cultivation of a wide range of crops and trees. Based on soil characteristics, rainfall, temperature and terrain, three main Agricultural Climatic Zone (Agro-Climatic Zones) in Bihar have been identified (GoB, 2009)[6]. These are:

Zone-I: (North Alluvial Plain): It includes the districts of West Champaran, East-Champaran, Gopalganj, Siwan, Saran, Sitamarhi, Muzaffarpur, Madhubani, Darbhanga, Samastipur, Sheohar, Begusarai and Vaishali. The Zone receives an annual rainfall of about 1040-1450 mm. The soil is mostly sandy loam and loam.

Zone-II: (North-East Alluvial Plain): It includes eight districts which are Saharsa, Purnea, Katihar, Supaul, Khagaria, Madhepura, Kishanganj, and Araria. The annual rainfall in this Zone ranges between 1200-1700 mm. The soil is mostly sandy loam and clay loam.

Zone-III: (South Zone Alluvial Plain): This covers the largest area comprising 17 districts. It is generally divided into two sub-Zones, which are the eastern and western parts. This Zone receives about 990-1240 mm of annual rainfall and has a variety of soils-sandy loam, clay loam, loam and clay.

Zone-III (A): (East-South Alluvial Plain): It comprises, Sheikhpura, Lakhisarai, Jamui, Munger, Bhagalpur and Banka.

Zone-III (B): (West-South Alluvial Plain): The districts like Patna, Nalanda, Gaya, Aurangabad, Nawadah, Jehanabad, Arwal, Bhojpur, Buxar, Rohtas and Bhabhua are included in this Zone.

From Table-1, it can be observed that each Zone has its unique agricultural characteristics due to differential climatic factor leading to wide range of socio-economic diversities. Agriculture is the main occupation of the state and because of this state is predominantly rural. Data shows that about 89.50 percent of the population is living in rural areas for their livelihood against 74.30 per cent for the country as a whole. The literate people in the state accounted for 47.53 percent of the total population, with 59.68 percent and 33.12 percent being the male and female respectively (Census, 2001; GoB, 2003[7]). The 61st NSSO round reveals that with regard to both total number of poor, Bihar stands the second in the country. About 41.4 per cent of the population is still living below poverty line in the state, as compared to only 27.5 percent at all-India level (GoI, 2009)[8].

Table-1: Important Features of Agro-Climatic Zones of Bihar

Zones	Districts	Area in (M. Ha)			Soil	Ph	Initiation/ Cessation of rainfall	Total rainfall (mm)	Temperature (Degree Celsius)		Main Cropping Systems
		Total Area	NSA#	Irrigated					Max	Min	
Zone-1	West and East Champaran, Gopal ganj, Saran, Siwan, Sitamarhi, Muzaffarpur, Darbhanga, Vaishali, Samastipur, Sheohar, Madhubani, Begusarai	3.26	2.15 (65.95)*	0.86 (40.00)**	Sandy Loam, Loam	6.5 - 8.4	12th June/30th Sep to 10th Oct	1040-1450 (1245)	36.6	7.7	Rice-Wheat, Maize-Wheat, Maize-Arhar, Maize-Potato-Moong, Maize-Sweet Potato-Moong, Maize-Mustard-Moong, Rice-Potato-Maize, Rice-Sugarcane
Zone-2	Purnea, Katihar Madhepura, Saharsa Araria, Kishanganj Supaul, Khagaria,	2.08	1.21 (58.17)	0.24 (19.83)	Sandy Loam, Clay Loam	6.8 - 7.8	7th June/30th Sep to 10th Oct	1200-1700 (1450)	33.8	8.8	Jute-Rice, Jute-Wheat, Jute-Rice-Wheat, Jute-Rice-Wheat, Jute-Potato, Jute-Khalai-Wheat, Jute-Rice-Wheat, Jute-Potato, Jute-Khalai-Wheat, Jute-Mustard, Jute-Pea, Rice-Wheat-Moong
Zone-3 (A)	Banka, Munger, Jamui Lakhisarai, Shekhpura Bhagalpur	1.11	0.49 (44.14)	0.21 (42.86)	Sandy Loam, Clay Loam, Loam, Clay	6.8 - 8.0	15th June/30th Sep to 10th Oct	990-1240 (1115)	37.1	7.8	Rice-Wheat, Rice-Wheat-Moong, Rice-Gram-Rice, Rice-Potato-Onion, Rice-Rai-Moong, Rice-Bar seem, Rice-Wheat-Moong, Rice-Wheat, Rice-Gram-Rice, Rice-Gram-Moong Rice-Gram-Moong, Rice-Wheat
Zone-3 (B)	Patna, Gaya, Jahanabad Nawada, Nalanda, Rohatas, Bhojpur, Aurangabad, Buxar, Kaimur, Arwal	2.92	1.68 (57.53)	1.37 (81.15)			10th June/ 30th Sep to 10th Oct				
Total	Bihar	9.37	5.53 (59.02)	2.68 (48.46)							

Source: Data based on compiled from ministry of agriculture, Government of Bihar
*Note: * Figures in parenthesis are % to geographical area.** Figures in parenthesis are % to net area sown. #   NSA: Net sown Area*

Figure-1: Agro-Climatic Zone-wise Map of Bihar

Source: www.krishi.bih.nic.in

The state is the poorest by all the means of socio-economic indicators (Table-2). A large group of landless labour from rural areas of the state migrates to other states like Punjab, Delhi, Mumbai and even in some parts of U. P in the sowing and harvesting seasons for their livelihood.

Table-2: Basic Features of the Economy of Bihar

Description	Bihar	India
Total Geographical Area, (Sq. Kms.) Census, 2001	94163	3287240
Population Density (2001)	880	324
Sex Ratio (Number of Female Per Thousand of Male) (2001)	921	933
Decadal Growth of Population (1991-2001)	28.4	21.3
Total Population in Millions (2001)	83.0	1028.7
Total Rural Population (in Millions) (2001)	74.3	742.5
Total Urban Population (in Millions) (2001)	8.7	286.1
Total Male Population (2001)	43.2	532.2
Total Female Population (2001)	39.8	496.5
Percentage of Urban Population (2001)	10.5	27.8
Percentage of Rural Population (2001)	89.5	72.2
Total Literacy Rate (2001)	47.5	64.8
Total Rural Literacy Rate (2001)	43.9	58.7
Total Urban Literacy Rate (2001)	71.9	79.9
Total Male Literacy Rate (2001)	33.1	53.7
Total Female Literacy Rate (2001)	33.1	53.7
Rural Female Literacy Rate (2001)	29.6	46.1
Total Poverty Ratio (NSSO-61st Round, 2004-05)	41.4	27.5
Total Rural Poverty Ratio (2004-05)	42.1	28.3
Agriculture Worker as Percentage of Total (Main + Marginal Worker) (2001)	74.6	58.4
Agriculture Worker as Percentage of Total Rural Worker (2001)	81.3	73.3
Work Participation Rate (2001)	33.9	39.3

Source: Census of India, 1991& 2001 and NSSO, Government of India, New Delhi.

The state is also frequently affected by the two sets of natural disasters like; flood and drought. Occurrence of the two consecutive natural disasters in form of tough drought and severe flood brought setback to agriculture. In 2007, the entire north Bihar was hit by the severe flood; consequently, the loss of cropped area was 16.63 lakh hectares in the state of Bihar (GoB, 2008)[9]. The state also suffers from very poor investment (public and private) in agriculture, as compared to the other states as well as major eastern states of the country. Consequently, the agriculture in Bihar has low productivity with lower cropping intensity among the major eastern states of India.

Growth and Pattern of Major Agriculture Crops

In this Section of this paper an attempt has been made to analyze the growth and pattern in area, production and yield of food grains vis-à-vis non-food grain crops in Bihar over the period from 1990-91 to 2007-08 along with the agro-climatic Zones of Bihar for the period from 1999-00 to 2006. Cropping pattern is the reflection of the family needs and the market demands in an area with the viewpoint of wheat has been the most profitable in the past. The needs and opportunities changes over time with change in technology, market demand and degree of openness of the economy. Cropping pattern being practiced by farmers depends on the quality of land, irrigation facilities, and other agro-climatic and socio-economic conditions of the area. Expansion in cultivable area is the determinant of growth in the production of food grains. The gross and net sown area in the state is estimated at 79.57 and 57.25 lakh hectares respectively with the cropping intensity of 1.38 percent (GoI, 2008)[10]. Both the cultivable area and production of food grains show increasing trends during pre-bifurcation period i.e. 1990-91 to 1999-2000. In terms of annual growth rate, both in area and production of food grains declined significantly during post-bifurcation period. It is evident that there is no scope for further increase in the cultivable area under food grains. Thus, increasing the yield and cropping intensity are the best options for accelerating the growth of agricultural production in the state. It can be observed from the Table-3 that the CAGR of area under food grains has significantly decreased from 3.14 percent per annum in pre-bifurcation period to 2.70 percent per annum in post-bifurcation period. It is due to decrease in area under almost all cereals, coarse cereals and pulses. The area under non-food grains registered miserable growth; it increased from 1.03 percent per annum to 1.11 percent per annum during the pre and post-bifurcation period respectively. This is because of the decrease in the area under oilseeds, jute, measta, fruits, sugarcane and jute. It is important to

highlight that the area under food grains still occupies more than 86 percent of total cropped area due to the traditional cropping pattern as well as traditional food habits. The crop-wise analysis of the data reveals that among the cereal crops, rice is one of the most widely cultivated crops in Bihar. However, the area under rice is constantly declining over the period but stood first in all the three comparative years at 3684 thousand hectares (Tha) in 1991-92, 3657 Tha and 3573 Tha in 2001 and 2007-08 respectively. The area under wheat shows ever-increasing trends and holds the second foremost growing crops in all the comparative years in Bihar. Thus, the area under wheat grew up by 1925 Tha to 2067 Tha and further to 2163 Tha. The area under coarse cereals, oilseeds and pulses demonstrate a declining trend in the year 2007-08 as compared to 2000-01.

Table-3: CAGR (Based on Dummy Technique) of Area, Production and Yield of Major Crops of Bihar (1991-92 to 2007-08)

Region	Crops	Year			CAGR		
		1991-92	2000-01	2007-08	Pre	Post	Over-all
Area (In'000 Hectare)	Food grains	7408 (84.5)	9883.2 (87.5)	9876 (86.3)	3.14**	2.70*	2.57*
	Non-Food grains	1359.5 (15.5)	1410 (12.5)	1570.8 (13.7)	1.03***	1.11*	1.13*
Production (In'000 MT)	Food grains	9192 (31.4)	12066 (38.9)	11770 (34.0)	6.46*	1.65***	0.27
	Non-Food grains	20107 (68.6)	18969 (61.1)	22797 (66.0)	-1.74	-0.53	-0.17
Yield (Kg/Hectare)	Food grains	1241 (7.7)	1221 (8.3)	1192 (7.6)	3.22**	-1.02	-2.24**
	Non-Food grains	14790 (92.3)	13453 (91.7)	14513 (92.4)	-2.74***	-1.62**	-1.28***

Source: Based on Data Compiled and Computed from Ministry of Agriculture, Govt. of Bihar, Indiastat.com, CMIE, Agriculture, various issues.

Figure in parenthesis is percentages share of total area, production and yield of food grains and non-food grains
Note: For Calculation, See Appendix-2 (A, B and C).
*Where: *, ** and *** are the 1 percent, 5 percent and 10 percent level of significance respectively.*
 # CAGR percent: Pre-Bifurcation period from 1991-92 to 1999-00 and Post-Bifurcation period: 2000-01 to 2007-08.
Note:Figure in parenthesis are the percentages share of area, production and Yield of food grains and non-food grains to the total agriculture (selected major crops),Food grains include: total cereals, total coarse cereals and pulses, and Non-food grains comprises rapeseeds and mustard, linseeds, groundnuts, jute, measta, sugarcane, fruits and vegetables. While, area in thousand hectares (Tha), Production in thousands metric tonnes (TMT) and Yield TMT/Tha.
Missing data of area and Production has been interpolated and extrapolated as per the nature of the data for crops like: Small Millets for the year, 1991-92, seasamum by $Y= a+bt$ formula, while; Area and Production of vegetables has been interpolated for the year 1993-94 and 1994-95 and computed by $Y = a+bt+ct^2$ formula, and further more small millets for the year 1993-94, 1995-96, 1997-98 and 2000-01 and gram for 1999-2000, Measta for 1992-93, 1993-94 has been interpolated by $Y_t = Y_o (1+r)^t$.

The area under vegetables increased drastically from 577 Tha in 1991-92 to 708 Tha in 2000-01 and further to 824 Tha in 2007-08. While the area under fruits shows a miserable increasing trend. The area under fruits grew from 267 Tha to 268 Tha and further to 286 Tha during the same period. Similarly area under total commercial crops namely; groundnuts and sugarcane has shown remarkable increase during 2007-08 as against the earlier period 2000-01. Finally, it can be observed from the data that Bihar has, to some extent, diversified in favour of horticulture and commercial crops during the over-all period. The change in cropping pattern in the state between pre and post-bifurcation period indicates significant shift from food grains to non-food grains like fruits and vegetables, fibers, etc., especially from coarse cereals (jowar, barley, ragi and small millets) and pulses to groundnuts, sugarcane, fibers and vegetables. Therefore, it can be said that Bihar has diversified in favour of horticulture and commercial crops, but it registered a growth rate of 1.11 per cent per annum which is significance at 1 percent level of significance in the post-bifurcation period in Bihar (Table-3). The SID value also supports that, the diversification in favour of horticulture crops in Bihar has increased from 0.788 in 1990-91 to 0.820 in 2005-06. Thus, the hypothesis that cultivation area has not shifted from traditional crops to horticultural and commercial crops in Bihar is rejected.

Area, Production and Yield of Food grains (Rice and Wheat)

Table-4 reveals that during 1999-00, highest area of 12.13 lakh hectares (Lha) has been accounted under aghani rice in Zone-3(B) while lowest area of 1.91 Lha under same crop has been recorded in Zone-3(A). In case of summer rice highest area of 1.02 Lha has been recorded in Zone-2, only 0.01 Lha area in both Zone-3(A) and Zone-3(B). Highest area of 4.06 Lha under bhadai rice has been accounted in Zone-1 while only 0.01 Lha in Zone-3(A). Highest (9.15 Lha) and lowest (1.58 Lha) area under wheat cultivation has been recorded in Zone-1 and Zone-3(A) respectively. Area under the aghani rice in Zone-3(B) remains continuously highest till 2005-06 in Bihar, whereas Zone-3(A) has recorded continuously lowest in each year till 2005-06. The area under bhadai (autumn) rice recorded highest in Zone-1 and lowest area in

Zone-3(A) in each year. Like bhadai rice, area under wheat cultivation recorded highest and lowest in Zone-1 and Zone-3(A) respectively in each year. Like area, production of aghani rice has recorded highest and lowest in Zone-3(B) and Zone-3(A) respectively in each year. Again the highest production of summer rice has been recorded in Zone-2 throughout the entire study time. Zone-1 has recorded the highest production of bhadai rice in each year. It is observed that the Zone-1 has recorded highest production of wheat till 2002-2003 while during 2003-2004 highest production of 14.83 lakh metric tonnes (LMT) has been recorded in Zone-3(B) but in 2004-05 and 2005-06 Zone-1 has produced highest amount of wheat. Again, in case of yield of aghani rice Zone-3(B) has recorded highest in each year except in 2004-05 when highest yield of 1.02 metric tonnes per hectare (MT/Ha) has been recorded in Zone-3(A). The yield of summer rice has been recorded highest 1.75 MT/Ha in Zone-2 in each year except in 2002-03. Highest yield of bhadai rice has been found in different Zones in different years, i.e., 1.41 MT/Ha, 1.34 MT/Ha and 1.27 MT/Ha in Zone-1 during 1999-00, 2001-02 and 2003-04 respectively; 1.35 MT/Ha, 1.01 MT/Ha and 1.01 MT/Ha in Zone-2 during 2000-01, 2004-05 and 2005-06 respectively; while 1.17 MT/Ha in Zone-3(B) during 2002-03. A noticeable Figure is observed that the highest Figure of the total production and yield of wheat have been observed in different Zones in each year. During 1999-00 to 2002-03 and 2005-06 highest yield has been recorded in Zone-3(B).

Table-4: Agro-Climatic Zone-wise Area, Production and Yield of Different Food Crops Since 1999-00 to 2005-06 in Bihar

Crops	Agro Climatic Zones	Area in lakh Hectares (Lha)							Production (in lakh Metric Tonnes (LMT))							Yield (Production lakh MT/Area lakh Hectares)						
		1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Aghani Rice	Zone-1	8.93	9.12	8.89	9.06	9.03	8.72	8.77	12.36	12.08	14.38	10.1	10.5	5.19	6.76	1.38	1.32	1.62	1.11	1.16	0.6	0.77
	Zone-2	6.34	5.57	5.63	5.54	5.56	5.29	5.26	7.58	6.29	5.37	6.05	7.71	4.1	5.07	1.2	1.13	0.95	1.09	1.39	0.78	0.96
	Zone-3 (A)	1.91	3.01	2.53	2.88	2.83	2.47	2.61	2.52	3.64	3.22	3.99	3.85	2.53	2.83	1.32	1.21	1.27	1.38	1.36	1.02	1.09
	Zone-3 (B)	12.13	11.71	11.58	11.33	11.65	9.11	9.42	23.56	22.37	23.53	21.91	23.83	5.25	15.57	1.94	1.91	2.03	1.93	2.04	0.58	1.65
	All Bihar	29.3	29.4	28.64	28.81	29.07	25.6	26.05	46.02	44.38	46.49	42.05	45.9	17.07	30.23	1.57	1.51	1.62	1.46	1.58	0.67	1.16
Summer Rice	Zone-1	0.22	0.2	0.19	0.22	0.2	0.2	0.19	0.31	0.34	0.36	0.38	0.24	0.21	0.18	1.39	1.71	1.88	1.72	1.23	1.06	0.96
	Zone-2	1.02	1.04	0.95	0.99	0.96	0.93	0.94	2.14	1.76	1.84	1.59	1.44	1.38	1.64	2.11	1.7	1.94	1.61	1.5	1.49	1.75
	Zone-3 (A)	0.01	0.01	0.01	0	0	0	0	0.01	0.01	0.01	0	0.01	0	0.01	1.86	1.63	1.84	0.26	1.4	1.34	1.36
	Zone-3 (B)	0.01	0.01	0.01	0.01	0	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.83	1.56	1.91	1.52	1.41	1.23	1.47
	All Bihar	1.25	1.25	1.15	1.21	1.17	1.14	1.13	2.47	2.13	2.22	1.97	1.7	1.62	1.83	1.98	1.7	1.93	1.62	1.45	1.42	1.61
Bhadai (Autumn) Rice	Zone-1	4.06	4.33	4.49	4.41	4.14	4.21	3.97	5.72	5.72	6.02	4.8	5.28	3.72	3.59	1.41	1.32	1.34	1.09	1.27	0.88	0.9
	Zone-2	1.31	1.55	1.39	1.19	1.35	1.3	1.37	1.22	2.1	1.3	1.19	1.55	1.31	1.38	0.93	1.35	0.93	1	1.14	1.01	1.01
	Zone-3 (A)	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	1.15	1.27	1.24	1.08	1.23	0.91	0.91
	Zone-3 (B)	0.03	0.02	0.07	0.02	0.03	0.02	0.04	0.03	0.03	0.08	0.02	0.04	0.02	0.04	1.16	1.3	1.23	1.17	1.24	0.91	1
	All Bihar	5.41	5.92	5.97	5.63	5.54	5.53	5.39	6.98	7.87	7.42	6.03	6.88	5.06	5.02	1.29	1.33	1.24	1.07	1.24	0.91	0.93
Wheat	Zone-1	9.15	9.04	9.27	9.19	8.92	9.07	9.13	20.07	19.78	18.5	16.51	14.72	16	12.02	2.19	2.19	2	1.8	1.65	1.76	1.32
	Zone-2	3.47	3.62	3.9	3.82	3.67	3.52	3.42	7.14	7.43	6.76	6.11	4.6	4.82	2.82	2.06	2.05	1.73	1.6	1.25	1.37	0.83
	Zone-3 (A)	1.58	1.65	1.5	1.48	1.57	1.49	1.35	2.66	2.86	2.49	2.31	2.73	2.03	1.82	1.68	1.73	1.66	1.56	1.74	1.37	1.35
	Zone-3 (B)	6.61	6.36	6.6	6.82	6.61	6.2	6.12	15.96	14.1	16.19	15.42	14.83	9.78	11.12	2.41	2.22	2.45	2.26	2.25	1.58	1.82
	All Bihar	20.81	20.67	21.26	21.3	20.77	20.28	20.02	45.84	44.17	43.93	40.36	36.89	32.63	27.78	2.2	2.14	2.07	1.89	1.78	1.61	1.39

Source: http://krishi.bih.nic.in

Note: Where all districts of Bihar are under these agricultural Zones, which are as follows;

Zone-1: W. Champaran, East Champaran, Gopalganj, Siwan, Saran, Sitamarhi, Muzaffarpur, Madhubani, Darbhanga, Samastipur, Sheohar, Begusarai, Vaishali

Zone-2: Saharsha, Purina, Katihar, Supaul, Khagaria, Madhepura, Kishanganj , Araria

Zone-3 (a): Bhagalpur, Sheikhpura, Lakhisarai, Jamui, Munger, Banka

Zone-3 (b): Bhabua, Rohtas, Aurangabad, Buxar, Jahanabad (Arval is included in this dist.), Gaya, Nalanda, Nawada, Patna

Table-4: Agro-Climatic Zone-wise Area, Production and Yield of Different Food Crops Since 1999-00 to 2005-06 in Bihar

Crops	Agro Climatic Zones	Area in lakh Hectares (Lha)							Production (in lakh Metric Tonnes (LMT))							Yield (Production lakh MT/Area lakh Hectares)						
		1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Aghani Rice	Zone-1	8.93	9.12	8.89	9.06	9.03	8.72	8.77	12.36	12.08	14.38	10.1	10.5	5.19	6.76	1.38	1.32	1.62	1.11	1.16	0.6	0.77
	Zone-2	6.34	5.57	5.63	5.54	5.56	5.29	5.26	7.58	6.29	5.37	6.05	7.71	4.1	5.07	1.2	1.13	0.95	1.09	1.39	0.78	0.96
	Zone-3 (A)	1.91	3.01	2.53	2.88	2.83	2.47	2.61	2.52	3.64	3.22	3.99	3.85	2.53	2.83	1.32	1.21	1.27	1.38	1.36	1.02	1.09
	Zone-3 (B)	12.13	11.71	11.58	11.33	11.65	9.11	9.42	23.56	22.37	23.53	21.91	23.83	5.25	15.57	1.94	1.91	2.03	1.93	2.04	0.58	1.65
	All Bihar	29.3	29.4	28.64	28.81	29.07	25.6	26.05	46.02	44.38	46.49	42.05	45.9	17.07	30.23	1.57	1.51	1.62	1.46	1.58	0.67	1.16
Summer Rice	Zone-1	0.22	0.2	0.19	0.22	0.2	0.2	0.19	0.31	0.34	0.36	0.38	0.24	0.21	0.18	1.39	1.71	1.88	1.72	1.23	1.06	0.96
	Zone-2	1.02	1.04	0.95	0.99	0.96	0.93	0.94	2.14	1.76	1.84	1.59	1.44	1.38	1.64	2.11	1.7	1.94	1.61	1.5	1.49	1.75
	Zone-3 (A)	0.01	0.01	0.01	0	0	0	0	0.01	0.01	0.01	0	0.01	0	0.01	1.86	1.63	1.84	0.26	1.4	1.34	1.36
	Zone-3 (B)	0.01	0.01	0.01	0.01	0	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.83	1.56	1.91	1.52	1.41	1.23	1.47
	All Bihar	1.25	1.25	1.15	1.21	1.17	1.14	1.13	2.47	2.13	2.22	1.97	1.7	1.62	1.83	1.98	1.7	1.93	1.62	1.45	1.42	1.61
Bhadai (Autumn) Rice	Zone-1	4.06	4.33	4.49	4.41	4.14	4.21	3.97	5.72	5.72	6.02	4.8	5.28	3.72	3.59	1.41	1.32	1.34	1.09	1.27	0.88	0.9
	Zone-2	1.31	1.55	1.39	1.19	1.35	1.3	1.37	1.22	2.1	1.3	1.19	1.55	1.31	1.38	0.93	1.35	0.93	1	1.14	1.01	1.01
	Zone-3 (A)	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	1.15	1.27	1.24	1.08	1.23	0.91	0.91
	Zone-3 (B)	0.03	0.02	0.07	0.02	0.03	0.02	0.04	0.03	0.03	0.08	0.02	0.04	0.02	0.04	1.16	1.3	1.23	1.17	1.24	0.91	1
	All Bihar	5.41	5.92	5.97	5.63	5.54	5.53	5.39	6.98	7.87	7.42	6.03	6.88	5.06	5.02	1.29	1.33	1.24	1.07	1.24	0.91	0.93
Wheat	Zone-1	9.15	9.04	9.27	9.19	8.92	9.07	9.13	20.07	19.78	18.5	16.51	14.72	16	12.02	2.19	2.19	2	1.8	1.65	1.76	1.32
	Zone-2	3.47	3.62	3.9	3.82	3.67	3.52	3.42	7.14	7.43	6.76	6.11	4.6	4.82	2.82	2.06	2.05	1.73	1.6	1.25	1.37	0.83
	Zone-3 (A)	1.58	1.65	1.5	1.48	1.57	1.49	1.35	2.66	2.86	2.49	2.31	2.73	2.03	1.82	1.68	1.73	1.66	1.56	1.74	1.37	1.35
	Zone-3 (B)	6.61	6.36	6.6	6.82	6.61	6.2	6.12	15.96	14.1	16.19	15.42	14.83	9.78	11.12	2.41	2.22	2.45	2.26	2.25	1.58	1.82
	All Bihar	20.81	20.67	21.26	21.3	20.77	20.28	20.02	45.84	44.17	43.93	40.36	36.89	32.63	27.78	2.2	2.14	2.07	1.89	1.78	1.61	1.39

Source: http://krishi.bih.nic.in

 Note: Where all districts of Bihar are under these agricultural Zones, which are as follows;
Zone-1: W. Champaran, East Champaran, Gopalganj, Siwan, Saran, Sitamarhi, Muzaffarpur, Madhubani, Darbhanga, Samastipur, Sheohar, Begusarai, Vaishali
Zone-2: Saharsha, Purina, Katihar, Supaul, Khagaria, Madhepura, Kishanganj , Araria
Zone-3 (a):Bhagalpur, Sheikhpura, Lakhisarai, Jamui, Munger, Banka
Zone-3 (b):Bhabua, Rohtas, Aurangabad, Buxar, Jahanabad (Arval is included in this dist.), Gaya, Nalanda, Nawada, Patna

Share of Area, Production and Yield of Food grains

Table-5 shows that the share of area and production of food crops in different agro-climatic Zones in the state. During 1999-2000, Zone-3(B) has recorded as highest as 41.4 percent area under aghani rice and its highest share with fluctuated Figure continued till 2005-06. Zone-3(A) has recorded lowest share of area under aghani rice, i.e. 6.5 percent in 1999-00, 10.2 percent in 2000-01, 8.8 percent in 2001-02, 10.0 percent in 2002-03, 9.7 percent in both 2003-04 and 2004-05 and 10 percent in 2005-06. It can also be observed that summer rice is cultivated mainly in Zone-2 which accounts highest share in each year till 2005-06 in Bihar. While Zone-3(A) and Zone 3(B) are placed at bottom in the share of area under summer rice. In the state, highest share of area under bhadai rice has been registered in Zone-1: i.e., 75.1 percent, 73.2 percent, 75.2 percent, 78.3 percent, 74.8 percent, 76.0 percent and 73.6 percent in 1999-00, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively. In case of area under wheat cultivation, highest share has been recorded in Zone-1 followed by Zone-3(B) in each year. While Zone-3(A) shows lowest percentage share of area under wheat in each year, i.e. 7.4 percent, 8.0 percent, 7.9 percent, 7.6 percent, 8.2 percent, 8.3 percent, and 7.5 percent in 1999-00, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05, and 2005-06 respectively. Likewise the highest percentage share of production of aghani rice, summer rice and bhadai rice has been recorded in Zone-3(B), Zone-2 and Zone-1 respectively. The percentage share of production of aghani rice in Zone-3(B) has been accounted for 51.2 percent, 50.4 percent, 50.6 percent, 52.1 percent, 51.9 percent, 30.7 percent, and 51.5 percent in 1999-00, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively. Highest percentage share of production of summer rice in Zone-2 is 86.8 percent, 82.75, 82.9 percent, 80.4 percent, 84.9 percent, 85.6 percent and 89.6 percent, while lowest Figure in Zone-3(A) is 0.4 per cent, 0.6 per cent, 0.4 per cent, 0.1 per cent, 0.3 per cent, 0.3 per cent and 0.3 per cent during 1999-00, 2000-01, 2001,02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively. Zone-1 has recorded highest percentage share in production of wheat accounting 43.8 per cent, 44.8 per cent, 42.1 per cent, 40.9 per cent, 39.9 per cent, 49.0 per cent and 43.3 per cent in 1999-00, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively. Zone-3(A) recorded lowest percentage of 6.2 per cent, 6.9 per cent, 6.2 per cent, 6.1 per cent, 7.9 per cent, 7.6 per cent and 7.8 per cent in 1999-00, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05 and 2005-06 respectively.

Table-5: Agro-Climatic Zone-wise Percentage Share of Area, Production of Food grains Since 1999-00 to 2005-06 in Bihar

Crops	Agro Climatic Zones	Percentage Share in Area							Percentage Share in Productions						
		1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Aghani Rice	Zone-1	30.5	31	31	31.4	31.1	34.1	33.7	26.9	27.2	30.9	24	22.9	30.4	22.4
	Zone-2	21.6	18.9	19.7	19.2	19.1	20.7	20.2	16.5	14.2	11.5	14.4	16.8	24	16.8
	Zone-3 (A)	6.5	10.2	8.8	10	9.7	9.7	10	5.5	8.2	6.9	9.5	8.4	14.8	9.4
	Zone-3 (B)	41.4	39.8	40.5	39.3	40.1	35.6	36.1	51.2	50.4	50.6	52.1	51.9	30.7	51.5
	All Bihar	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Summer Rice	Zone-1	17.6	16.1	16.5	18	17	17.7	16.5	12.4	16.2	16.1	19.1	14.4	13.3	9.8
	Zone-2	81.4	82.7	82.4	81.2	82.3	81	82.9	86.8	82.7	82.9	80.4	84.9	85.6	89.6
	Zone-3 (A)	0.4	0.6	0.5	0.3	0.3	0.3	0.3	0.4	0.6	0.4	0.1	0.3	0.3	0.3
	Zone-3 (B)	0.5	0.6	0.6	0.5	0.4	1	0.3	0.5	0.6	0.6	0.4	0.4	0.8	0.3
	All Bihar	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bhadai (Autumn) Rice	Zone-1	75.1	73.2	75.2	78.3	74.8	76	73.6	81.9	72.7	81.1	79.7	76.7	73.5	71.5
	Zone-2	24.2	26.3	23.3	21.1	24.4	23.4	25.4	17.4	26.7	17.5	19.8	22.5	25.9	27.5
	Zone-3 (A)	0.2	0.2	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.4	0.2	0.2	0.3	0.2
	Zone-3 (B)	0.5	0.4	1.1	0.3	0.6	0.3	0.7	0.4	0.4	1.1	0.3	0.6	0.3	0.7
	All Bihar	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Wheat*	Zone-1	44	43.7	43.6	43.1	43	44.7	45.6	43.8	44.8	42.1	40.9	39.9	49	43.3
	Zone-2	16.7	17.5	18.3	17.9	17.7	17.4	17.1	15.6	16.8	15.4	15.1	12.5	14.8	10.1
	Zone-3 (A)	7.4	8.0	7.9	7.6	8.2	8.3	7.5	6.2	6.9	6.2	6.1	7.9	7.6	7.8
	Zone-3 (B)	31.8	30.8	31.1	32.0	31.8	30.6	30.6	34.8	31.9	36.9	38.2	40.2	30.0	40.0
	All Bihar	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Same as Table-4

Annual Growth Rate of Area, Production and Yield of Food grains

Table-6 reveals the percentage change in area of production and yield of rice and wheat in different agro-climatic Zones in Bihar. The Table shows high degree of fluctuations in aghani rice. The highest annual growth of area which is 57.5 percent in Zone-3(A) during 1999-00 to 2000-01, and has recorded highest average annual growth rate of 7.8 percent during the period from 2000-01 to 2005-06. While Zone-3(B) has recorded highest negative average growth rate of -3.7 percent per annum over the same period. This is because of the decline in area under aghani rice by -21.8 percent during 2003-04 to 2004-05. In the cultivation of summer rice, Zone-3(B) registered highest average growth rate of 9.5 percent per annum, while Zone-3(A) registered negative growth rate of -2.8 percent per annum. The total area under the cultivation of bhadai rice in Bihar has increased by 45.8 percent in Zone-3(B). A noticeable Figure is observed in the growth pattern of area under wheat. Zone-3(A) has registered highest negative average rate of -2.4 percent per annum over the period; because area under wheat has declined by -9.5 percent and -8.9 percent during 2001-02 and 2005-06 in the same Zone. The area under wheat cultivation has declined by -0.6 per cent per annum in Bihar as a whole. A wide fluctuations in the growth rate of yield of aghani rice has been observed. In the year 2000-01, all the Zones of Bihar has recorded negative growth rate, while highest positive growth of 187.3 percent yield in 2005-06 has been recorded in Zone-3(B). Thus, Zone-3(B) registered highest average rate of growth by 20.2 percent per annum among all the Zones of Bihar over the period while Zone-1 has registered lowest as well negative average growth rate of -4.7 percent per annum during the same period.

Table-6:Zone-wise Annual and Average Annual Growth Rate of Area, Production and Yield of Food Crops in Bihar from 2000-01 to 2005-06

Crops	Agro Climatic Zones	Growth Rates in Area							Growth Rate in Productions							Growth Rates of Yield						
		2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	AAGR	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	AAGR	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	AAGR
Aghani Rice	Zone-1	2.1	-2.5	1.9	-0.4	-3.4	0.6	-0.3	-2.3	19	-29.8	4	-50.6	30.2	-4.92	-4.3	22.1	-31.1	4.4	-48.8	29.5	-4.70
	Zone-2	-12.1	1.1	-1.7	0.4	-4.9	-0.7	-3.0	-17	-14.8	12.8	27.4	-46.8	23.6	-2.47	-5.6	-15.7	14.7	26.8	-44.1	24.4	0.08
	Zone-3 (A)	57.5	-15.8	14	-2	-12.4	5.3	7.8	44.8	-11.7	23.9	-3.3	-34.3	11.8	5.20	-8	4.9	8.7	-1.4	-25	6.1	-2.45
	Zone-3 (B)	-3.5	-1	-2.2	2.9	-21.8	3.3	-3.7	-5	5.2	-6.9	8.7	-78	196.8	20.13	-1.6	6.3	-4.8	5.7	-71.9	187.3	20.17
	All Bihar	**0.3**	**-2.6**	**0.6**	**0.9**	**-12**	**1.8**	**-1.8**	**-3.6**	**4.7**	**-9.5**	**9.1**	**-62.8**	**77.1**	**2.50**	**-3.9**	**7.5**	**-10.1**	**8.2**	**-57.8**	**74**	**2.98**
Summer Rice	Zone-1	-8.3	-5.9	14.8	-9.1	2	-7.8	-2.4	12.7	3.7	5.2	-34.9	-12.3	-16.2	-6.97	22.9	10.2	-8.4	-28.4	-14	-9.1	-4.47
	Zone-2	1.9	-8.7	4.1	-2.4	-3.7	1.4	-1.2	-17.7	4.3	-13.8	-9	-4	18.3	-3.65	-19.2	14.2	-17.2	-6.8	-0.3	16.7	-2.10
	Zone-3 (A)	40.3	-28.3	-24.3	3.6	-14	5.7	-2.8	22.7	-18.8	-89.3	456.9	-17.3	7.2	60.23	-12.5	13.3	-85.9	437.7	-3.8	1.4	58.37
	Zone-3 (B)	22.8	-10.4	-16.3	-25.1	153.4	-67.5	9.5	4.5	9.7	-33.6	-30.4	122.1	-61.4	1.82	-14.9	22.5	-20.7	-7.1	-12.3	18.7	-2.30
	All Bihar	**0.4**	**-8.4**	**5.7**	**-3.7**	**-2.2**	**-0.9**	**-1.5**	**-13.6**	**4.1**	**-11.2**	**-13.8**	**-4.8**	**13**	**-4.38**	**-14**	**13.6**	**-15.9**	**-10.5**	**-2.7**	**14.1**	**-2.57**
Bhadai (Autumn) Rice	Zone-1	6.6	3.7	-1.7	-6.1	1.5	-5.6	-0.3	0	5.2	-20.2	9.9	-29.6	-3.5	-6.37	-6.2	1.4	-18.8	17.1	-30.6	2.2	-5.82
	Zone-2	19	-10.6	-14.3	13.7	-4.3	5.9	1.6	72.7	-38.4	-7.9	29.7	-15.5	5.7	7.72	45.1	-31.1	7.5	14.1	-11.7	-0.2	3.95
	Zone-3 (A)	-2.2	100.9	-42.6	-16.2	41.3	-15.2	11.0	7.8	96.5	-50	-4.5	4.9	-15.3	6.57	10.3	-2.2	-13	13.9	-25.8	-0.1	-2.82
	Zone-3 (B)	-15.7	195.6	-76	102.4	-46.5	114.9	45.8	-5.7	179.6	-77.2	114.4	-60.6	134.5	47.50	11.9	-5.4	-5	6	-26.4	9.1	-1.63
	All Bihar	**9.5**	**0.9**	**-5.6**	**-1.6**	**-0.1**	**-2.5**	**0.1**	**12.7**	**-5.7**	**-18.8**	**14.1**	**-26.5**	**-0.7**	**-4.15**	**2.9**	**-6.5**	**-13.9**	**16**	**-26.4**	**1.8**	**-4.35**
Wheat	Zone-1	-1.3	2.6	-0.9	-2.9	1.7	0.7	0.0	-1.5	-6.5	-10.7	-10.9	8.7	-24.9	-7.63	-0.2	-8.8	-9.9	-8.2	6.9	-25.4	-7.60
	Zone-2	4.5	7.6	-1.9	-3.9	-4.2	-3	-0.2	4.1	-9.1	-9.6	-24.6	4.8	-41.6	-12.67	-0.4	-15.5	-7.9	-21.6	9.3	-39.8	-12.65
	Zone-3 (A)	4.4	-9.5	-1.4	6.1	-5.2	-8.9	-2.4	7.4	-13.2	-7.1	18.2	-25.5	-10.4	-5.10	2.9	-4.1	-5.8	11.4	-21.4	-1.6	-3.10
	Zone-3 (B)	-3.7	3.8	3.3	-3.1	-6.2	-1.3	-1.2	-11.6	14.8	-4.7	-3.8	-34.1	13.7	-4.28	-8.2	10.7	-7.8	-0.7	-29.7	15.2	-3.42
	All Bihar	**-0.7**	**2.9**	**0.2**	**-2.5**	**-2.4**	**-1.3**	**-0.6**	**-3.6**	**-0.6**	**-8.1**	**-8.6**	**-11.5**	**-14.9**	**-7.88**	**-3**	**-3.3**	**-8.3**	**-6.2**	**-9.4**	**-13.8**	**-7.33**

Source: Same as Table-4

Note: AAGR: Average Annual Growth Rate

The state shows poor performance in the yield of summer rice. It registered a growth rate of -14.0 percent in 2000-01, -15.9 percent in 2002-03, -10.5 percent in 2003-04 and -2.7 percent in 2004-05, however it increased by 13.6 percent in 2001-02 and 14.11 percent in 2005-06. In 2004-05, all the Zones have recorded negative growth in yield of summer rice, but a highest growth, i.e., 434.7 percent has been recorded in 2003-04 in Zone-3(A). The state shows a positive growth in yield of bhadai rice of 2.9 percent in 2000-01, 16.0 percent in 2003-04 and 1.8 percent in 2005-06, but a negative growth of -6.5 percent in 2001-02, -13.9 percent in 2002-03 and -26.4 percent in 2004-05. The important point is that all the Zones of Bihar have recorded a positive growth in yield of bhadai rice in 2000-01 except negative growth of -6.2 percent in Zone-1. Among all Zones, Zone-2 has registered highest average rate of growth of yield of 3.95 percent under bhadai rice crops over the period. Positive growth of yield of wheat is observed in Zone-1 in 2004-05 (6.9 percent), in Zone-2 in 2004-05 (9.3 percent), in Zone-3(A) in 2000-01 (2.9 percent) and in 2003-04 (11.4 percent) and in Zone-3(B) in 2001-02 (10.7 percent) and in 2005-06 (15.2 percent).

The growth rates of Gross State Domestic Product (GSDP) of the states during pre and post bifurcation periods

Bihar and Jharkhand have improved dramatically with massive jumps in per capita income and overall economic growth. From Table 7 we can observe that average growth rates for the period before the formation of the states (over 1994-95 and 2001-

02) Jharkhand was growing at 3.6 per cent while Bihar grew at 4.9 per cent. The mother state Bihar was growing at faster rate over that period (Fig.2).

Table 7- Growth before 2000: (Figures are in %)

YEARS	JHARKHAND	BIHAR
1994-95	4.2	10.9
1995-96	2.6	-13.9
1996-97	-4.1	23.7
1997-98	26.3	-3.8
1998-99	5.7	7.5
1999-00	-2.7	3.6
2000-01	-9.8	16.0
Average Growth over 1994-95 and 2001-02	3.6	4.9

Source: Planning Commission Data
Note: Even though the states did not exist before 2000, Planning Commission has data for the areas which formed the new states.

From Table 8 it can be observed that Jharkhand has failed to match Bihar's performance since 2000(Fig.3). Data revealed that Bihar's growth was mostly powered by a steady agricultural growth rate of 8.1 per cent over 2004-09, while the corresponding figure for Jharkhand was 1.4 per cent. This could be one of the reasons behind Jharkhand lagging Bihar in post 2000 periods. In respect of the average industrial growth rate over 2004-2009, Bihar registered 5.8 per cent whereas Jharkhand recorded much higher at 11.5 per cent.

Fig.2

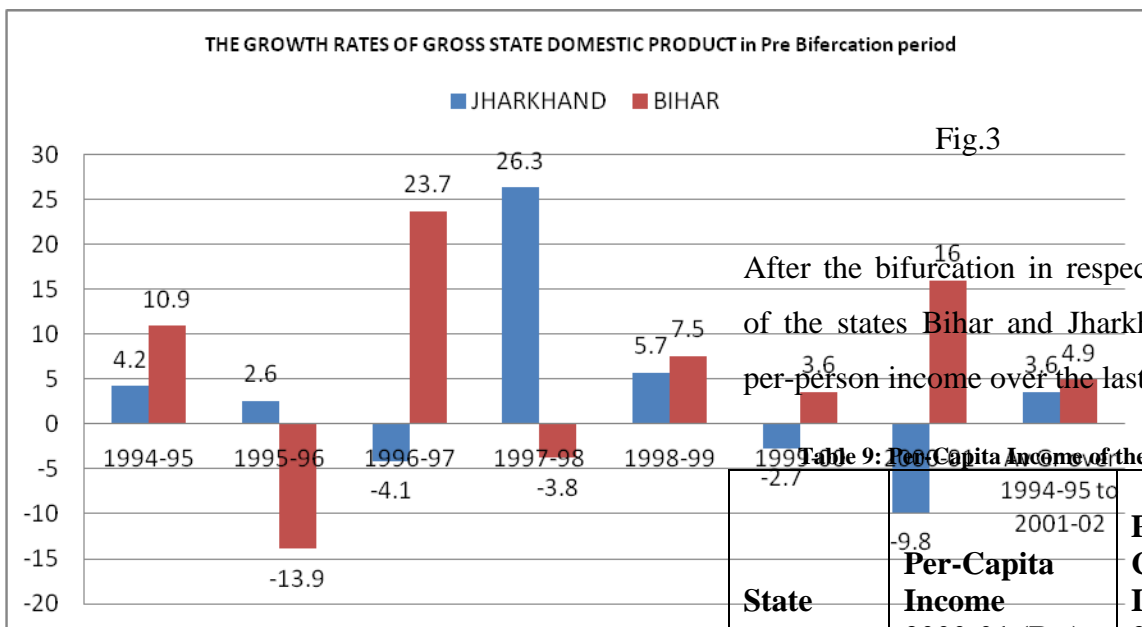THE GROWTH RATES OF GROSS STATE DOMESTIC PRODUCT in Pre Bifercation period

Fig.3

After the bifurcation in respect of per-capita income of the states Bihar and Jharkhand have doubled the per-person income over the last decade (Table9).

Table 9: Per-Capita Income of the states

State	Per-Capita Income 2000-01 (Rs.)	Per-Capita Income 2010-11 (Rs.)	Per-Capita Income of 2010-11 as a multiple of 2000-01
1. Bihar	6,554	13,632	2.0
2. Jharkhand	9,980	21,734	2.1

**Source: Planning Commission Data**

Over 2004-09, Jharkhand has done a better job in reduction of poverty than Bihar. Jharkhand has reduced it by 6.2 per cent while Bihar has managed only by 0.9 per cent (Table10). If we take absolute number of poor people into account Bihar did the worst with an increase of 5 million (49 million to 54 million) over 2004-09. Jharkhand reduced the number of poor people by 1 million (12 million to 11 million).

Table 8: Growth after 2000: (Figures are in %)

YEARS	JHARKHAND	BIHAR
2001-02	6.7	-4.7
2002-03	2.5	11.8
2003-04	8.0	-5.1
2004-05	15.2	12.1
2005-06	-3.2	0.9
2006-07	2.3	17.7
2007-08	20.5	7.6
2008-09	-1.7	14.5
2009-10	4.9	10.4
2010-11	6.0	14.7
2011-12	6.5	13.1
Average since 2004-05	6.3	11.4

Source: Planning Commission Data

Table 10: Number of people below poverty line

THE GROWTH RATES OF GROSS STATE DOMESTIC PRODUCT in Post Bifercation period
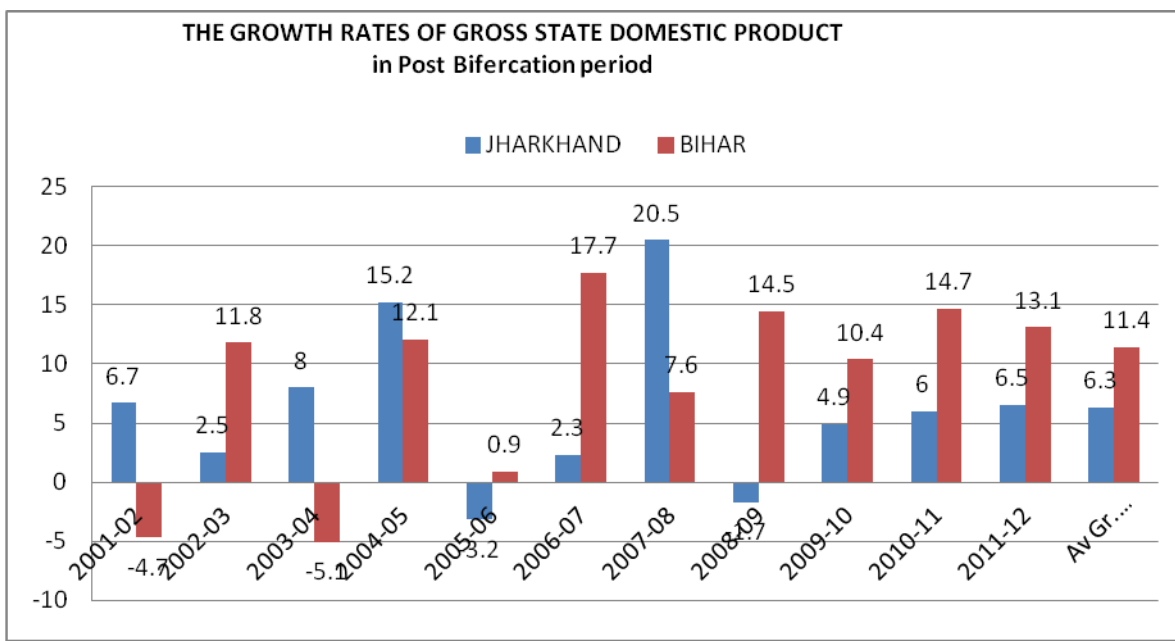
States	Poverty Rate 1993-94 (%)	Poverty Rate 2004-05 (%)	Poverty Rate 2009-10 (%)	% Reduction in poverty since 2004-05
1. Bihar	60.5	54.4	53.5	0.9
2. Jharkhand	NA	45.3	39.1	6.2

Note- Poverty Rate- Number of people below poverty line as a % of total population
*Source: Planning Commission Data*

If we look at Bihar's year-wise growth rates performance against 'similar' states like Orissa, Madhya Pradesh, and Rajasthan we can conclude that Bihar had actually done better than almost all states(Table11and Fig.4).

Table 11: Growth In Bihar Against Other States(Figures in %)

Year	Bihar	Orissa	Madhya Pradesh	Rajasthan
2005-06	0.9	5.6	5.3	6.6
2006-07	17.7	12.8	9.2	11.6
2007-08	7.6	10.9	4.6	5.1
2008-09	14.5	7.7	12.3	9.0
2009-10	10.4	6.6	10.5	5.5
2010-11	14.7	8.6	8.1	10.9
2011-12	13.1	7.1	N.A	N.A
Average Growth over 2005-12	11.3	8.5	8.3	8.1
Average Growth over1994-02	4.9	3.9	4.7	7.3
Change in % growth over the 2 periods	6.3	4.6	3.6	0.8

Source: Planning Commission Data

Fig.4
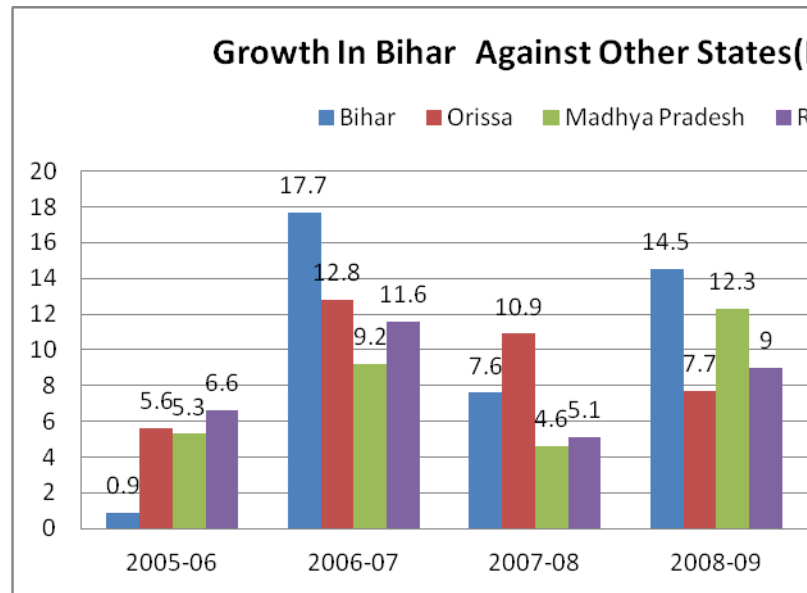
Conclusion

The study shows that the Bihar has diversified agriculture production in favour of horticulture and commercial crops at very slower rate during the post-bifurcation period. But, it is important to highlight that the area under food grains still occupies more than 86 percent of total cropped area due to the traditional cropping pattern as well as traditional food habits. Therefore, area, production and yield of non-food grain crops are more stable as compared to food grain crops. Among the agro-climatic Zones in Bihar, highest share in area and production of aghani rice, lineseeds, seasamum, pea, gram and lentil has been found in Zone-3(B), while bhadai rice, wheat, rapeseeds and mustard, and arhar has been found in Zone-1. Similarly, highest share of area and production of summer rice and sunflower has been found in Zone-2. Whereas, the highest share of area under moong cultivation has been found in Zone-2, but its production has not been maintained. As a result, share of production of moong has been

recorded highest in Zone-1. Amongst the agro-climatic Zones of Bihar, the per capita income is highest in Zone-3(B) which is higher than the state average followed by Zone-3(A), Zone-1 and Zone-2. The most prosperous Zone in Bihar is Zone-3(B) and within it, Patna appears at the top. While, in Zone-3(A) and Zone-1, Munger and Begusarai appears most prosperous districts enjoying highest per capita net district domestic product (PCNDDP). Zone-2 is dominated by agriculture and allied sector and it is the least prosperous Zone in the state. In this Zone, Katihar appear to be the highest prosperous district, while Araria at the bottom is having lowest per capita income.

After the bifurcation of Bihar, the growth rate in terms of both GSDP and NSDP showed remarkable increase in almost all sub-sectors as compared to pre-bifurcation period. However, agriculture and allied sector has accounted miserable growth rate as compared to industrial and services sector. The share of agriculture and allied sector has declined from 46.70 percent to 26.51 percent during 1990-91 to 2008-09. Despite sharp decline of its share in NSDP, agriculture still plays a vital role in the development of Bihar. The urgent need of the hour is to increase Investments in rural infrastructure for water management/soil conservation/ construction of roads to link rural area with urban area etc. With appropriate technology, infrastructure and policy support, it is possible to reverse the declining trend in food grain production and check the migration of the people from Bihar to other states.

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