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Study of Economics of Maize as influenced by different levels of Nitrogen, Phosphorus and Zinc

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Abstract- This paper summarizes the economics of maize production under different treatment combinations of nitrogen, phosphorus and zinc. A field experiment was conducted during the *rabi* season of the year 2009- 10 at Pulse Research Station, Anand Agricultural University, Model Farm, Vadodara, Gujarat. Results revealed that highest B:C ratio was found to be significant under application of N_3 (160 kg N ha^{-1}), P_3 (80 kg P_2O_5 ha^{-1})and Z_2 (5 kg Z ha^{-1}) over other treatments. The gross realization in terms of rupees per hectare was worked out separately for each treatment by taking the average maize grain yield into consideration of the respective treatments on the basis of their prevailing market prices.

Index Terms- Benefit cost ratio, Economics, Nitrogen, Phosphorus, Zinc, Maize and Yield

I. INTRODUCTION

Maize has been widely cultivated as a rain fed crop in India. Recent studies have shown that maize can be successfully grown during *rabi* in many part of the country due to evolution of new genotypes. The yield level of maize during *rabi* season is considerably higher than that of *Kharif* due to its timely water availability and higher fertilizer use efficiencies (Singh, 1974). Nitrogen is the key element in crop growth and is the most limiting nutrient in Indian soil. The paramount importance of nitrogen for increasing the yield has been widely accepted. Nitrogen influences the quality of product by improving the level of protein, succulence and palatability.

Application of micronutrient also play significant role in improvement of grain yield of maize. Among, micronutrient zinc plays an important role in photosynthesis, nitrogen metabolism and regulates auxin concentration in the plant. The Zn deficiency was found wide spread in Indian soil. The availability of phosphorus and the micronutrients like zinc and manganese can be limiting factors for plant growth especially in the young maize plant with a small root soil interface. Therefore, if mineral elements readily available to the young plant are provided before the root system is fully developed; they are likely to enhance the growth, particularly at low temperatures. In maize zinc deficiency appears during the early growth stage and the plants exhibit stunted growth. Dangarwala et al. 1994 reported that zinc deficiency has been observed in middle and north Gujarat regions at the extend of 25 percent in maize crop.

But the benefit and cost ratio have been also taken into consideration for best combination of fertilizers to be used under specific location. With this background a field trial was undertaken to study the "Response of Maize (Zea mays L.) to the Levels of Nitrogen, Phosphorus and Zinc during rabi season under middle Gujarat conditions." at Pulse Research Station, AAU, Model Farm, Vododara during rabi of the year 2009-10.

II. MATERIALS AND METHOD

A field experiment was conducted at Pulse Research Station, Model Farm, Anand Agricultural University, Vadodara, Gujarat during the *rabi* season of the year 2009- 10. Soil of the experimental field was sandy loam with pH 7.5. It was very deep and fairly moisture retentive, low in available nitrogen, zinc and organic carbon and high in available phosphorus and potash. Eighteen treatment combinations consisting of three levels of nitrogen (80, 120 and 160 kg N ha^{-1}), three levels of phosphorus (40, 60 and 80 kg P_2O_5 ha^{-1}) and two levels of zinc (0 and 5 kg Z ha^{-1}) were tested in factorial randomized block design with three replications. Furrows were opened manually in each plot 60 cm apart in dry conditions after through preparation of land. The full dose of phosphors and zinc and 1/3rd quantity of nitrogen according to treatments were applied at the time of sowing. Remaining 2/3rd quantity of nitrogen was applied in two equal split i.e. at knee high stage and at tesseling stage. Eight irrigations were given as when required. The experiment was sown with single cross hybrid maize 'HQPM-1' on 8 Nov 2009 and harvested on 10 March 2010.

The gross realization in terms of rupees per hectare was worked out separately for each treatment by taking the average maize grain yield into consideration of the respective treatments on the basis of their prevailing market prices. The cost of cultivation for each treatment was worked out considering the cost of all the operations and the inputs used. The current rate of agricultural operations and market price of inputs were used for calculation. The total cost of cultivation was subtracted from the gross realization to obtain net income per hectare for the individual treatments and recorded accordingly.

Benefit cost ratio was worked out from the total income accrued from total grain yield obtained over total expenditure incurred considering the prevailing market rates for produce and each inputs required for different treatments.

$$\text{Benefit: cost ratio (BCR)} = \frac{\text{Total income (Rs. ha}^{-1}\text{)}}{\text{Total expenditure (Rs. ha}^{-1}\text{)}}$$

III. RESULTS AND DISCUSSION

Economics the crop as influenced by nitrogen, phosphorus and zinc levels are presented in Table 1 and also graphically presented in Fig.1.

Effect of nitrogen levels on B: C ratio:

The data given in Table 1 indicated that treatment N_3 (160 kg N ha^{-1}) recorded the highest net realization (Rs. 41079 ha^{-1}) with maximum BCR value of 2.21. It was closely followed by N_2 (120 kg N ha^{-1}), which realized the net income of Rs. 38262 ha^{-1} with the BCR value of 2.17, while the lowest net return was noticed under treatment N_1 (80 kg N ha^{-1}) Rs. 32631 ha^{-1} with the BCR value of 2.03. Similar results were also reported by (Singh *et al.*, 2000a).

Effect of phosphorus levels on B: C ratio:

Effect of phosphorus levels on B: C ratio given in Table 1 indicated that treatment P_3 (80 kg P_2O_5 ha^{-1}) recorded the highest net realization (Rs. 38855 ha^{-1}) with BCR value of 2.14. The next best treatment was P_2 (60 kg P_2O_5 ha^{-1}), which realized the net income of Rs. 38705 ha^{-1} with the highest BCR value of 2.19. The lowest net return was noticed under treatment P_1 (40 kg P_2O_5 ha^{-1}) Rs. 34412 ha^{-1} with the BCR value of 2.09.

Effect of zinc levels on B: C ratio:

The results regarding economics as influenced by various levels of zinc presented in Table 1 indicated that the highest level of Zn_2 (5 kg Zn ha^{-1}) registered maximum net realization (Rs. 39992 ha^{-1}) with BCR of 2.21 than application of Zn_1 (0 kg Zn ha^{-1}) registered the lowest net realization of Rs. 34,656 ha^{-1} with BCR value of 2.06. The results are in line of the results reported by Sawarkar *et al.* (1999).

Table 1: Economics of maize as influenced by different levels of nitrogen, phosphorus and zinc

Treatments	Yields (kg ha^{-1})		Gross realization (Rs. ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Net Realiza--tion (Rs. ha^{-1})	BCR
	Grain	Stover				
Nitrogen levels, kg ha^{-1} (N)						
N_1:80	4678	6959	56022	25106	32631	2.03
N_2:120	5209	7628	62137	25625	38262	2.17
N_3:160	5550	7742	65436	26144	41079	2.21
Phosphorus levels, kg ha^{-1} (P)						
P_1:40	4838	7137	57816	25120	34412	2.09
P_2:60	5272	7568	62579	25625	38705	2.19
P_3:80	5328	7625	63199	26129	38855	2.14
Zinc levels, kg ha^{-1} (Zn)						
Zn_1:0	4896	7165	58392	25476	34656	2.06
Zn_2:5	5396	7721	64005	25774	39992	2.21

Input cost
Rs. 12.09 per kg of N
Rs. 23.50 per kg of P_2O_5
Rs. 55.55 per kg of Zn
Rs. 130 kg^{-1}

Selling price
Grain @ Rs 9 kg^{-1}
Stover @ Rs 2 kg^{-1}
Cost of maize seeds:

IV. CONCLUSIONS

- In light of the results obtained from this investigation, it can be concluded that for securing maximum seed yield and net profit, it is advisable to apply 120 kg N ha-1 and 60 kg P2O5 ha-1 in addition to 5 kg Zn ha-1 to *rabi* maize crop var. HQPM-1 under middle Gujarat Agro-climatic conditions.
- The experiment should be repeated for at least two or three seasons for evaluating consistency and applicability of the treatments to arrive at conclusive recommendations.
- Different sources of fertilizer and methods of application should be tested through judging the fertilizer use efficiency in order to minimize the load of increasing cost of fertilizers on farmer.
- It is worthwhile to include different organic sources as a part in the nutrient management of the crop considering the soil sustainability in long run as well as to minimize the cost of cultivation which ultimately results in increased B: C ratio.
- Similar economics studies should be generated for other Agro climatic zones where the maize is cultivated.

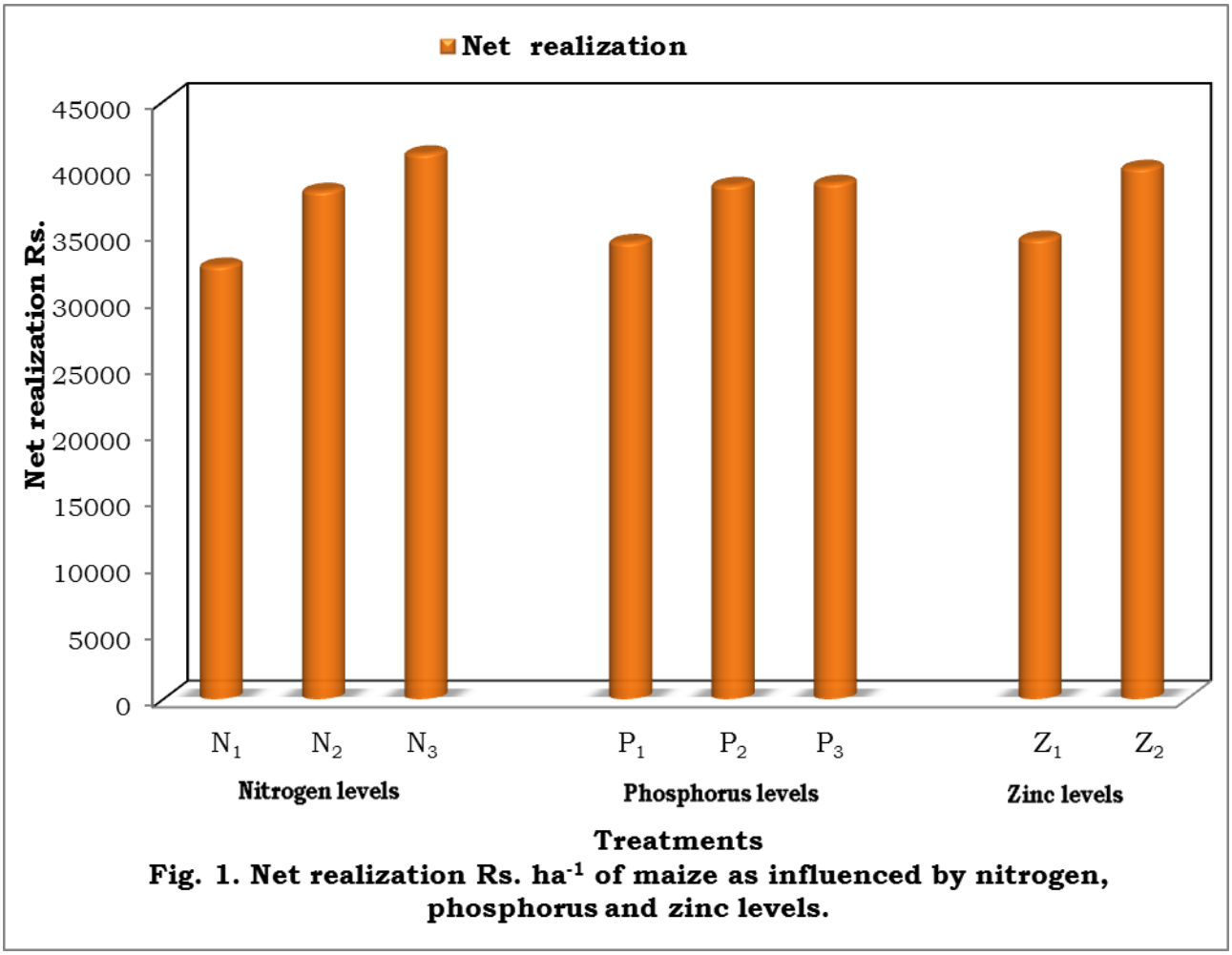

Fig. 1. Net realization Rs. ha^{-1} of maize as influenced by nitrogen, phosphorus and zinc levels.

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Impact of Gender on Some Organizational Variables: A Study

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Abstract- The present study was carried out to measure the impact of gender on some organizational variables like work motivation, job satisfaction, need for achievement and life satisfaction. The sample of 200 employees was selected and was divided into two parts i.e.100 male and 100 female. The five scales namely Personal Data Sheet, work Motivation Questionnaire, Job Satisfaction Scales, Sentence Completion Scales and Life Satisfaction Scale were administered on them. The Data was collected and analyzed with the help of mean, SD and t. Result with help of mean, SD and t. result indicated that male had higher level of work motivation than female. There was no significant difference between male and female employees on job satisfaction. It was found that male employees have high need for achievement than female employees and concluded that the male and female did not differed on life satisfaction scale. Several factors were responsible for these phenomena.

Index Terms- Impact of Gender, Male and Female, organizational variable, life satisfaction, work motivation.

I. INTRODUCTION

Recently organization psychologists as well as industrial psychologists are concentrating their attention on how employees feel about their jobs or their satisfaction and determining ways to improve it at a reasonable level of satisfaction (Tamini and Khan, 2009). Now a days, work motivation, job satisfaction, life satisfaction and need for achievement are highly researched variables in psychological researchers.

Human behavior does operate in vacuum. It is in fact, not meaningless. It is purpose oriented and goal directed. The persistence in activity and the tendency to complete a task are some of this sign of goal directed behavior i.e. motivational behavior. So, motivation is a set of energetic forces that originate both within as well as beyond a human being to initiate work related behavior and to determine i5ts form, direction, intensity and duration (Pinder, 1988).

Job satisfaction is the favorable viewpoint of the worker toward the work role, he present by occupies (Ivancevich and Donnelly, 1968).Job satisfaction is simply how people feel about their jobs and different aspects of job (Spector, 1997). It is an attitudinal (and affective). Response to one's job (McCormick and Ilgen, 1989). In nutshell, in words of Hackman and Oldham (1980), 'Job satisfaction refers to the individual's attitude towards specific facts of work.'

India is a multifaceted society with its own unique culture. The cultural background of our nation regards women in specific perspective. Although with increasing literacy among women, the condition women have improved, yet they still face several difficulties like injustice, discrimination, etc.

Historically too, there were different standards of behavior for men and women , where in, men were dominant figure in the work place and women were confined to home environment. Only the Western societies allowed women to work outside home and in the eastern society for women to work outside home and to earn money was considered derogatory. She was kept at home as a symbol of family morality is getting more and more education and status of women is changing. The society has also begun to realize that women are the central point around which the family and society revolve. U.N.O. report also endorses this view. The exclusion of women from many aspects of development process has important indirect effect. As women will pass on her own experience and attitude to her children, thereby having influences on them (Jain and Gupta,1992).

Now a days, women in the Indian society have began to realize their capacities and have taken a step forwards to the industrialized world. With the rise in the importance of employment, women have begun to look for employment opportunities. More and more, female are combining marriage, home and career. Paid employment increasingly significant in the lives of women which may be related to greater satisfaction and happiness .Moreover, it depends largely on the particular view of paid work that an individual's holds. The multiple roles of being a homemaker as well as workplace requirement is often a source of stress and burden.

Life satisfaction is synonymous to quality of life. The interest in the quality of work life is in keeping with growing concern to general quality of life or life satisfaction. Life satisfaction refers to a person's general happiness, freedom from tension, interest in life satisfaction. Life satisfaction refers to a person's general happiness, freedom from tension, interest in life, etc. According to Chadha, et al. (1993), the term quality of life usually measured as psychological and social well being. In other words, quality of life usually measured as psychosocial and social well being. In other words, quality of life is the physical fitness (actual and perceived by an individual) and psychological health (low on loneliness, helpless and high on life satisfaction) as well as the leisure time activities and social support network derived from environment by an individual.

Lio et al. (1990) analyzed nine life satisfaction variables involving with relations, hobbies, place of residence, satisfying life (happy and dull) health condition, physical fitness, health and overall satisfaction with one's life situations.

The need for achievement can be seen in many areas of human behavior. That allows the individual's performance to be evaluated according to some internally or externally imposed

criterion that involves the individual in competing with others of that otherwise involves some standard of excellence (Smith and Brown, 1964, Spence and Helmreich, 1983). Robort (1995) opined that need for achievement is a socially characterized need with two critical comments, a set of internalized standards that represents personal achievement and theoretical energizing or motivating condition that impels the person toward attempts to meet the4se standards. Need for achievement is important for the growth of individual organization.

Considering above review of literature, it was found that true is paucity of researches on work motivation, job satisfaction, need for achievement and life satisfaction, in India and public sector industries. So, it was decided to measure the impact of sex on work motivation, job satisfaction, need for achievement and life satisfaction.

II. Research Elaboration

2.1 Aim of the Study:

Following will be main aim of this research work.

1. To measure the impact of sex on work motivation of the employees.
2. To measure the effect of sex on job satisfaction.
3. To measure the impact of sex on need for achievement.
4. To measure the effect of sex on life satisfaction.

2.2 Hypotheses :

Considering above aims, following hypotheses were formulated.

- The Work motivation of male employees will be higher than female employees.
- The job satisfaction of male employees will be higher than female employees.
- Male employees will have higher need for achievement that female employees.
- The life satisfaction of male employees will be higher than female employees.

2.3 Methodology :

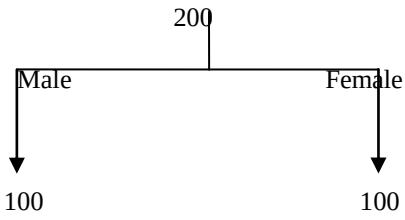
Sample :

A sample of 200 employees was selected

Sample Area :

The sample was selected from Bokaro Steel Plant, Bokaro, Jharkhand. Bokaro Steel Plant is a steel making factory situated in Bokaro district.

Sample Distribution:



Sample Selection:

The sample selected through incidental cum purposive sampoi9ijng technique.

Tools used:

Following tools was used.

Personal Data Sheet:

This PDS was used to seek some demographic information-name, age, sex, organization, post, educational qualification, etc.

Work Motivation Questionnaire:

This work motivation questionnaire has been developed by K. G. Agrawal in 1998. It is a likert type scale consisting 26 items. Each sentence has to be completed by selecting on among three alternatives. Higher the number so scores, higher the level of work motivation and vice-versa.

Job Satisfaction Scale:

This scale was used to measure the job satisfaction level of the employees. This scale is developed by Amar Singh and T. R. Sharma. This scale is likert type scale consisting 30 items. This has been published by National Psychological Corporation, Agra.

Sentence Completion Test:

Sentence completion test was used to measure the level of need for achievement of the sample. It is a paper – pencil test and consists 50 items. The possible range of score is from 0 to 50. Higher score indicates high need achievement and vice-versa.

Life Satisfaction Scale:

Life satisfaction scale was used to measure the life satisfaction level of the employees. This was developed by Pramila Singh and George Joseph. It has 35 items and rated on five points scale.

Test administration:

After taking consent from employees, all tests were administered into two sessions. In session I, Personal Data Sheet, Work Motivation Questionnaire, Job Satisfaction Scale were administered. In session II, Need for Achievement Scale and Life Satisfaction Scale were administered and data was collected and arranged in tables.

III. Result and Discussion

After collecting the data from the employees, the data was tabulated in following table.

Table-1
(Mean, SD and t of male and female employees on work motivation, job satisfaction, need for achievement and life satisfaction.)

S. No.	Variables	Male		Female		T	<P
		Mean	SD	Mean	SD		
1	Work Motivation	94.6	9.33	99	10.7	2.12	.01
2	Job Satisfaction	75.69	8.66	69.9	11.72	1.85	NS*
3	Need for Achievement	75.72	10.67	70.72	11.73	7.58	.01
4	Life Satisfaction	36.9	1.32	37.6	2.06	1.37	NS*

Sex and Work Motivation:

Considering above table I, it is found that the mean, SD on work motivation scale is 94.6 and 9.33 respectively, while the mean, SD of female on work motivation are 99 and 10.7 respectively. The t between these two sub-groups is 2012 which is significant on .01 levels. It means male and female employees both vary on work motivation level. Male employees have high work motivation than female employees. Thus, the hypothesis which states that "The work motivation of male will be higher than female" is accepted. Male employees have higher work motivation than female employees.

Sex and Job Satisfaction:

Pondering over above table, it is observed that mean, SD of male employees on job satisfaction are 75.69 and 8.66 respectively, while mean, SD of female employees are 69.6 and 11.72 respectively. The between there two groups is 1.85 which is not significant. It means these two groups do not differ significantly on job satisfaction. In other words, it can be said that the job satisfaction of male employees is not different from female employees. Thus the hypothesis which states that "The job satisfaction of male employees will be higher than female employees is not accepted ". Thus null hypothesis if accepted and it can be concluded tht there is no difference of job satisfaction between male and female employees.

Sex and Need for Achievement:

Considering above table, it is obvious that mean and SD of male employees are 75.67 and 10.67 respectively, where as the mean and SD of female employees are 70.72 and 11.73 respectively. The between these two subgroups is 7.58 which is significant on .01 level. It means both subgroups of employees are different significantly on need for achievement. Thus the hypothesis which states that "Male will have higher need for achievement that female" is accepted. Male employees have higher need for achievement that female employee.

Sex and Life Satisfaction:

Analyzing above table, it is found that mean, SD of life satisfaction are 36.9 and 1.32 respectively. The mean, SD of female on life satisfaction are 37.6 and 2.06 respectively. The betw3een these two sub-group is 1.37 which is not significant on any level. It means these subgroups do not very significantly on life satisfaction. Therefore, the hypothesis which states that male will have higher life satisfaction that female is not accepted and null hypothesis is accepted. Hence, it can be said that male and female employees do not differ on life satisfaction.

IV. Results and Finding

Since this research work was done to estimate the impact of sex on work motivation, job satisfaction, need for achievement and life satisfaction. For this, four scales were administered on a sample of 200 employees. Data was collected. Then statistical treatment was done and result was analyzed.

3.1 Sex and Work Motivation:

The above finding has indicated that the work motivation of male was higher that female employees. It is observed that female and male differ significantly in their attitude regarding work. Males try to achieve zenith in the work, while women have fear of success (Horner, 1968), or have no strong will to achieve the zenith. Achieving zenith is to some extent against the womanly quality. It has been supported by Drecher and Ash, 1990, Leugh and Plake, 1990, Bhogle and Murthy, 1990.

3.2 Sex and Job Satisfaction:

As result has indicated that there is no difference between male and female on the basis of job satisfaction. The level of job satisfaction is some what equal to men. Because till date, women are aware of and sensitive to their needs, aspirators and rights are asserting themselves through economic route. Women were urban, well-educated, employed in various occupational settings. The employees may not have on easy time working in the male world but were certainly better educated than the unemployed and considered work to be an expression of self. As these women did not operate within the constrains of a given role situation. They were more like men in testing boundaries and altering constraints. It as supported by Afroz and Mittra (2003).

3.3 Sex and Need for Achievement :

Needless to say, need for achievement is a potential agent for work motivation. The higher need for achievement level, the higher will be work motivation. A number of studies have been reported that there exists positive correlation between need for achievement and work motivation (Litwin and Stinger, 1968; McClelland, 1953;Hoyenga and Hoyengam, 1984). The findings of Razaque (2005) also supports this findings.

3.4 Sex and Life Satisfaction :

Pondering over the result, it was found that both male employees and female employee did not vary on life satisfaction scale. It means both male and female employees were satisfied equally. Several factors like equality of education, posting in

accordance with ability, no incidence of under employment or over employment, transparency in promotion are responsible for this. Because these factors enhanced job satisfaction which ultimately connected with life satisfaction.

V. CONCLUSIONS

It is concluded that

- Male employees had higher level of work motivation than female employees.
- There was no difference between male and female employees on job satisfaction.
- Male employees had higher need for achievement than female employees.
- Male and female employees did not differ on life satisfaction.

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Interactive Softwares for Costing of Concrete Based on its Elasticity Modulus

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Abstract- Softwares have been developed for estimating the modulus of elasticity, E, of concrete. These softwares can predict several possible combinations of mix proportions of concrete components that can yield concrete of desired elasticity modulus, E. The determination of optimum cost of concrete based on a specified modulus of elasticity, entails several time wasting manual calculations of the total cost of all the mix proportions predicted for the specified modulus of elasticity by the software. Here, the focus is on developing interactive softwares for cost analysis of normal concrete based on its elastic modulus. The interactive softwares were developed using Scheffe's and Osadebe's statistical theories. The softwares developed, can predict all possible combinations of mix proportions as well as the total cost of concrete of desired modulus of elasticity. Conversely, it can predict the modulus of elasticity, E, obtainable from concrete of a given mix proportion and cost. In addition it can predict the cheapest mix proportion that can yield a desired modulus of elasticity of concrete. The costs obtained from the softwares based on Scheffe's and Osadebe's theories, compare favourable with market costs, as well as with each other.

***Index Terms*-** softwares, cost of analysis, concrete, elastic modulus, Scheffe's theory. Osadebe's theory.

I. INTRODUCTION

A knowledge of the modulus of elasticity, E, of concrete, is necessary in the analysis and design of concrete members. More than anything else, the proportions of the constituent elements of concrete mix determines its modulus of elasticity (Myers, 1999). Thus, the cost of concrete based on its elastic modulus, depends on the cost of individual components. Presently the predictions of concrete cost based on its elastic modulus are carried out using conventional methods of concrete mix design. These methods require trial mixes (Simon, 2003 and Osadebe's theory, Usually, concrete is optimized to meet any desired performance criteria at minimum cost. Effectively and efficiently optimized concrete mixes usually have better properties, satisfy intended use and minimizes cost.

In this work, softwares based on Scheffe's (2003), are developed for easy, instantaneous, accurate and economical prediction of optimum concrete cost whole at same time satisfying the performance criterion of elastic modulus.

II. THEORITICAL BACKGROUND

The softwares are based on models derived from Scheffe's and Osadebe's theories of optimization.

2.1 Scheffe's theory

Scheffe's theory (1958) and some experimental data were used to derive one of the models on which the software is based. In his own work, Scheffe's considered experiments with mixtures in which the desired property of a product depends on the proportions of the constituents present as the atoms of a mixture. According to the theory, the sum of the proportions of the constituents, X_i, must be equal to one, i.e.

$$\sum X_i = 1 \qquad \text{……………………… (1)}$$

and the proportion of each constituent must be equal or greater than zero, i.e.

$$X_i \geq 0 \qquad \text{……………………… (2)}$$

Normal concrete has four components and so it is analyzed using a three-dimensional factor space (i.e a tetrahedron) Scheffe represented the property (response) of the mixture with the following polynomial expression.

$$Y = b_0 + \sum_{i=1} b_i x_i + \sum b_{ij} x_i x_j \qquad \text{……. (3)}$$

The application of Scheffe's expression to normal concrete (a four – component mixture represented by a 3-dimensional space), yielded the following equation

$$Y_i = b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_{12}X_1X_2 + b_{13}X_1X_3 + b_{14}X_1X_4 + b_{23}X_2X_3 + b_{24}X_2X_4 + b_{34}X_3X_4 \qquad \text{……………………(4)}$$

And the final Scheffe's model derived for the costing of a four- component concrete mix based on its elastic modulus, is as follows (Egbulonu, 2011):

$$Y = 41.31X_1 + 50.04X_2 + 25.21X_3 + 19.24X_4 - 95.58X_1X_2 - 28.64X_1X_3 + 22.10X_1X_4 - 55.76X_2X_3 - 25.96X_2X_4 + 14.26X_3X_4 \qquad \text{…………………… (5)}$$

In order to satisfy the condition given by Eqn(1), actual concrete mixes such as 1:2:4 and 1:3:6 must be transformed using Eqn(6).

$$[Z] = [A][X] \quad \text{……..……..…(6)}$$

where,……..

[Z] = matrix of actual component proportion..
[A] = matrix of arbitrary mix proportions.
[X] = matrix of pseudo component proportions

2.2 OSADEBE'S THEORY

Osadebe's theory is the second theory used in deriving the second model on which the second software is based. On his own, Osadebe(2003) represented the response (property of interest(with a continuous function, F(z), which is differentiated with respect to its predictors, Z_i. Taylor series was used to develop the model (mathematical equation). The response function, Y(z), which depends on the proportion of the constituents of the mixture components and not on the quantities, is continuous and differentiable with respect to its predictors, Z_i.

$$F_{(z)} = \sum F^m(Z^{(0)}) * (Z_i - Z^{(0)})/m! \quad \text{……..……..... (7)}$$

where

Z_i is the ratio of the actual proportions of components to the total quantity of concrete, S.

m is the degree of the response function

$$0 \le m \le \infty$$

Using Taylors series, the response function, $F_{(z)}$ was expanded up to the second order in the neighbourhood of a chosen point $Z^{(0)} = Z_1^{(0)}, Z_2^{(0)}, Z_3^{(0)}$ and $Z_4^{(0)}$ to obtain Eqn(8)

$$F(z) = F_0(Z^{(0)}) * (Z_1 - Z^{(0)})/0! + \sum F'(Z_i - Z^{(0)})'/1! + \sum F'(Z^{(0)}) * (Z_i - Z^{(0)})^2/2! + \sum F''(Z^{(0)}) * (Z_i - Z^{(0)}) * (Z_1 - Z^{(0)})^2/2! \quad \text{……..…… (8)}$$

where

$$1 \le i \le 4$$

The function, $F(z)$ was used in deriving the following model for the determination of the modulus of elasticity, E, of concrete which is a four- component mixture.

where

$$\mathbf{Y} = 5351667.6400\,\mathbf{Z_1} + 888151.9143\,\mathbf{Z_2} + 1835.219102\mathbf{Z_3} + 2392.479301\mathbf{Z_4} - 10609392.05\mathbf{Z1Z_2} - 5791804.077\,\mathbf{Z_1Z_3} - 5620199.635\mathbf{Z_1Z_4} - 699734.4294\,\mathbf{Z_2Z_3} - 786415.528\,\mathbf{Z_2Z_4} + 12085.08274\,\mathbf{Z_3Z_4} \quad \text{……..…} \ \mathbf{(9)}$$

Its derivation is contained elsewhere (Egbulonu, 2011).

2.3 Cost Analysis

The functional portion, Z_i, determined from the model for elastic modulus i.e. Eqn(9), are used in estimating the total costs of concrete mixes.

For $1m^3$ concrete, the following condition must be satisfied

$$Z_1 + Z_2 + Z_3 + Z_4 = 1 \quad \text{……..……..……(10)}$$

In a compact form, Eqn(10) becomes

$$\sum_{i=1}^{4} Z_i = 1 \quad \text{……..... (11)}$$

But, $1m^3$ of concrete weighs 2400kg.

Therefore,

$$\sum_{i=1}^{4} Z_i = 2400\text{Kg} \quad \text{……..… (12)}$$

And so, the quantity of constituents are calculated as follows:

$$\text{Quantity of water} = \frac{Z_1}{\sum Z_i} * 2400 * \quad \text{……..….(13)}$$

Quantity of cement = $\frac{Z_2}{\sum Z_i} * 2400$ * …………………………………………………......…’.(14)

Quantity of sand = $\frac{Z_3}{\sum Z_i} * 2400$ * ……………………………………………………………...(15)

Quantity of crushed rock = $\frac{Z_4}{\sum Z_i} * 2400$ * …………………………………………………..…(16)

where Z_1, Z_2, Z_3 and Z_4 are the proportions of water, cement, sand and crushed rock respectively. Assuming w, c, k, and p are the unit costs (i.e.cost per Kilogram), then the cost of each concrete constituent is as follows:

Cost of water = $\frac{Z_1}{\sum Z_i} * 2400 * w$ …………………………………………..………..…(17)

Cost of cement = $\frac{Z_2}{\sum Z_2} * 2400 * c$ ……………………………………………………...(18)

Cost of sand = $\frac{Z_3}{\sum Z_3} * 2400 * c$ ……………………………………………...............(19)

Cost of crushed rock = $\frac{Z_1}{\sum Z_i} * 2400 * p$ …………………………………………..…(20)

In oder to obtain the cost of each concrete mix, the costs of all concrete components are summed.
The total cost of concrete = (Cost of water + Cost of cement + Cost of sand + Cost of crushed rock)

$$= \frac{2400}{\sum_{i=1}^{4} Z}(Z_1 + Z_2 + Z_3 + Z_4) \quad \text{…………………………………………… (21)}$$

III. COMPUTER SOFTWARES

Two softwares are developed, one from each of the Scheffe's and Osadebe's models for elastic modulus and cost function. The first software (given in Appendix A) was developed from Scheffe's model (i.e Eqn(5)) and the cost function (i.e Eqn(21)) while the second software was based on Osadebe's model (i.e Eqn(9)) and the cost function (i.e Eqn(21)). Each software has two parts, the first part which can predict the modulus of elasticity, E, when the mix properties are specified, and the second part which can predict the mix proportions, given the modulus of elasticity of concrete.

The softwares are writhen in **Q-Basic** language. The mix proportions obtained from the software based on Scheffe's and Osadebe's models based on specified modulus of elasticity, E, of 30Nmm^2, are given in Tables 1 and 2.

IV. RESULTS AND ANALYSIS

4.1 Sscheffe- based estimate for modulus of elasticity

The computer results for optimization and estimation of cost using Scheffe's theory when modulus of elasticity of 30N/mm^2 is fed into the computer, are presented in Table 1

Table 1:Output of Scheffe-based cost and mix ratios corresponding to an input of elastic modulus of 30N/mm^2

S/N	Cost (N)	X_1	X_2	X_3	X_4	Y	Z_1	Z_2	Z_3	Z_4
1	19819.18	0.80	0.06	0.04	0.28	30.00	0.58	1.00	2.20	3.48
2	19488.64	0.30	0.01	0.15	0.54	30.00	0.60	1.00	2.24	3.78
3	19846.22	0.32	0.00	0.26	0.42	30.00	0.59	1.00	2.10	3.62
4	20150.31	0.37	0.03	0.21	0.39	30.00	0.58	1.00	2.02	3.44
5	20710.05	0.44	0.05	0.21	0.31	30.00	0.57	1.00	1.87	3.16
6	21042.8	0.50	0.14	0.03	0.33	30.00	0.56	1.00	1.83	2.94
7	21802.87	0.57	0.10	0.12	0.21	30.00	0.55	1.00	1.64	2.69
8	22728.99	0.64	0.03	0.26	0.07	30.00	0.54	1.00	1.43	2.44
9	22699.82	0.66	0.14	0.05	0.15	30.00	0.53	1.00	1.49	2.36

$Cost_{min}$= 19488.64 COUNT= 2… Z1:Z2:Z3:Z4= 0.60: 1.00: 2.24:32.78

where Z_1, Z_2, Z_3 and Z_4 are the real proportions of water, cement, sand and crushed rock respectively.

And X_1, X_2, X_3 and X_4 are the pseudo proportions of water, cement, sand and crushed rock respectively.

From the Table 1, the real mix ratio, 0.54:1.00:1.43:2.44 yielded a concrete with a maximum cost of ₦22,728.99 while the real mix ratio, 0.60:1.00:2.24:3.78 gave a concrete with minimum cost of ₦19,488.64. Thus, the use of real mix ratio of 0.60:1.00:2.24:3.78, will result into a saving cost of ₦3,240.35 (16.62%) over the use of the mix ratio, 0.54:1.00:1.43:2.44.

4.2 Osadebe- based Cost Estimates for modulus of elasticity.

The computer results for optimization and cost estimates using Osadebe's theory when a modulus of elasticity of 30N/sq m is fed into the computer are presented thus.

Table 2: Output of Osadebe-based cost estimates and mix ratios corresponding to input of elastic modulus of 30N/Sq.mm

S/N	Cost (N)	Z_1	Z_2	Z_3	Z_4	Y	S_1	S_2	S_3	S_4
1	18665.29	0.10	0.12	0.21	0.53	30.00	0.63	1.00	2.47	4.53
2	22421.78	0.10	0.18	0.31	0.41	30.00	0.53	1.00	1.67	2.24
3	23722.58	0.10	0.20	0.28	0.42	30.00	0.51	1.00	1.36	2.05

where S_1, S_2, S_3 and S_4 are real proportions of water, cement, sand and crushed rock respectively.

and Z_1, Z_2, Z_3 and Z_4 are the fractional proportions of water, cement, sand and crushed rock respectively.

From the Table 2, the real mix ratio, 0.51:1.0:1.36:2.05 gave a concrete with a maximum cost of ₦23,772.58 while the real mix ratio 0.63:1.0:2.47:4.53 gave a concrete which has the least cost of ₦18,665.29. Thus, the use of real mix ratio, will result into a saving of ₦5,057.29 (i.e 27.09%) over the use of the mix ratio, 0.51: 1.0:1.36:2.05.

Comparison of Cost estimates

A comparison of cost estimates given in Tables 1 and 2 shows that for the elastic modulus of 30N/mm^2**,** the maximum percentage difference between the least cost predicted by the software based on Scheffe's model and least cost predicted by the software based on Osadebe model, is 4.44% percent. Since the percentage difference is insignificant, any of the two softwares can be used in obtaining accurately the cost estimates of concrete based on its elastic modulus.

V. CONCLUSION

These softwares developed can predict several mix ratios that can yield concrete of desired elastic modulus, as well as the total cost of each concrete mix ratio. And the use of the softwares in the design and costing of concrete based on its elastic modulus, is simple and inexpensive, All that is required is the inputation of the desired elastic modulus and the unit prices of water , cement, sand and coarse aggregate.

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APPENDIX A : MODULUS COST ESTIMATES BY SCHEFFE'S

```
CLS
 REM ****APPENDIX E****13/12/09
 REM COST ANALYSIS AND MODULUS OF
ELASTICITY:31/08/08
 REM THIS WAS WRITTEN BY BEN EGBULONU
 REM CIVIL ENGINEERING DEPARTMENT, FUTO
 REM THIS IS FOR ANALYSIS OF COST OF MATRIALS
AND ALL POSSIBLE MIXES WHEN
 REM MODULUS OF ELASTICITY IS GIVEN AND
MINIMUM COST/MIX and ALL COSTS RQD**
 REM A Q-BASIC PROGRAMM THAT OPTIMISES
CONCRETE MIX PROPORTIONS
 REM VARIABLES USED ARE
 REM X1,X2,X3,X4,Z1,Z2,Z3,Z4,Ymax,Yout,Yin
 REM COST OF MATRIALS PER
kg***C(cement)=32;K(sand)=3.2;P(agg)=6,w(water=1.2)
    PRINT "ENTER C=;K=;P=;w="; C; K; P; w;
    INPUT C, K, P, w
    REM TO DEFINE WHAT IS GIVEN AND WHAT
REQUIRED TO DETERMINE.
    REM WHEN MIX IS GIVEN G=1 0R G=2 IF E IS GIVEN
    PRINT "DEFINE WHAT IS GIVEN AS G="; G;
    INPUT G
    IF G = 1 THEN  ELSE GOTO 5
    REM MIX GIVEN AS Z1,Z2,Z3,Z4.
    PRINT "ENTER VALUE OF W/C=Z1"; Z1
    INPUT Z1
    PRINT "ENTER VALUE OF CEMENT=Z1"; Z2
    INPUT Z2
    PRINT "ENTER VALUE OF SAND=Z3"; Z3
    INPUT Z3
    PRINT "ENTER VALUE OF CRUSH ROCK =Z4"; Z4
    INPUT Z4
    LET X1 = 40 * Z1 - 16 * Z2 + 0 * Z3 - 2 * Z4
    LET X2 = -60 * Z1 + 26 * Z2 + 1 * Z3 + 2 * Z4
    LET X3 = -20 * Z1 + 9 * Z2 - 2 * Z3 + 2 * Z4
    LET X4 = 40 * Z1 = -18 * Z2 + 1 * Z3 - 2 * Z4
    LET MOE = 41.31 * X1 + 50.04 * X2 + 25.21 * X3 + 19.24
* X4 - 95.58 *
    X1 * X2 - 28.64 * X1 * X3 + 22.1 * X1 * X4 - 55.76 * X2 *
X3 - 25.96
    * X2 * X4 + 14.26 * X3 * X4
    REM PRINT VALUE MOR
    PRINT "VALUE OF MOE="; MOE; "X1"; X1, "X2"; X2;
"X3"; X3; "X4"; X4;
 GOTO 7
5 LET COUNT = 0
 CLS
 GOSUB 10
 PRINT "Tmin=";Tmin;"COUNT=";COUNT;"Z1:Z2:Z3:Z4";
USING "###.##"; Z1;Z2;Z3;Z4
7 END
 REM END OF MAIN PROGRAMM
10 REM PROCEDURE BEGINS
 LET Ymax = 0
 LET Tmin = 100000
 PRINT
 PRINT
 REM A COMPUTER MODEL FOR COMPUTING
CONCRETE MIX PROPORTIONS
 PRINT "CORRESPONDING TO A REQUIRED MOE"
 PRINT
 INPUT "ENTER DESIRED MOE"; Yin
 GOSUB 70
 FOR X1 = O TO 1 STEP .01
 FOR X2 = O TO 1 - X1 STEP .01
 FOR X3 = O TO 1 - X1 - X2 STEP .01
 LET X4 = 1 - X1 - X2 - X3
 LET Yout = 41.31 * X1 + 50.04 * X2 + 25.21 * X3 + 19.24 *
X4 - 95.58 * X1
 * X2 - 28.64 * X1 * X3 + 22.1 * X1 * X4 - 55.76 * X2 * X3 -
25.96 * X2 *
  X4 + 14.26 * X3 * X4
 GOSUB 80
 IF (ABS(Yin - Yout) <= .001) THEN 20 ELSE 30
20 LET COUNT = COUNT + 1
 GOSUB 90
30 NEXT X3
 NEXT X2
 NEXT X1
 PRINT
 IF (COUNT > 0) THEN GOTO 40 ELSE GOTO 50
40 PRINT "THE MAXIMUM MOR PREDICTABLE"
 PRINT "BY THIS MODEL IS"; Ymax; "N/sq.mm"
 SLEEP (2)
 GOTO 60
50 PRINT "SORRY! DESIRED MOE OUT OF RANGE OF
MODEL"
 SLEEP 2
60 RETURN
70 REM PROCEDURE PRINT HEADING
 REM
 PRINT "COUNT X1 X2 X3 X4 Y Z1 Z2 Z3 Z4"
 REM
 RETURN
80 REM PROCEDURE CHECK MAX
 IF Ymax < Yout THEN Ymax = Yout ELSE Ymax = Ymax
 RETURN
90 REM PROCEDURE OUT RESULTS
 LET Z1 = .5 * X1 + .55 * X2 + .6 * X3 + .65 * X4
 LET Z2 = X1 + X2 + X3 + X4
 LET Z3 = 1 * X1 + 2 * X2 + 2 * X3 + 3 * X4
 LET Z4 = 1.5 * X1 + 3 * X2 + 4 * X3 + 5 * X4
   LET ZSUM = Z1 + Z2 + Z3 + Z4
    LET Tcost = (2600 / ZSUM) * (W * Z1 +C * Z2 + K * Z3 +
P * Z4)
  IF Tmin > Tcost THEN Tmin = Tcost ELSE Tmin = Tmin
 PRINT TAB(1); COUNT; Tcost; USING "###.##"; X1; X2; X3;
X4; Yout; Z1; Z2;
 Z3; Z4
 RETURN
```

APPENDIX B: MODULUS COST ESTIMATES BY OSADEBE'S

```
CLS
 REM FOR APPENDIX G** 13/12/09
 REM ** MAXIMUM** RUN TIME =60sec TO 5mins ***
 REM A Q-BASIC PROGRAMM THAT OPTIMISES
CONCRETE MIX PROPORTIONS
 REM THIS WAS WRITTEN BY BEN EGBULONU
 REM CIVIL ENGINEERING DEPARTMENT, FUTO
 REM VARIABLES USED ARE :
Z1,Z2,Z3,Z4,S1,S2,S3,S4,Ssum,Ymax,Yout,Yin
 REM MODEL USED ELASTIC MODULUS
 REM PROGRAM PRINTING SPLIT IN 1ST-17, THEN 20s
TO ENTER PRINTING WINDOW.
 REM MAIN PROGRAMM BEGINS
 REM COST OF MATRIALS PER
kg**C(cement)=32;K(sand)=3.2;P(agg)=6,w(water=1.2)
    PRINT "ENTER C=;K=;P=;w="; C; K; P; w;
    INPUT C, K, P, w
    REM WHEN MIX IS GIVEN G=1 0R G=2 IF E IS GIVEN
    PRINT "DEFINE WHAT IS GIVEN AS G="; G;
    INPUT G
    IF G = 1 THEN  ELSE GOTO 5
    REM MIX GIVEN AS ACTUAL MIX RATIOS,
S1.S2.S3.S4.
    PRINT "ENTER VALUE OF W/C=S1"; S1
    INPUT S1
    PRINT "ENTER VALUE OF CEMENT=S2"; S2
    INPUT S2
    PRINT "ENTER VALUE OF SAND=S3"; S3
    INPUT S3
    PRINT "ENTER VALUE OF AGG=S4"; S4
    INPUT S4
    LET Ssum = S1 + S2 + S3 + S4
    REM CALCULATING FRACTIONAL PARTS
    LET Z1 = S1 / Ssum: Z2 = S2 / Ssum: Z3 = S3 / Ssum: Z4 =
S4 / Ssum
  REM   ****** CEFFICIENTS OS REGRESSION *******
    A1 = 5351667.64#: A2 = 888151.9142999999#: A3 =
1835.219102#
    A4 = 2392.479301#: A5 = -10609392.05#: A6 = -
5791804.077#
    A7 = -5620199.635#: A8 = -699734.4294#: A9 = -
786415.528#
    A10 = 12085.08274#
  REM CALCULATING ACTUAL MODULUS OF
ELASTICITY
    LET MOE = A1 * Z1 + A2 * Z2 + A3 * Z3 + A4 * Z4 + A5
* Z1 * Z2 + A6 *
    Z1 * Z3 + A7 * Z1 * Z4 + A8 * Z2 * Z3 + A9 * Z2 * Z4 +
A10 * Z3 * Z4
    REM PRINT VALUE OF MOE
    PRINT "VALUE OF MOE="; MOE; "S1"; S1; "S2"; S2;
"S3"; S3; "S4"; S4;
    "Z1"; Z1; "Z2"; Z2; "Z3"; Z3; "Z4"; Z4
    GOTO 7
5 LET COUNT = 0
 CLS
 GOSUB 10
7 END
 REM END OF MAIN PROGRAMM
10 REM PROCEDURE BEGINS
 LET Ymax = 0
 PRINT
 PRINT
 REM A COMPUTER MODEL FOR COMPUTING
CONCRETE MIX PROPORTIONS
 PRINT "CORRESPONDING TO A REQUIRED MODULUS
OF ELASTICITY"
PRINT
 INPUT "ENTER DESIRED MODULUS OF ELASTICITY";
Yin
 GOSUB 70
 FOR Z1 = O.035 TO .25 STEP .001
 FOR Z2 = .07 TO .28 STEP .001
 FOR Z3 = .22 TO .35 STEP .001
 LET Z4 = 1 - Z1 - Z2 - Z3
REM        ****** CEFFICIENTS OS REGRESSION *******
    A1 = 5351667.64#: A2 = 888151.9142999999#: A3 =
1835.219102#
    A4 = 2392.479301#: A5 = -10609392.05#: A6 = -
5791804.077#
    A7 = -5620199.635#: A8 = -699734.4294#: A9 = -
786415.528#
    A10 = 12085.08274#
LET Yout = A1 * Z1 + A2 * Z2 + A3 * Z3 + A4 * Z4 + A5 * Z1
* Z2 + A6 * Z1 * Z3 + A7 * Z1 * Z4 + A8 * Z2 * Z3 + A9 * Z2
* Z4 + A10 * Z3 * Z4
 IF ABS(Yin - Yout) <= .001 THEN 20 ELSE GOTO 30
20 LET COUNT = COUNT + 1
 GOSUB 90
30 NEXT Z3
 NEXT Z2
 NEXT Z1
 PRINT
 IF (COUNT > 0) THEN GOTO 60 ELSE GOTO 50
50 PRINT "SORRY! DESIRED MOE OUT OF RANGE OF
MODEL"
  SLEEP 1
60 RETURN
70 REM PROCEDURE PRINT HEADING
 REM
 PRINT "COUNT Z1 Z2 Z3 Z4 Y S1 S2 S3 S4"
 REM
 RETURN
90 REM PROCEDURE OUT RESULTS
 LET S1 = Z1 / Z2: S2 = Z2 / Z2: S3 = Z3 / Z2: S4 = Z4 / Z2
LET SSUM = S1 + S2 + S3 + S4
    LET Tcost = (2600 / SSUM) * (W *S1 + C * S2 + K * S3 +
P * S4)
 PRINT TAB(1); COUNT; Tcost; USING "###.##"; Z1; Z2; Z3;
Z4; Yout; S1; S2;
 S3; S4
 RETURN
 REM ************** 1ST PRINTING 0-18,NEXT 17-
37,ETC.**********
 PRINT TAB(1); COUNT; USING "###.##"; Z1; Z2; Z3; Z4;
Yout; S1; S2; S3; S4
```

100 RETURN

Nutrient Recovery Systems for Human Urine - Ways to Realize Closed Loop Sanitation and Future Sustainable Agricultural Systems

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Abstract- This paper provides an overview on the concept of closed loop sanitation systems. A brief outline has been given on existing sanitation facilities in India, ways to implement ecological sanitation and retrofitting of nutrient recovery systems into existing sanitation facilities. In recent times, though India has witnessed phenomenal development in water resources, access to adequate sanitation facilities remain one of its major development issues. Urine Diversion Systems as a sustainable sanitation alternative can help India move closer in achieving such goals. Today, a new paradigm is being formed in wastewater management that focuses on what resources can be recovered from wastes rather than what constituents must be removed from it. Such a paradigm can help us develop a 'closed loop fertility system' that can re-circulate nutrients from human beings back to agricultural fields. At present a wide research gap exists in this sector as research has been more focused on engineering better sanitation facilities. Sanitation systems could be re-designed in order to incorporate processes that simultaneously recover and recycle nutrients being flushed away. Any proposed project to implement these ideas can only be regarded successful if the agricultural trials of urine recycling provide useful data on agricultural benefits and potential savings in chemical fertilizers.

Index Terms- Human Urine, Nutrient Recovery Systems, Ecological Sanitation, Urine Diversion, Food Security

I. SANITATION – THE INDIAN SCENARIO

With its landmass of 3.29 million square kilometers and a population of over a billion, India is an assortment of pluralistic diversity in terms of culture, religion and language. Endowed with enormous natural resources, the Indian economy has grown steadily, and economic liberalization has unleashed the vast potential of the private sector, which today accounts for nearly 75 % of GDP [1]. India has witnessed phenomenal development of water resources and self sufficiency in food grains, rapid expansion in the urban, energy and industrial sectors, and drinking water infrastructure for about 85 % of India's urban and rural population. The report Asia Water Watch 2015 projected that India can achieve its Millennium Development Goals (MDG) Sanitation Targets in both urban and rural areas if it continues expanding access at its 1990-2002 rates. By 2015, the percentage of people in urban areas served by improved sanitation is expected to reach 80 %, up from 43 % in 1990. In rural areas, the projection is 48 %, an incredible improvement over the coverage rate of just 1 % in 1990. In real numbers, that means more Indians will have improved their sanitation situation from 1990 to 2015 than the total number of people currently residing in the United States [2].

Though it seems that India is on track in achieving its sanitation targets, the reality of such a scenario depends on several factors. MDG only shows an achievable level if the country commits to use all its power to complete it. Despite recent progress, access to improved sanitation remains far lower in India compared to its neighboring countries, Bangladesh and Pakistan - both of which have a lower gross domestic product per capita than India. Both the countries have had a significant improvement in sanitation facilities over the past decade [3]. Analysis of sanitation coverage data from various sources show that despite the acceleration of coverage under the Eighth Plan, only between 18-19 % of all rural households have a toilet which indicates that the rest still defecate in the open. For these poverty ridden people who slog day and night for a two time meal, it is natural not to have facilities for defecation in or near their homes. While the urban households are not that deprived, sanitation problems in crowded environments are characteristically more serious. In these areas, there is a need for safe ecological sanitation. Out of the many developed cities in India, only around 70 have partial sewerage treatment facilities and systems. As of 2003, only 30 % of the wastewater was treated before disposal because state governments and municipalities did not have enough funds to either treat the waste water or build efficient sewage treatment systems. As a result, untreated water finds its way into water systems such as rivers, lakes, groundwater and coastal waters, causing severe water pollution [4].

Several other factors have often been the reasons for inadequate sanitation. Sanitation facilities may be available but could be *inconvenient, unpleasant* or *unhygienic.* This may be the result of inappropriate design and construction, or inadequate management and maintenance of such facilities. On the other hand, even where toilets are available, some are not used or are underused, with family members preferring open defecation. People may underuse their toilet because of misunderstandings in its functioning and maintenance. For instance, in case of twin-pit pour flush toilets, some people fear that the pits will fill rapidly if the toilet is used too often. They remain unaware of the fact that the contents of a full pit can be safely removed manually once they have been given time to degrade [5].

The impact of inadequate sanitation has been much worse on human health. Unsafe disposal of human excreta facilitates the transmission of oral-fecal diseases, including diarrhea and a range of intestinal worm infections such as hookworm and

roundworm [6]. It has been estimated that diarrheal morbidity can be reduced by an average of 6-20 % with improvements in water supply and by 32 % with improvements in sanitation. [7]. Today, India is losing billions of dollars each year because of poor sanitation facilities. According to an assessment, Losses incurred on account of inadequate sanitation were as high as the state incomes of Andhra Pradesh or Tamil Nadu and were more than Gujarat's state income in 2006-07. The economic toll is mainly due to access time costs for households, illness costs for families, messed up cities causing fall in tourism, expenditure on medicines, healthcare and funerals. The total economic impact of inadequate sanitation in India amounts to Rs. 2.44 trillion a year which was equivalent of 6.4 percent of India's GDP in 2006. This means a per person annual impact of Rs. 2180 [8].

The provision of water and sanitation facilities are important public health measures that contribute significantly to the reduction in the disease burden of populations. The provision of such facilities is also critical to socio-economic development and has important equity implications as increasing numbers of international protocols and national policies emphasize the 'rights-based' approach to development [9].

II. IMPLEMENTING ECOLOGICAL SANITATION

A. A Success Story

It is important for the improvements in water and sanitation to be integrated and appropriately planned. Thousands of success stories have emerged from all over the country, focusing on either off-site or onsite sanitation. One such interesting story is of Dhikpur, a secondary school which designed a new scoring system for health classes that grades a student's performance based on his or her active participation in improving community sanitation. The school uses toilet construction assignments as a part of its effort to achieve total sanitation in the neighboring catchment area. A student who installs a toilet at home not only receives 10 marks in health class, but is given a 'tika' in appreciation and recognition. The student is invited to the front of the prayer ground, honored by all the students, and recognized by having a 'tika' placed on his or her forehead. The opportunity to earn respect increased student involvement and as a result, after a year, the town was declared an open-defecation-free-town by the state government [10].

B. Choice of Sanitation Technology

Many people in developing countries rely upon untreated groundwater supplies for their drinking water supplies. They are obtained from drilled boreholes or tube wells and springs. Such sources are usually of good quality and are much better than some traditional sources of supply. However, groundwater can become contaminated and there is special concern that the introduction of on-site sanitation systems may in certain circumstances contribute to contamination of drinking water supplies.

The choice of sanitation technology depends on many economic, technical and social issues. Whilst off site sewerage is often viewed as the most desirable form of sanitation, it has several drawbacks. There is evidence from European experiences that leaking sewers may significantly contribute to microbiological and nitrate contamination of groundwater and thus may present a significant risk in regions where groundwater is exploited for domestic supply. Furthermore, sewage treatment plants are often poorly operated and managed leading to the discharge of inadequately treated wastes into the environment. Some forms of treatments such as the waste stabilization ponds may be prone to leaching of both microbiological and chemical contaminants.

On-site systems (Septic Tanks, pit latrines, VIP latrines etc.) often represent a significant hazard through groundwater contamination as fecal matter accumulates in one place and leaching of contaminants into the subsurface environment can occur.[9] Septic tanks typically hold the solid component of wastes in a sealed tank where the matter decomposes an-aerobically. Liquid effluent is usually discharged into a soakaway pit. In well-designed septic tanks, the solid matter does not represent a significant threat, but the soakaway pits may cause contamination. Thus when considering the use of sewerage, attention must be paid to the possibility for groundwater contamination, ensuring that systems are operated and designed with groundwater protection needs in mind. In addition to being economically viable, socially acceptable, and technically appropriate, an advanced excreta treatment system should also protect the environment and natural resources.

C. Historical Background on Diversion Systems

The "Divide and Rule" policy, has gained momentum since the British first introduced it in India. Today, the alternatives to the conventional wastewater system include systems that separate or divert urine and feces in order to utilize the nutrients more efficiently. In Swedish cities, urine was often collected separately and poured into the drain to avoid smells and to prevent the latrine from filling too quickly [11]. Already in 1867 it was known that "the proportion of value of the fertilizing ingredients held in solution in urine to that contained in feces is as six to one" [12, 13] while Müller, a German scientist at that time, saw it as a necessity to separate the urine from the feces in order to produce a fertilizer that was of manageable proportions [14, 15].

In many other parts of the world, it is a tradition to keep the urine and feces apart. The old Japanese practice of nightsoil recovery from urban areas separated urine and feces, since urine was regarded as a valuable fertilizer [16]. In Yemen the urine is drained away and evaporated on the outer face of multistorey buildings to obtain the feces as a dry fraction without smell for later use as fuel, a system that has been in use for hundreds of years [17].

III. FOOD SECURITY IN INDIA

"Our modern society separates food production and consumption, which limits our ability to return nutrients to the land. Instead we use them and then flush them away" [18]. In addition to loss of nutrients, the exponential growth in population has created doubts regarding self-sufficiency in food production in near future paving a threat to sustainability. Food Security is not only dependent on ability of agriculture to produce sufficient food at national level; food insecurity also results from failure of communities to guarantee access to sufficient food at the household level [19]. India is characterized by high levels of poverty, especially in rural areas which accounts for approximately half of the country's population. These people depend only on agriculture to sustain their living. In order to feed

a country of population much more than billion, farmers used chemical fertilizers to fulfill the ever increasing demands of food supply. Unbalanced application of chemical fertilizers have caused significant decline in soil health, including soil organic matter and crop productivity over the last few decades [20]. Increasing environmental awareness in the general population has caused many farmers in developed countries to switch over to organic farming which has been gaining popularity as a plant nutritional soil supplement [21]. Organic agricultural products are gaining popularity all over the world as they provide consumers with a basket of safer and better trusted foods. They contain fewer nitrates, nitrites, pesticide residues and trace elements compared to conventional crops. However, due to decrease in raw organic matter such as animal wastes, crop residues and green manure to prepare compost, scientists are looking forward for different organic sources which are abundant in nature and available at a very low cost. Human Urine, fulfils all the above requirements, and has been gaining importance for organic cultivation [22, 23].

A. Human Urine as a Plant Supplement

Each individual produces 1- 1.5 L of urine per day in 4-5 times [24] and an adult excretes on an average 500 L of urine in a year [25]. According to Wolgast (1993), one liter of urine contains 11 g Nitrogen (N), 0.8 g Phosphorous (P) and 2 g Potassium (K), developing an NPK ratio of about 11:1:2. Thus, if 500 L of urine is produced by each person in a year, it amounts to an equivalent of 5.6 kg of Nitrogen, 0.4 kg of Phosphorous, and 1 kg of Potassium. However, the composition of human urine varies from person to person and from region to region depending on his or her feeding habits, the amount of drinking water consumed, physical activities, body size, and environmental factors [26, 27].

Urine normally lacks hazardous chemical compounds or heavy metals [24]. Also, the strong odor of human urine is due to the body's breakdown of asparagusic acid or high amount of NH^{4+} present [28, 29]. The urine of a healthy person is sterile, and although bacteria may be picked up in urinary tracts they do not pose a significant health risk from a healthy person [30].

B. Agricultural Benefits of Urine

There are several reasons why urine works so well as a fertilizer. Urine contains few, if any pathogens but majority of the plant fertilizing nutrients [31]. This high nutrient content-low pathogen combination implies it can be used to increase the yield of crops. The nitrogen found in abundance in urine is good for plant growth because it helps to build protoplasm, protein and other components of plant growth. It certainly promotes leafy growth. Phosphorus is important in the root formation, ripening of fruits and germination of seeds, although the percentage of phosphorus compared to nitrogen in urine is low. Potassium is also essential for promoting good fruit (and flower) development. Plants differ in their requirements, but overall plants fed with some urine grow better than plants which never come into contact with urine. Urine is particularly valuable for grasses like maize and leafy green vegetables, and onions, which respond to the high nitrogen content of urine [32-40]. Studies conducted in Sweden [41] show that an adult's urine contains enough nutrients to fertilize 50-100% of the crops needed to feed one adult.

C. Linking Sanitation and Agricultural Productivity

A new paradigm is forming in the water and wastewater management sector to focus on the resources that can be recovered from wastewater rather than the constituents that must be removed [42]. Current human waste collection systems do much to minimize human contact with the pathogens in excrement, but little to ensure that those nutrients will be returned to natural systems in a way that benefits food production soils. Ecological Sanitation can help towards achieving a "closed loop fertility system" that can re-circulate nutrients from human beings in urban areas back to agricultural fields. A closed loop system can achieve dual goals of reduced health risks to humans by diverting urine from water systems where it acts as a pollutant and at the same time recovering useful nutrients and returning them back quickly to food systems. By closing the loop, energy that would be required for waste treatment can be saved and resources can be utilized to increase crop yields which would also offset the need to buy chemical fertilizers. Thus, urine diversion can provide additional positive impacts for meeting the MDGs.

IV. URINE DIVERSION SYSTEMS

Urine-Diversion Dehydration Toilets (UDD-Toilets; in India commonly referred to as "composting toilets") make use of a combination of composting and desiccation (dehydration) processes for the hygienically safe on-site treatment of human excreta [43]. A UD toilet has two outlets with two collection systems: one for urine and one for feces (and possibly a third one for anal wash water), in order to keep these two (or three) excreta or wastewater fractions separate. UD toilets may, or may not, mix water and feces, or some water and urine, but they never mix urine and feces.

There are two distinct types of UDTs. Double-Vault Toilets are designed to operate in batches. Fecal matter is collected and stored in twin compartment. Daily deposits are stored in one compartment. A small amount of ash, sawdust, sand etc. is sprinkled over the feces after each use, to absorb moisture and help in speeding up the dehydration process. The lead compartment is sealed after it is full for one year while the lag compartment is put to use. One year is provided for desiccation and hygienization. Urine and other wash water is diverted to plastic tank for further application as nitrogen rich fertilizer to agricultural fields. The finished compost is applied to the land in order to increase organic content, improve water holding capacity and availability of nutrients. The other type is Single-Vault UDD Toilet, where there is only one storage tank for collection of feces. Thus, secondary storage is necessary.[44] UDTs are mainly suitable for regions with high average temperatures, long dry and short rainy seasons or arid climatic conditions with high evaporation rates. Nevertheless, with the right designs, they can also work in a more humid climate and it is also possible to utilize a UDT in regions with cold climate conditions. Moreover, a UDT is slightly more difficult to keep clean than other toilets because of both the lack of water and need to separate the solid feces and liquid urine. For cleaning, a damp cloth may be used to wipe down the seat and the inner bowls. Special care should be taken to prevent cleaning water from entering the vaults. Some toilets are easily removable and

can be cleaned more thoroughly. No particular design will work for everyone, and, therefore, some users may have difficulty separating both streams perfectly which may result in extra cleaning and maintenance.

A. Feasibility of Urine Diversion

It is often assumed that new sanitation systems would have to be designed and built on order to accomplish urine separation. Even today in developing countries misconception prevails that retrofitting existing systems would be expensive and ineffective [31]. Fortunately, this is not the case as by using a little creativity and behavior modifications urine diversion can be made easy, cost-effective and efficient addition to existing sanitation systems. Places using seat toilets can be modified easily to collect urine. In the worst case scenario, urinals can be set up that collect some portion of the urine in order to prevent at least some of the nutrients being lost away. Once people understand and embrace such a technology they would be more willing to upgrade to modified urine separating seats.

B. The Downside

In spite of the highlighted advantages of urine as a liquid fertilizer, using urine in its inherent form has several disadvantages. Higher rates of application of urine could increase soil salinity and electrical conductivity. Untimely and uneven application could cause considerable crop failure [45]. Urine is a fast acting fertilizer and the downside of using it is that, plants cannot use the nutrients it provides all at once. Thus, unless the soil that surrounds the plant can hold the nutrients, they will seep down the root line, and be lost to the plants. Dilution is usually required and this factor varies for different plants. Pharmaceutical residues may be excreted via urine which might eventually end up in agricultural fields (46, 47). Insufficiently treated urine could also cause a transmission of pathogens. Urine application being a labor intensive process may not be viable option in developed farmlands. It is a relatively heavy medium fluid (low value/weight), difficult to transport and store. Another concern is the volatility of nitrogen in urine. The high pH of urine in the collection vessel (normally 9-9.3), coupled with its high ammonium concentration, means there is a risk of losing nitrogen in the form of ammonia [25]. Cultural and ethical prejudices of using urine, has also been major setback to its popularity [41].

V. NUTRIENT RECOVERY SYSTEMS

Urine in its inherent form does not add much value in terms of agricultural productivity. However the components which make up this waste stream have the potential to do so. One of the most important compounds that can be recovered and recycled is Urea ($CO(NH_2)_2$). More than 90% of urea produced worldwide is used as a nitrogen-release fertilizer. Urea has the highest nitrogen content of all solid nitrogenous fertilizers in common use (standard crop-nutrient rating of 46-0-0). A wide variety of conventional and non-conventional technologies and processes have been developed for the manufacture and quantification of urea, like the diacetyl monoxime colorimetric method, Berthelot reaction, Bosch-Meiser urea process etc.. All of these methods necessitate high throughput instrumentation and hence high capital costs. More importantly, synthetic urea contains impurities like biuret and isocyanic acid which are toxic to the plants that are to be fertilized.

A more viable and sustainable alternative to the manufacture of synthetic urea could be to transform valuable nutrients in the urine into solid materials by employing existing separation operations. The advantages of such a process would be that the volume of material that needs to handled would be substantially reduced compared to liquid urine while also eliminating the loss of nitrogen to the atmosphere. Moreover, a high level of hygiene could be maintained and spreading of the recovered nutrients as fertilizer on arable land could be made much more flexible.

Conventional separation techniques such as reverse osmosis, chemical precipitation, electro-chemical process and ion exchange can be used for such urea recovery systems. However, strict operating conditions, high cost, long periods and bad impact from shock loads make them undesirable to be used in practical industrial applications [48]. Compared to these methods, adsorption has drawn more attention by researchers due to its feasibility, high safety and low cost [49]. Biomaterials (Sugarcane Bagasse, Coconut Shells, Vineyard Pruning, etc.), activated carbon, zeolite, chitosan, polymers, etc. all have the potential to be used as low cost adsorbents for recovery of urea from anthropogenic waste streams.

At present a wide research gap exists in this sector as research has been more focused on engineering better sanitation facilities in keeping with the Millennium Development Goals of the UN. However, a more integrated and holistic approach can help solve several of the problems faced today. Sanitation systems could be re-designed in order to incorporate a process that simultaneously recovers and recycles nutrients being flushed away. Such an approach would help us avoid redundancy and help formulate a more comprehensive research plan. If the long term perspective of increasing the circulation of nutrients from urban to rural areas is to increase more research effort needs to be focused on designing and implementing such systems.

VI. PRINCIPLES FOR LARGE SCALE IMPLEMENTATION

There is growing awareness among decision-makers, policy-makers and professionals within water and sanitation sector that wide demographic, geographic, socio-cultural, and financial conditions make attempts to direct sanitation technology transfer subject to large risks of failures. These risks can be considerably reduced if some principles for sanitation management are followed. One is to raise political will, and secure financial resources for such projects. Another is to involve all stakeholders throughout planning and implementation to the greatest possible extent, ensuring sanitation projects are not simply supply of dry-toilets to the targeted areas. Comprehensive installation of such systems along with a suitable mechanism for resource recovery from waste streams is needed. End users must be trained to use, operate and maintain the installed systems via workshops and practical demonstrations. Any such proposed project can only be regarded successful if the agricultural trials of urine recycling provide useful data on agricultural benefits and potential savings in chemical fertilizers. Simply put, we need to think about what we mean by sanitation, and think again about how we are going

to do it right.

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Simulation-Based Performance Evaluation of Routing Protocols in Vehicular Ad-hoc Network

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Abstract- A Vehicular Ad-hoc Network (VANET) is a collection of wireless vehicle nodes forming a temporary network without using any centralized Road Side Unit (RSU). VANET protocols have to face high challenges due to dynamically changing topologies and symmetric links of networks. A suitable and effective routing mechanism helps to extend the successful deployment of vehicular ad-hoc networks. An attempt has been made to compare the performance of two On-demand reactive routing protocols namely AODV and DSR which works on gateway discovery algorithms and a geographical routing protocol namely GPSR which works on an algorithm constantly geographical based updates network topology information available to all nodes in VANETs for different scenarios. Comparison is made on the basis of different metrics like throughput, packet loss, packet delivery ratio and end-to-end delay using SUMO and NS2 simulator. In this paper we have taken different types of scenarios for simulation and then analysed the performance results.

Index Terms- VANET, AODV, DSR, GPSR, SUMO, RSU, NS-2, PDR, Throughput, E2E delay etc.

I. INTRODUCTION

VANET is autonomous and self-organizing wireless ad-hoc communication network. In this network vehicles are called nodes which involve themselves peer-to-peer for communication of information. This is new technology in India thus government has taken a huge attention on it. Many research projects related VANET are COMCAR [1], DRIVE [2], FleetNet [3] and NoW [4], CarTALK 2000 [5], CarNet [6]. Many different VANET applications such as Vehicle Collision Warning, Security Distance Warning, Driver Assistance, Cooperative Cruise Control, Dissemination of Road Information, Internet Access, Map Location, Automatic Parking and Driverless Vehicles. In this research paper we have analysed the performance of AODV DSR and GPSR routing protocol on CBR connection pattern with different pause time, speed time also different network parameters and different measured performance metrics such as Packet Delivery Ratio, Packet Loss, Throughput and End-to-End Delay of this three routing protocols are compared for their performance analysis.

II. VEHICULAR AD-HOC NETWORK ROUTING PROTOCOLS

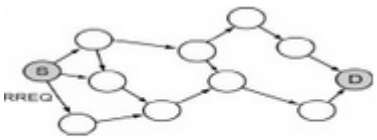
An ad-hoc routing protocol is a standard [9-10], that controls how vehicle nodes decide in which way to route the packets between computing device in vehicular ad-hoc network. There are different types of routing protocol in VANET such as proactive routing protocol, reactive routing protocol, hybrid routing protocol, topology based routing protocols and position based routing protocols. Existing unicast routing protocols of VANET is not capable to meet every traffic on highway road scenarios. They have also had some advantages and disadvantages. We have selected two reactive routing protocols i.e. AODV and DSR and one position-based routing protocol i.e. GPSR for simulation purpose analysis.

Ad-hoc On Demand Distance Vector Routing Protocol (AODV)

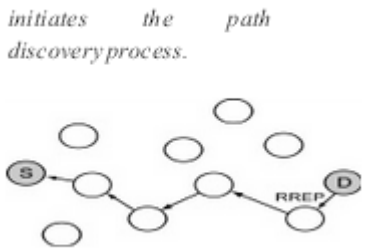
It is purely On-Demand route acquisition routing protocol. It is better protocol than DSDV network as the size of network may increase depending on the number of vehicle nodes [7] [12].

Path Discovery Process [8] [12]

In order to discover the path between source and destination, a route request message (RREQ) is broadcasted to all the neighbours who again continue to send the same to their neighbours, until the destination is reached. Every node maintains two counters: sequence number and broadcast-id in order to maintain loop-free and most recent route information. The broadcast-id is incremented for every RREQ the source node initiates. If an intermediate node receives the same copy of request, it discards it without routing it further. When a node forwards the RREQ message, it records the address of the neighbour from which it received the first copy of the broadcast packet, in order to maintain a reverse path to the source node. The RREQ packet contains: the source sequence number and the last destination sequence number know to the source. The source sequence number is used to maintain information about reverse route and destination sequence number tells about the actual distance to the final node.



A) *Source node S*

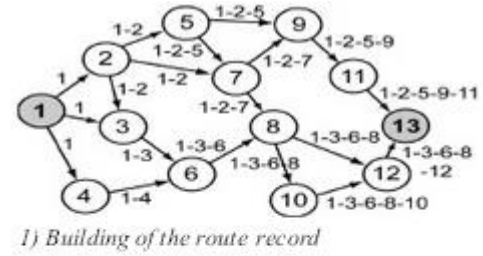


B) A RREP packet is sent back to the source.

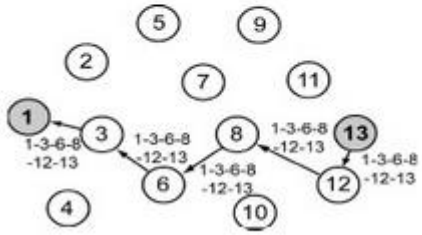
Figure-1 AODV Path Discovery Process

Route Maintenance [12]

A moving source node sends a new RREQ request packet to find a new route to the destination. But, if an intermediate node moves from its place, its upstream neighbour notices the move and sends a link failure notification message to each of its active upstream neighbours to inform them about the move until the source nodes is reached. After that the discovery process is again initiated.



1) Building of the route record



2) Propagation of the Route- reply.

Figure-2 DSR Route Discovery Process

III. DYNAMIC SOURCE ROUTING PROTOCOL (DSR) [8] [12]

It is an On-Demand routing protocol in which the sequence of nodes through which a packet needs to travel is calculated and maintained as an information in packet header. Every mobile node in the network needs to maintain a route cache where it caches source routes that it has learned. When a packet is sent, the route-cache inside the node is compared with the actual route needs to be covered. If the result is positive, the packet is forwarded otherwise route discovery process is initiated again.

A. Route Discovery

The source node broadcasts request-packets to all the neighbours in the network containing the address of the destination node, and a reply is sent back to the source node with the list of network-nodes through which it should propagate in the process. Sender initiates the route record as a list with a single element containing itself followed by the linking of its neighbour in that route. A request packet also contains an identification number called request-id, which is counter increased only when a new route request packet is being sent by the source node. To make sure that no loops occur during broadcast, the request is processed in the given order.

- If the pair (source node address, request-id) is found in the list of recent route requests, the packet is discarded.
- If the host's address is already listed in the request's route record, then also the packet is discarded ensuring the removal of later copies of the same request that arrive by using a loop.
- When a destination address in the route request matches the host's address, a route reply packet is sent back to the source node containing a copy of this route.
- Otherwise, add this host's address to the route record field of the route request packet and rebroadcast the packet.

A route reply is obtained in DSR by two ways: Symmetric-links (bidirectional), in which the backward route is followed again to catch the source node. Asymmetric-links (unidirectional) needs to discover the route up to the source node in the same manner as the forward route is discovered.

B. Route Maintenance

It can be accomplished by two ways: 1) Hop-by-Hop acknowledgement at the data link layer.
2) End-to-End acknowledgements.

The first method allows the early detection and retransmission of lost or corrupt packets in the data-link layer. If a transmission error occurs, a route error packet containing the address of node detecting the error and the host address is sent back to the sender. Whenever a node receives a route error packet, the hop in error is removed from the route cache and all routes containing this hop are truncated at that point. When the wireless transmission between two nodes does not work equally well in both directions, and then end-to-end replies on the application or transport layer may be used to indicate the status of the route from one host to the other.

IV. GREEDY PERIMETER STATELESS ROUTING PROTOCOL (GPSR)

Greedy Perimeter Stateless Routing (GPSR) [25] is one of the best examples of position based routing. GPSR uses closest neighbours information of destination in order to forward packet. This method is also known as greedy forwarding. In GPSR each node has knowledge of its current physical position and also the neighbouring nodes. The knowledge about node positions provides better routing and also provides knowledge about the destination. On the other hand neighbouring nodes also assists to make forwarding decisions more correctly without the interference of topology information. All information about

nodes position gathered through GPS devices. GPSR protocol normally devised in to two groups:

- Greedy forwarding: This is used to send data to the closest nodes to destination.
- Perimeter forwarding: This is used to such regions where there is no closer node to destination.

In other words we can say it is used where greedy forwarding fails. Further we will see in detail how these forwarding strategy works and what are issues in them.

A. *Greedy Forwarding*

In this forwarding strategy data packets know the physical position of their destination. As the originator knows the position of its destination node so the greedy regions/hops are selected to forward the packets to the nodes that are closer to their destination. This process repeats until the packet successfully delivered to desired destination. Nearest neighbor's physical position is gathered by utilizing beaconing algorithms or simple beacons. When a neighboring node forwards packet to closer region to destination, the forwarding node receive a beacon message that contain IP address and position information. Then it updates its information in the location table. If forwarding node does not receive beacon from its neighboring node within a specific time period, it assumes that either neighbor fails to forward packet to region closer to destination or neighbor's is not in its radio range. So it removes its entry from location table [25]. The major advantage of greedy forwarding is that it holds current physical position of forwarding node. Thus by using this strategy total distance to destination becomes less and packets can be transmitted in short time period. Besides its advantages there are few drawbacks of this strategy i.e. there are some topologies used in it that limits the packet to move to a specific range or distance from the destination. Furthermore, this strategy fails when there are no closer neighbours available to destination.

B. *Perimeter Forwarding*

Perimeter forwarding is used where greedy forwarding fails. It means when there is no next hop closest neighbour to the destination is available then perimeter forwarding is used. Perimeter forwarding uses nodes in the void regions to forward packets towards destination. The perimeter forwarding used the right hand rule. In right hand rule [25], the voids regions are exploited by traversing the path in counter clockwise direction in order to reach at specific destination. When a packet forward by source node, it forwarded in counter clockwise direction including destination node until it again reached at the source node. According to this rule each node involved to forward packet around the void region and each edge that is traversed are called perimeter. Edges may cross when right hand rule finds perimeter that are enclosed in the void by utilizing heuristic approach [24]. Heuristic has some drawbacks besides it provides maximum reach ability to destination. The drawback is that it removes without consideration of those edges which are repeated and this may cause the network partitions. To avoid this drawback another strategy is adopted that is described below.

C. *Planarized Graph*

When two or more edges cross each other in a single graph is called planar graph. Relative Neighbourhood Graph (RNG) and Gabriel Graph (GG) [25] are two types of planar graphs used to remove the crossing edges. Relative neighbourhood graph (RNG) is defined as, when two edges intersect with radio range of each other and share the same area. For example, x and y are the two edges that share the area of two vertices x and y. The edge x, y are removed by using RNG because another edge from x towards v is already available Figure-3. Gabriel Graph (GG) is used to remove only those crossing edges which are in between the shared area of two nodes having the same diameter as the other nodes have. Figure-4 depicts GG: shows that the midpoint diameter is less than the diameter of node x or node y. Thus the edge from the x, y cannot be removed. So there is less network disconnection in the GG as compared to RNG.

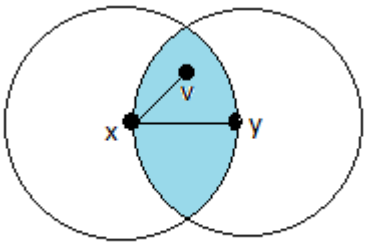


Figure-3 Example of RNG

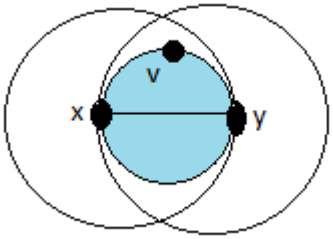


Figure-4 Example of GG

D. *Features of GPSR*

GPSR combines the greedy forwarding with the perimeter forwarding to provide better routing decision on both full and Planarized network graph by maintaining neighbour's information in the location table. For the forwarding decisions in perimeter mode GPSR packet header include the following distinct characteristics [11].

- GPSR packet header has the flag identity that is used to identify whether packet is in greedy forwarding or in perimeter forwarding.
- It contains destination node physical address.
- GPSR packet header also contains location of packet in the perimeter mode and the location of the new face to take a decision whether to hold the packet in the perimeter mode or to return it to the greedy mode.
- GPSR also have the record of sender and receivers address of the packet when the edge's crosses in the new face.

GPSR also have several distinct characteristics that are if the packet is in perimeter mode then its location address is

compared to forwarded node address and if distance to location and destination node is less then packet it switched to greedy mode to forward packet towards destination. GPSR discard those packets that are repeatedly forwarded as destination for such packets are not in range. The packets in perimeter mode never send twice through the same link if destination is in range. Overall GPSR is an efficient example of the position based routing that uses the geographic location of nodes and reduced usage of routing state on each node. Furthermore, it provides maximum robustness in highly dynamic wireless ad hoc networks.

E. *Issue in GPSR*

Besides GPSR certain characteristics, it suffers from several drawbacks. Greedy forwarding measured as unsuitable for the vehicular networks where the nodes are highly mobile and the node may not be able to maintain its next hop neighbours information as the other node may gone out of range due to high mobility. This can lead to data packets loss. The second problem may occur during beaconing mechanism that beacons may lost due to channel destruction or bad signal. This problem can lead to removal of neighbour information from location table [13]. GPSR uses Planarized graphs as its repair strategy where greedy forwarding fails. But these graphs perform well in the highway scenario due to their distributed algorithms [14]. These graphs does not perform well in such environment of vehicular communication where a lot of radio obstacles involves, in addition to this their distributed nature may lead to certain partition of network and may lead to packet delivery impossible. Hence there is need of such position based routing protocols, which merge position information with the road topological structure in order to make possible vehicular communication in presence of radio obstacles.

V. PROBLEM STATEMENT

The objective of the work is to compare the performance of the three routing protocols based on On-Demand Behavior, i.e. Ad-hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR) [8] [15] and Greedy Perimeter Stateless Routing (GPSR) protocols, for wireless ad-hoc networks based on the performance and comparison has been made on the basis of their properties like throughput, packet delivery ratio (PDR), end-to-end delay and data packet loss with respect to different scenarios - one by varying the number of nodes, again by varying the mobility of the nodes, again by varying the number of connecting nodes at a time and lastly by varying pause time.

The general objectives can be outlined as follows:

1) Study of Ad-hoc Networks
2) Get a general understanding of Vehicular Ad-hoc Networks
3) Study of different types of VANET Routing Protocol
4) Detailed study of AODV, DSR and GPSR
5) Generate a simulation environment that could be used for simulation of protocols
6) Simulate the protocols on the basis of different scenarios: by varying the number of nodes and by varying the traffic in the network
7) Discuss the result of the proposed work and concluding by providing the best routing protocol.

VI. METHODOLOGY

- Selection Techniques for Network Performance Evaluation

There are three techniques for performance evaluation, which are analytical modeling, simulation and measurement [12]. Simulation is performed in order to get the real-event results with no assumption as in case of analytical modelling.

- Random Waypoint Mobility Model

A node, after waiting a specified pause time moves with a speed between 0 km/h and V_{max} km/h to the destination and waits again before choosing a new way point and speed.

VII. SIMULATION ASSUMPTIONS

The following assumptions are considered when building the TCL script [8][16-18]:

1) For simplicity, all flows in the system are assumed to have the same type of traffic source. Each sender has constant bit rate (CBR) traffic with the rate of data rate/number of stations packet per second.
2) The source node is fixed to 100 nodes with maximum connection is 60 nodes (to show a density condition) and if the nodes are varied for the calculation it is mentioned in area.
3) The implementation of grid and integrate between grid and routing protocols.

VIII. PERFORMANCE METRICS

A. *Packet Delivery Ratio*

Packet delivery ratio is a very important factor to measure the performance of routing protocol in any network. The performance of the protocol depends on various parameters chosen for the simulation. The major parameters are packet size, no of nodes, transmission range and the structure of the network. The packet delivery ratio can be obtained from the total number of data packets arrived at destinations divided by the total data packets sent from sources. In other words Packet delivery ratio is the ratio of number of packets received at the destination to the number of packets sent from the source. The performance is better when packet delivery ratio is high. Mathematically it can be shown as equation (i).

$$\text{Packet Delivery Ratio} = \frac{\Sigma(\text{Total packets received by all destination node})}{\Sigma(\text{Total packets send by all source node})} \text{----------(i)}$$

B. *Average End-to-End Delay*

Average End-to-end delay is the time taken by a packet to route through the network from a source to its destination. The average end-to-end delay can be obtained computing the mean of end-to-end delay of all successfully delivered messages. Therefore, end–to-end delay partially depends on the packet delivery ratio. As the distance between source and destination increases, the probability of packet drop increases. The average end-to-end delay includes all possible delays in the network i.e. buffering route discovery latency, retransmission delays at the MAC, and propagation and transmission delay. Mathematically it can be shown as equation (ii).

$$D = \frac{1}{n} \sum_{i=1}^{n} (Tr_i - Ts_i) * 1000 \text{ [ms]} \text{----------(ii)}$$

Where

D = Average E2E Delay
i = packet identifier
Tr_i = Reception time
Ts_i = Send time
n = Number of packets successfully delivered

C. *Packet Loss*

Packet Loss is the ratio of the number of packets that never reached the destination to the number of packets originated by the source. Mathematically it can be shown as equation (iii).

PL= (nSentPackets- nReceivedPackets)/ nSentPackets ------(iii)

Where

nReceivedPackets = Number of received packets
nSentPackets = Number of sent packets

D. *Packet Loss Ratio*

Packet Loss Ratio is the ratio of the number of packets that never reached the destination to the number of packets originated by the source. Mathematically it can be shown as equation (iv).

PLR = (nSentPackets- nReceivedPackets)/ nSentPackets * 100 ----------(iv)

Where

nReceivedPackets = Number of received packets
nSentPackets = Number of sent packets

E. *Average Throughput*

It is the average of the total throughput. It is also measured in packets per unit TIL. TIL is Time Interval Length. Mathematically it can be shown as equation (v).

Average Throughput = (recvdSize/(stopTime-startTime))*(8/1000) ----------(v)

Where

recvdSize = Store received packet's size
stopTime = Simulation stop time
startTime = Simulation start time

IX. SIMULATION RESULTS

Two On-Demand (Reactive) routing protocols namely Ad-hoc On-Demand Distance Vector Routing (AODV) and Dynamic Source Routing (DSR) and one Geographical (Position-Based) routing protocols namely Greedy Perimeter Stateless Routing (GPSR) protocols is used. The mobility model used is Random waypoint mobility model because it models the random movement of the vehicle mobile nodes.

Scenario 1: In this scenario, number of nodes connected in a network at a time is varied and thus varying the number of connections, through which the comparison graphs of AODV, DSR and GPSR, is obtained.

Parameter	Value
Protocols	AODV, DSR, GPSR
Number of Nodes	30, 50, 150, 300
Simulation Time	600 sec
Traffic Type	CBR
Routing protocol	AODV, DSR, GPSR
Transmission Range	250 m
Mobility Model	Random Waypoint
Simulation area	500 * 500 m
Node Speed	20 m/s
Pause Time	00 sec
Interface Type	Queue
Mac Protocol	802.11Ext
Packet Size	512 MB
Queue length	50
Radio Propagation Model	Two Ray Ground

Table-1: Various parameters used while varying number of connections

Varying Traffic	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
30	248	120.442	93.6028	240.9	2.890
50	644	131.145	97.5757	278.97	4.908
150	799	130.306	98.1747	240.58	5.999
300	1285	129.825	92.3664	266.87	6.789

Table-2.1 AODV

Varying Traffic	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
30	246	127.754	72.8348	218.56	1.590
50	173	74.7002	45.1786	248.55	1.678
150	383	193.11	11.4177	190.18	1.909
300	313	142.524	1.2919	198.33	1.909

Table- 2.2 DSR

Varying Traffic	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
30	235	110.750	70.8090	210.56	1.050
50	160	70.7008	40.4567	214.55	1.150

150	280	110.90	10.990	150.90	1.190
300	280	90.00	1.989	140.89	1.190

Table- 2.3 GPSR

Table- 2 Performance of AODV, DSR and GPSR with varying Number of Connections

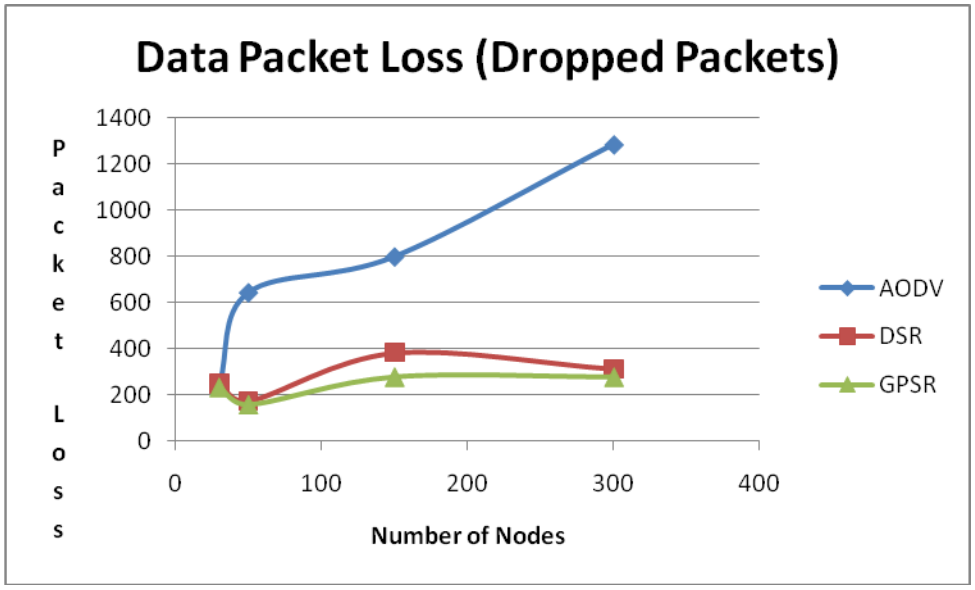


Figure- 5 Data Packet Loss (Dropped Packets) for AODV, DSR and GPSR

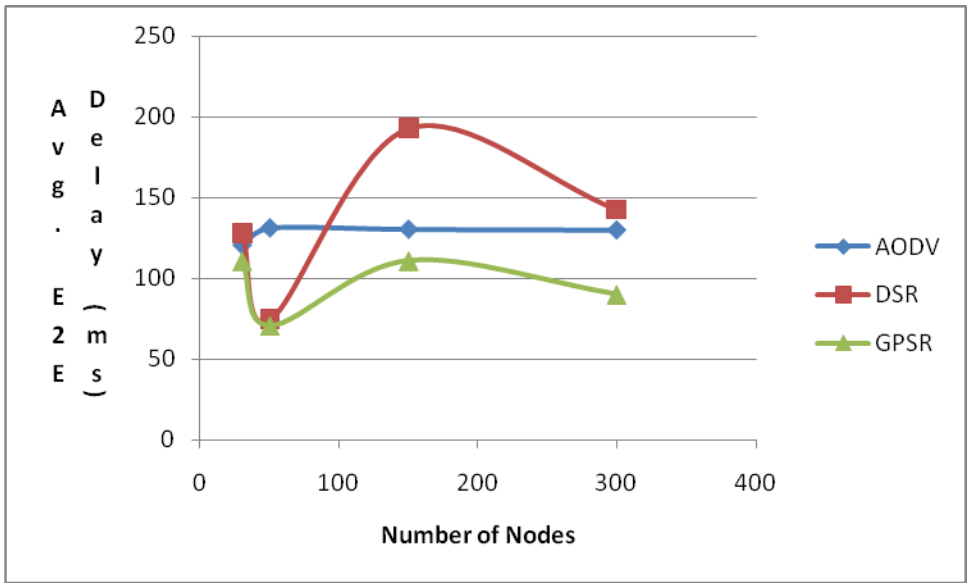


Figure- 6 Average E2E Delay for AODV, DSR and GPSR

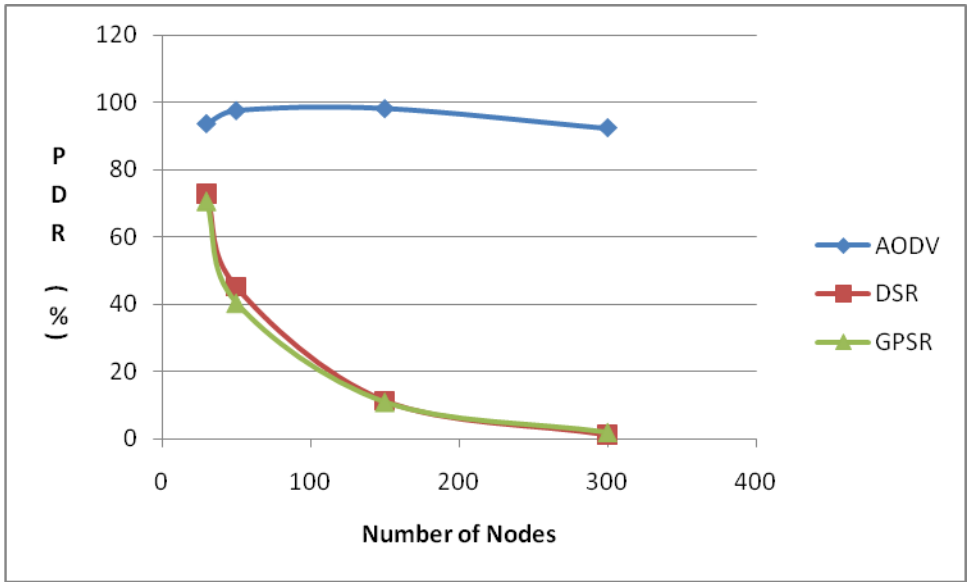


Figure- 7 Packet Delivery Ratio for AODV, DSR and GPSR

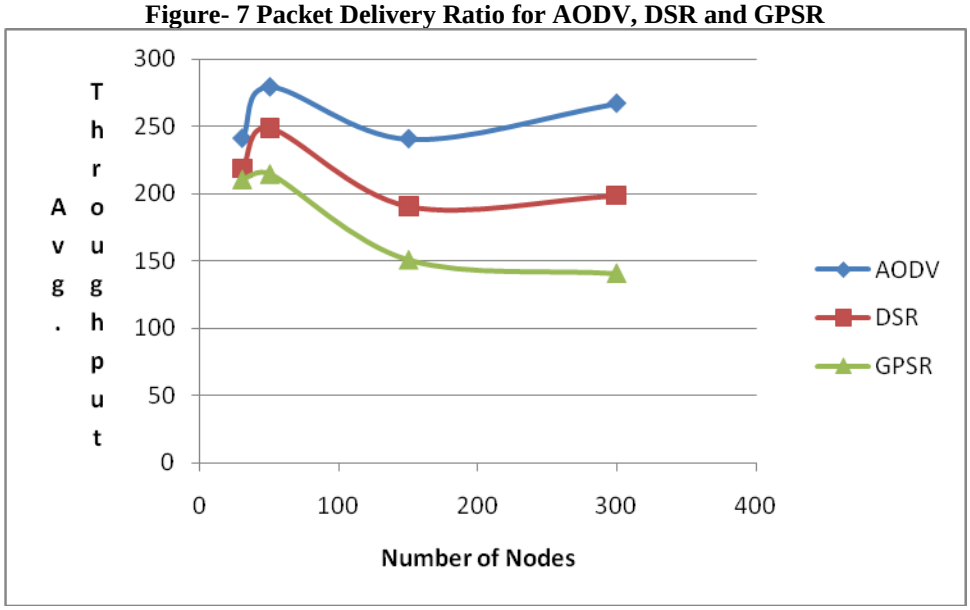


Figure- 8 Average Throughput for AODV, DSR and GPSR

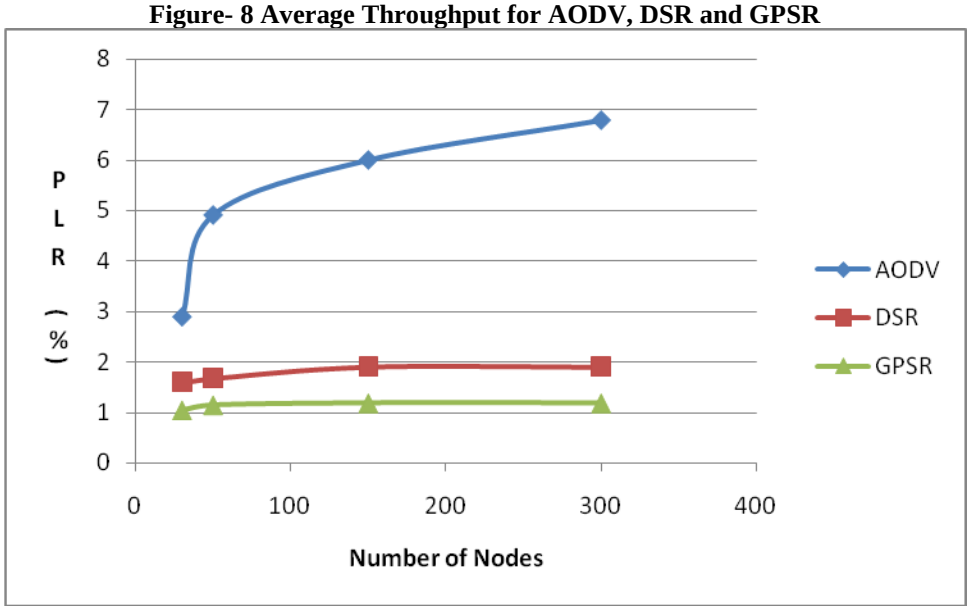


Figure- 9 Packet Loss Ratio for AODV, DSR and GPSR

Scenario 2: Here in the second scenario the total number of vehicle nodes in the network at a time remains fixed and thus varying pause time of the network.

Parameter	Value
Protocols	AODV, DSR, GPSR
Number of Nodes	200 with 100 connections
Simulation Time	600 sec
Traffic Type	CBR
Routing protocol	AODV, DSR, GPSR
Transmission Range	250 m
Mobility Model	Random Waypoint
Simulation area	500 * 500 m
Node Speed	10 m/s
Pause Time	50 sec,100 sec, 150 sec, 200 sec, 250 sec, 300 sec.
Interface Type	Queue
Mac Protocol	802.11Ext
Packet Size	512 MB
Queue length	64
Radio Propagation Model	Two Ray Ground

Table-3: Various parameters used while varying pause time in the network

Pause Time	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
50	1157	163.395	87.1369	204.97	2.890
100	995	104.604	92.892	452.67	2.345
150	1372	204.393	88.6116	248.94	2.134
200	1037	72.9835	92.1389	415.84	1.567
250	1355	101.22	95.859	608.61	1.456

Table- 4.1 AODV

Pause Time	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
50	541	140.519	2.96298	87.66	2.1890
100	754	227.774	6.31215	156	2.0981
150	1350	179.826	10.4053	117.3	1.8909
200	525	145.887	13.7914	221.97	1.7898
250	1434	208.651	35.0666	356.86	1.5678

Table- 4.2 DSR

Pause Time	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
50	450	130.908	2.45689	78.99	2.1345
100	680	234.900	2.56756	123	1.2347
150	590	139.080	8.76543	112.77	1.4568
200	300	123.879	9.78645	123.67	1.2349
250	560	178.094	15.6754	234.56	1.1230

Table- 4.3 GPSR

Table- 4 Performance of AODV, DSR and GPSR with varying pause time in the network

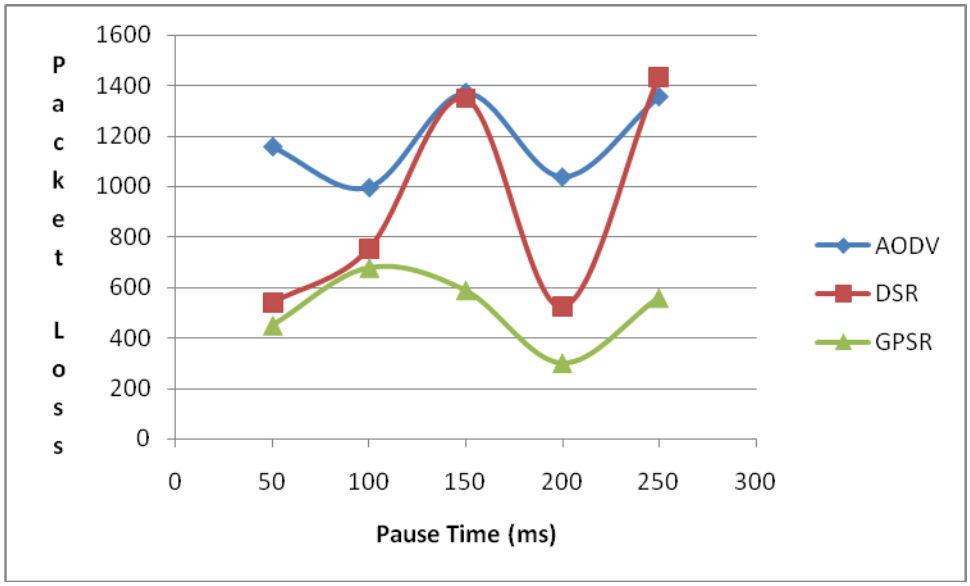


Figure- 10 Data Packet Loss (Dropped Packets) for AODV, DSR and GPSR

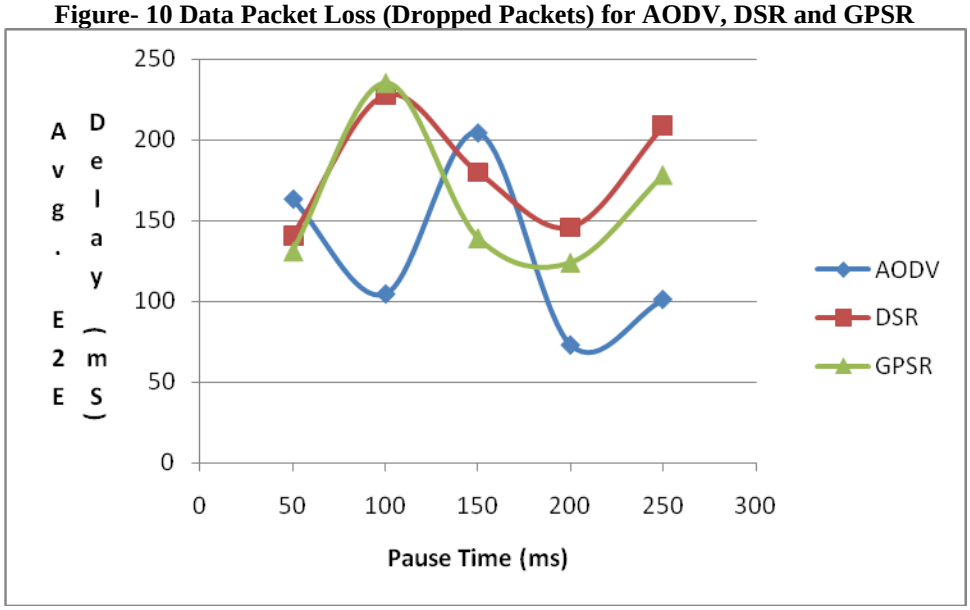


Figure- 11 Average E2E Delay for AODV, DSR and GPSR

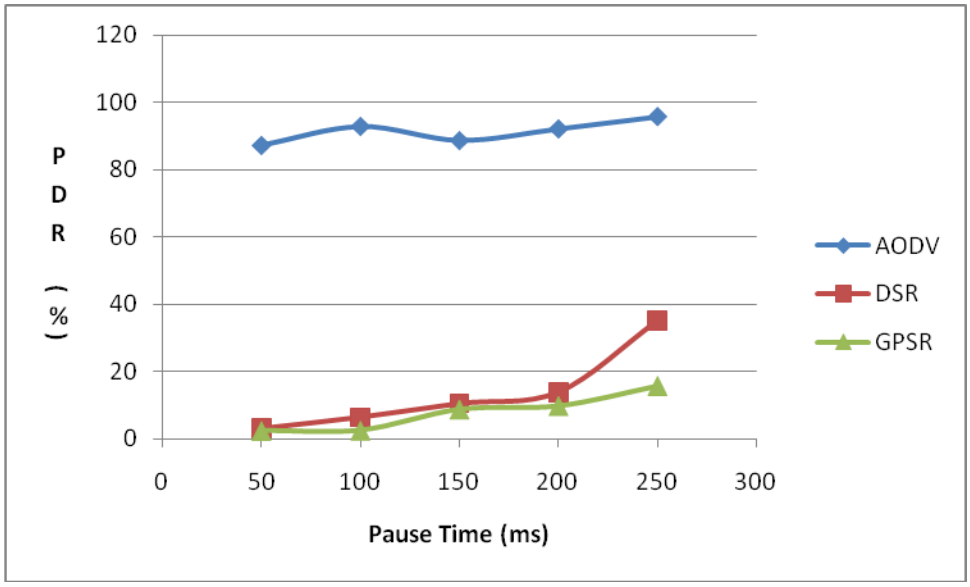


Figure- 12 Packet Delivery Ratio for AODV, DSR and GPSR

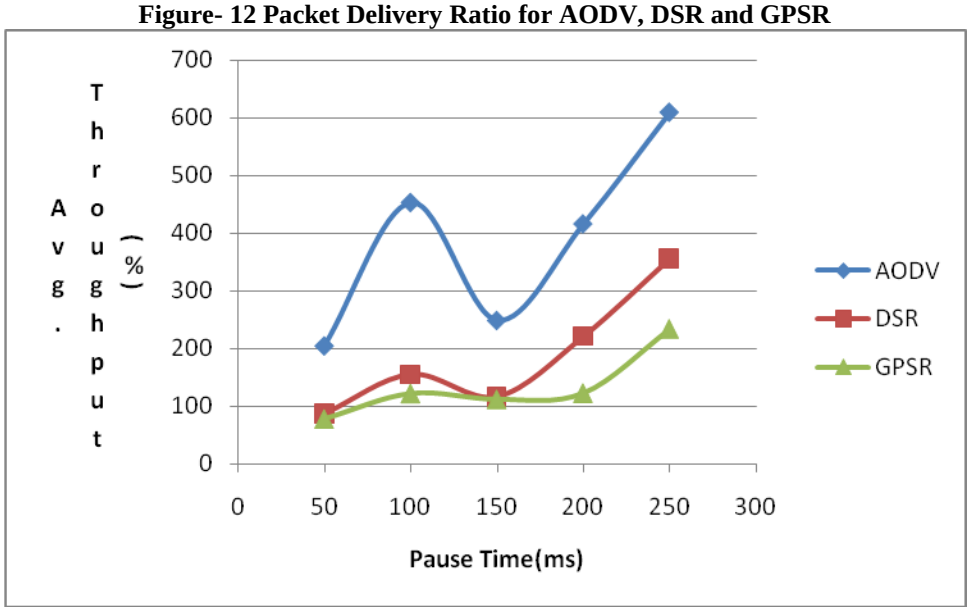


Figure- 13 Average Throughput for AODV, DSR and GPSR

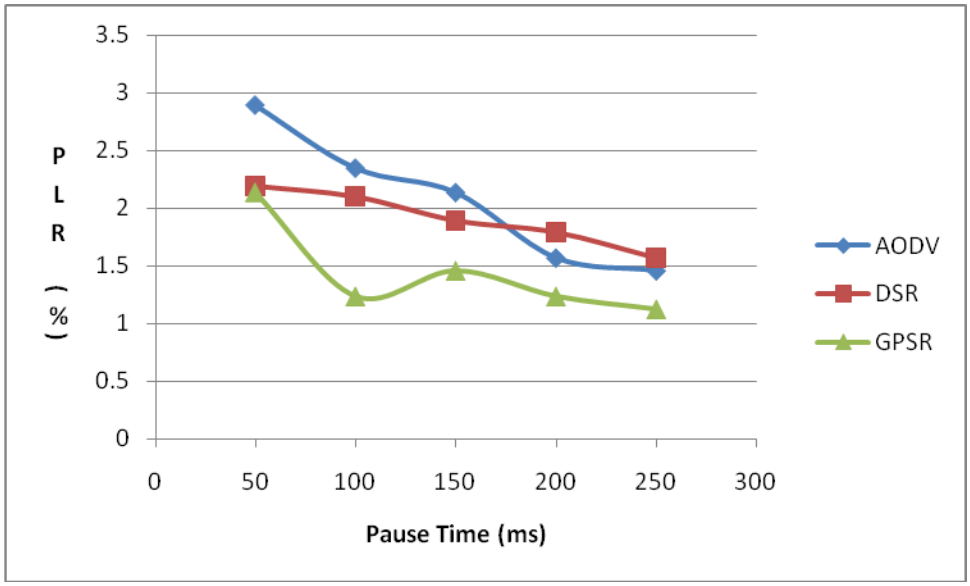


Figure- 14 Packet Loss Ratio for AODV, DSR and GPSR

Scenario 3: Here in the third scenario, the total number of vehicle nodes in the network at a time remains fixed and thus speed of the node with which they are moving in the area of 500 * 500 meter network.

Parameter	Value
Protocols	AODV, DSR, GPSR
Number of Nodes	200 with 100 connections
Simulation Time	600 sec
Traffic Type	CBR
Routing protocol	AODV, DSR, GPSR
Transmission Range	250 m
Mobility Model	Random Waypoint
Simulation area	500 * 500 m
Node Speed	10 m/s, 30 m/s, 50 m/s, 70 m/s, 90 m/s
Pause Time	10 sec
Interface Type	Queue
Mac Protocol	802.11Ext

Packet Size	**512 MB**
Queue length	**50**
Radio Propagation Model	**Two Ray Ground**

Table-5 various parameters used while varying mobility of the vehicle nodes i.e. speed of the nodes in the network

Speed of the nodes	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
10	**1157**	**163.395**	**87.1639**	**204.87**	**2.5789**
30	**908**	**176.577**	**90.6245**	**249.17**	**10.678**
50	**954**	**323.638**	**88.1336**	**182.41**	**2.3456**
70	**1225**	**118.265**	**91.5398**	**327.57**	**2.4567**
90	**993**	**142.934**	**88.6138**	**217.87**	**1.5678**

Table- 6.1 AODV

Speed of the nodes	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
10	**541**	**140.519**	**2.95298**	**86.66**	**2.4567**
30	**127**	**159.535**	**0.18956**	**75.78**	**10.903**
50	**331**	**56.067**	**0.15583**	**52.18**	**1.2456**
70	**207**	**108.879**	**0.25082**	**53.29**	**2.3456**
90	**124**	**107.668**	**0.03373**	**11.02**	**2.5567**

Table- 6.2 DSR

Speed of the nodes	Packet Loss	Average E2E Delay	Packet Delivery Ratio	Average Throughput	Packet Loss Ratio
10	**528**	**135.900**	**1.8900**	**87.00**	**2.900**
30	**110**	**167.900**	**0.7829**	**72.00**	**11.780**
50	**135**	**78.900**	**0.6790**	**45.89**	**1.8902**
70	**178**	**108.890**	**0.1890**	**42.90**	**2.1900**
90	**109**	**107.099**	**0.1900**	**10.90**	**1.2899**

Table- 6.3 GPSR

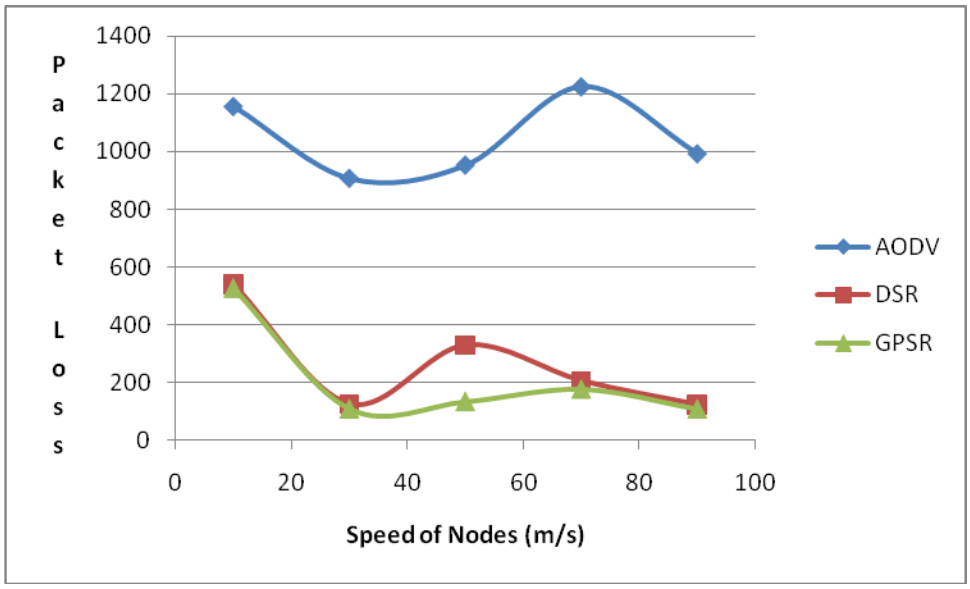


Figure- 15 Packet Loss (Dropped Packets) for AODV, DSR and GPSR

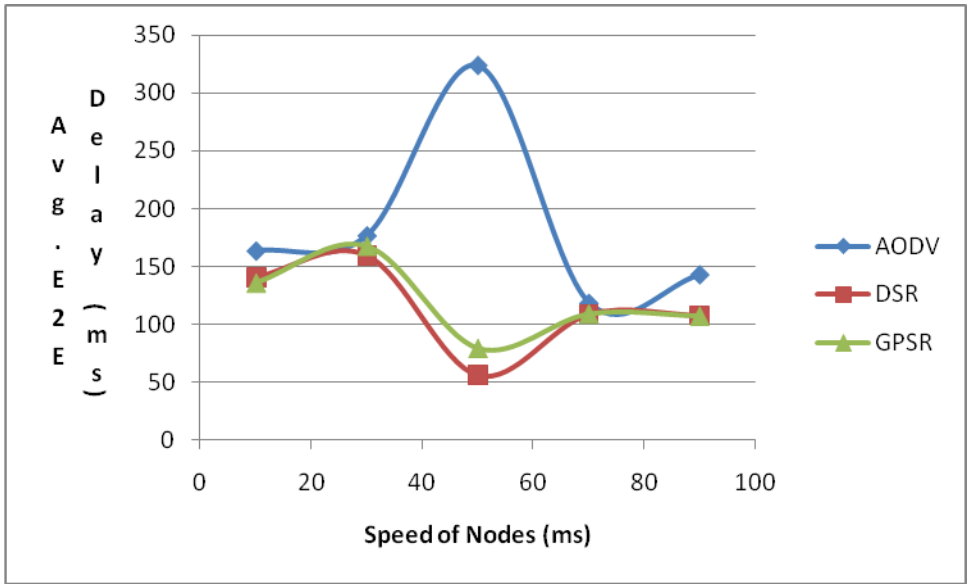


Figure- 16 Average E2E Delay for AODV, DSR and GPSR

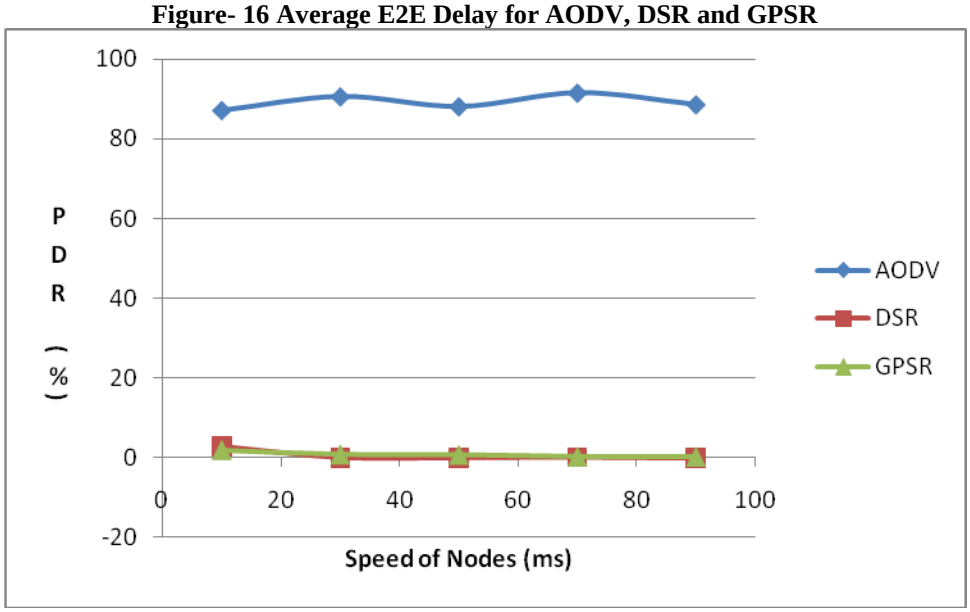


Figure- 17 Packet Delivery Ratio for AODV, DSR and GPSR

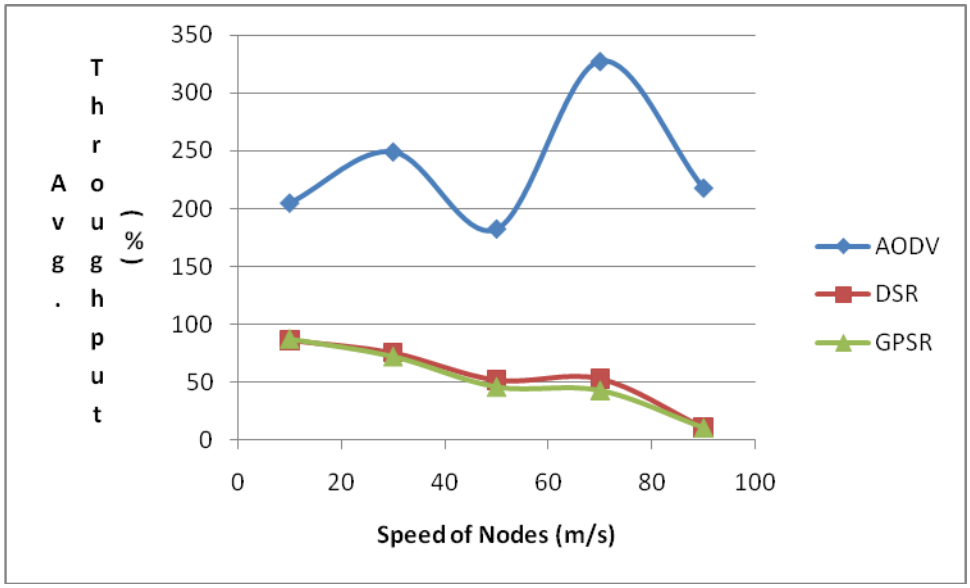


Figure- 18 Average Throughput for AODV, DSR and GPSR

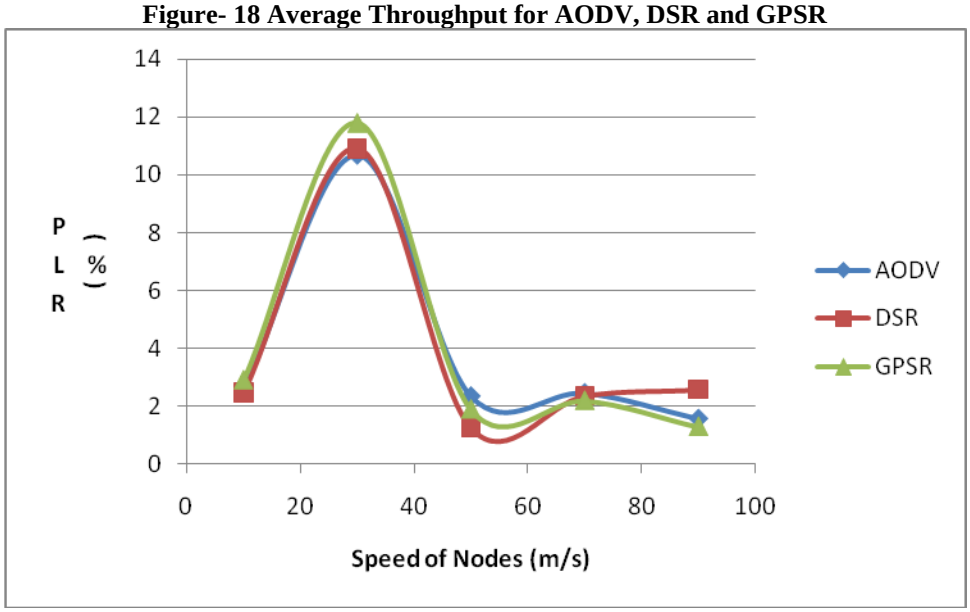


Figure- 19 Packet Loss Ratio for AODV, DSR and GPSR

X. ANALYSIS AND RESULTS

The paper shows the realistic comparisons of protocols which are both reactive and position based routing protocol and the simulation results agree based on theoretical analysis. The different scenarios were made in the SUMO and NS2.34. We run the simulation for 600 secs and generate the trace file from which we save the graphs for analysis and calculation as shown above. These graphs are found very helpful in the statistical analysis of these routing protocols performance. The required graphs were saved as the bitmap image for the statistical analysis.

Scenario1:- Number of Nodes Varied.

The first scenario is simulated and it generates the required trace file as shown in Figure-3. In this scenario, the vehicle nodes were simulated using Ad-hoc On Demand Distance Vector (AODV), Dynamic Source Routing Protocol (DSR) and GPSR routing protocol using CBR traffic application which were checked by different parameters such as E2E Delay, Packet Delivery Ratio, Packet Loss Ratio, Throughput etc. Graph show the Packet Delivery Ratio in percentage (%). The x-axis denotes the number of nodes and y-axis is PDR in %.

E2E Delay:- Performance of DSR increases and then decreases with increasing number of vehicle nodes, but the delay decreases with increasing number of vehicle nodes for GPSR network. For AODV, it varies with increasing number of vehicle nodes.

Packet Loss:- With increasing number of vehicle nodes AODV show worst-performance, It remains same for all less number of vehicle nodes, but with increasing vehicle nodes AODV show maximum packet loss.

Packet Delivery Ratio:- Performance of AODV remains constant for increasing number of vehicle nodes , whereas performance of GPSR is more better than DSR and AODV.

Throughput:- The performance of AODV, DSR and GPSR remains almost constant for increasing number of vehicle nodes but GPSR and DSR shows better than AODV.

Packet Loss Ratio;- It remains same for all less number of vehicle nodes, but with increasing vehicle nodes AODV show maximum packet loss.

Scenario 2:- Pause Time Varied:-

E2E Delay:- AODV serves the best among all the protocols.
Packet Loss:- GPSR outperforms all other protocols in all conditions.

Packet Delivery Ratio:- GPSR performance better than AODV and DSR routing protocol.

Throughput:- GPSR outperforms the other two protocols but AODV shows better performance than DSR routing protocol.
Packet Loss Ratio:- GPSR outperforms all other protocols in all conditions.

Scenario 3:- Mobility of nodes is varied.

E2E Delay:- AODV performs constantly when speed of node changes whereas GPSR performs better than DSR.

Packet Loss:- GPSR and DSR performance better than AODV.

Packet Delivery Ratio:- DSR performs constantly in all conditions whereas AODV performs better than both GPSR and DSR.

Throughput:- DSR performance well in all conditions but GPSR performs better than AODV.
Packet Loss Ratio:- GPSR and DSR performance better than AODV.

XI. CONCLUSION

AODV shows the best performance with its ability to maintain connection by periodic exchange of information required for TCP network. AODV performs best in case of packet delivery ratio and GPSR outperform others in case of throughput. Varying pause time, GPSR outperform others in case of packet loss and throughput, but overall AODV outperforms GPSR and DSR as in high mobility environment topology change rapidly and AODV can adapt to the changes, but with taking everything into account GPSR is better than others. At higher node mobility, AODV is worst in case of packet loss and throughput but performs best for packet delivery ratio, GPSR performs better than AODV for higher node mobility, in case of end-to-end and throughput but DSR performs best in case of packet loss. Hence, for real time traffic GPSR is preferred over DSR and AODV. Finally, from the above research work performance of AODV is considered best for Real-time and TCP network.

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A review of Lantana camara studies in India

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Abstract- *Lantana camara*, a noxious weed, has been expanding and now established in many regions of the world, including India. As it poses major threats to ecosystem, it has been in the focus of control attempts. For the purpose of this research, various characteristics of *Lantana camara* are discussed and techniques to combat its invasion in India have been studied. Results reveal that species have become menace and expanding its range. Present research also suggest that more than 80% of studies focus on its impact, use, toxicity, and its therapeutic uses only. It thus comes out clear, that research focusing on path and progression of *Lantana camara*, besides knowing its ecology, is the need of the hour. Information of this kind, as presented in this research, is critically needed to plan-out a befitting response to protect the ecosystems at a matching scale; else it may be impossible to make any headway towards meaningful control with small, scattered and sporadic attempts.

Index Terms- *Lantana camara*, invasion, India, management, planning, review

INTRODUCTION

Globally, there is a surfeit of IAS that affects ecological processes and cause loss of biodiversity from native ecosystem (Gordon, 1998; McNeely, 2001; Dogra et al., 2010). This includes myriad of impacts such as alteration in ecosystem processes (Charles and Dukes, 2007; Devine and Fei, 2011), decline in abundance and richness of native flora (Capers et al., 2009), alteration in community structure (Gordon, 1998; Sanders et al., 2003) and many more. Invasion is considered as the second most widespread threat to global biodiversity next to habitat destruction (Park, 2004; Leadley et al., 2010). Risk is limited not only to loss in biodiversity but environment, economies, and humans are at loss as well (Andersen et al., 2004; Pimentel et al., 2000; Perrings, 2010; Hulme, 2012). Therefore global efforts are being made to control invasive species as these are considered to pose significant threats that are difficult to reverse.

Various definitions of invasive species have been proposed by internationally acclaimed organizations in invasion research (Table 1). Although defined variously by different authors, the definition of invasive species given by GISP is considered most pertinent to the present discussion which states that 'invasive alien species are non-native organisms that cause, or have the potential to cause, harm to the environment, economies, or human health' (GISD, 2010). The definitions convey that the benefit of an action, which may lead to the introduction or spread of an invasive species, is clearly outweighed by the potential harm caused by the species. In the context of invasive species definition, invasion potential of the species thus can be expressed as the weighted sum of dispersal movements, and accessibility from 'infected' bioregions to 'uninfected' bioregions and ability to maintain viable population.

Table I: Definitions of invasive species by organizations engaged in invasion research

Definitions	Organization
A species that is not native to the ecosystem under consideration whose introduction causes or is likely to cause economic or environmental harm or harm to human health.	National Invasive Species Council, 2001
Species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce.	Convention on Biological Diversity (CBD)
Non-native organisms that cause, or have the potential to cause, harm to the environment, economies, or human health.	Global Invasive Species Programme (GISP)
Animals, plants or other organisms introduced by man into places out of their natural range of distribution, where they become established and disperse, generating a negative impact on the local ecosystem and species.	International Union for Conservation of Nature (IUCN)
The Invasive Species Specialist Group uses definitions 1 and 2 for invasive species 1. Species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce. 2. Species whose introduction and/or spread threaten biological diversity (CBD).	Invasive Species Specialist Group (ISSG)
An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health	Invasive Species Advisory Council (ISAC)

It is the invasion potential of species that enable it to be successful invaders and colonizers of the novel environments, whether introduced deliberately or accidentally (Dogra et al. 2009). This rapid and increasing rate of invasive potential and its establishment have very little prospect of reversing (Muniappan et al. 2009; Sharma and Raghubanshi 2011). More concretely, evidence is

accumulating that the rate of change in global ecosystem due to invasion potential is exceeding at pace with which we advance our understanding of the change (Lockwood et al., 2007; EEA, 2010). Developing regions are fast witnessing this change and particularly more evident in India.

India is abode of indigenous species and well known for its biodiversity hotspots. A large majority of exotics plaguing the country are natives of American continent, followed by Eurasia, Europe, Asia, Africa and Australia. Although, a large number of exotics have reached naturalization in India; only a few have noticeably altered the ecosystem structure and functions. Amidst them, *Lantana camara* stands out distinctly in the list of top invaders (Murali and Setty, 2001; Hiremath and Sundaram, 2005; Sharma and Raghubansi, 2006; Prasad et al., 2007; Sahu and Singh, 2008; Babu et al., 2009). *Lantana camara* is one such pantropical weed which is affecting ecosystem, and causing biodiversity loss at greater extent. The species is native of Central and South America and the Caribbean with geographical expansion between 35°N and 35°S (Day et al., 2003). Figure 1 depicts native and introduced distribution range of *Lantana camara* worldwide.

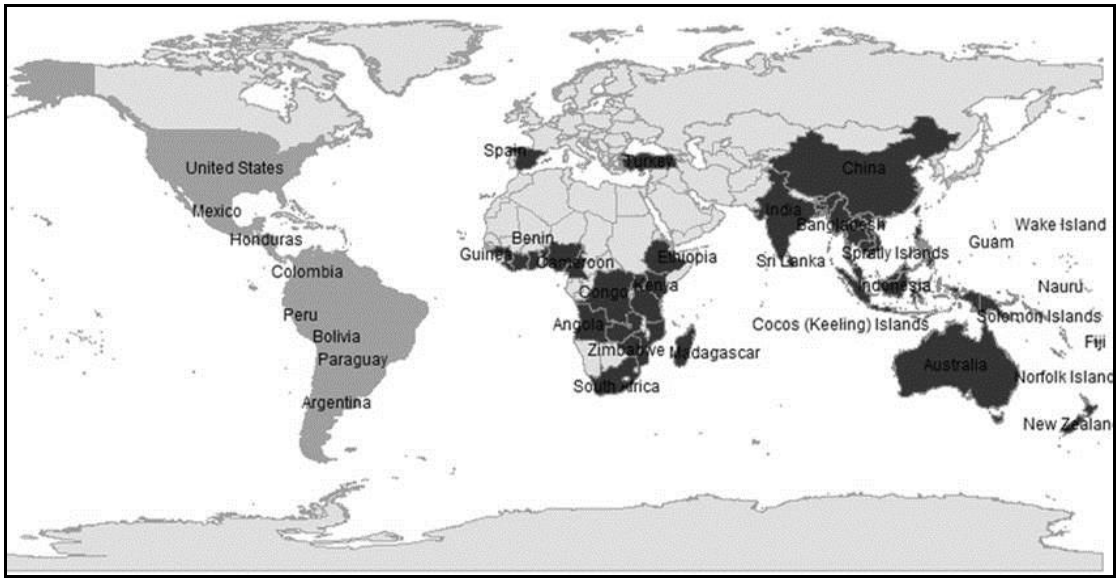

Figure 1: *Lantana camara* native (light grey) and introduced or naturalized (dark grey) regions (**Source:** Adapted and modified from Day et al., 2003)

The genus being tropical in origin reaches its maximum diversity in the Caribbean, Central and northern South America (Taylor et al., 2012). In addition to the American species, some species are believed to have their origin in Africa and one species in India (Ghisalberti, 2000; Bhagwat et al., 2012). All species of *Lantana camara* despite of varied origin belong to Calliorheas section which is well characterized in the neotropics world (Sanders, 1987; Sanders, 2012). The diversity, broad geographic expansion and wide ecological tolerance are so inbuilt in species, that the Invasive Species Specialist Group (ISSG) considers it as among 100 of the "World's Worst" invaders (ISSG 2001).

The species has made itself indispensable in most parts of India. It was introduced in 1809 as an ornamental plant by the British in Calcutta Botanical Garden (Brandis, 1882; Aravind and Rao, 2001; Nanjappa et al., 2005). Voyaging two centuries of its establishment in India, at present it is considered to be extremely adaptable and prolific. Thus, it has its indiscriminate spread and presence in almost all regions of India including farm, pasture, fallow land and forest except the Thar Desert and its surroundings (Kannan et al., 2009; Aravind et al., 2010; Kimothy et al., 2010; Surampalli, 2010; Patel et al., 2011; Dobhal et al., 2011). Not only is the geographic range of *Lantana camara* still expanding in many regions of India, but the density of infestations within its range is increasing and has been recognized as a future threat to ecosystems (Roy et al 2002; Day et al. 2003; Sharma et al. 2005; Kohli et al. 2006; Dogra et al. 2009). An article in the widely-read magazine, Down to Earth (Sethi 2004), attests to the growing recognition of this problem by civil society, and to its no longer being a concern of the scientific community alone. Thus, the present research aims to review various aspects of *Lantana camara* research in India and the techniques adopted to combat its invasion. The study also aims to identify gaps in existing studies and what further research should be directed so that concrete headways to control invasion can be made.

A. Lantana camara: General description and invasion predicament

The word *Lantana camara* derives from Latin 'lento' which means to bend (Ghisalberti, 2000). The species was first described and given its binomial name by Linnaeus in 1753 (Munir, 1996; Kumarasamyraja et al., 2012). It is the genus of verbenaceae family with 600 varieties existing worldwide. *Lantana camara*, a native species of South, Central America and the Caribbean islands (Figure 3.1) (Baars, 2002), has its presence recorded even in Brazil, Florida, Jamaica, Mexico, and Trinidad. The species is spread over wide geographical range in neotropics but none is reported from Old World (Day et al., 2003; Sanders, 2006; GISIN, 2011). Some species of *Lantana camara* are also believed to originate from Africa and one from India (Lowe et al., 2003; Baars, 2002; Day et al., 2003; Heshula, 2009).

B. Biology

Lantana camara, also known as wild sage, is a thorny multi-stemmed, deciduous shrub with an average height of 2m (6ft). The shrub's taxonomic position is defined as belonging to the class of magnoliopsida, order lamiales, family verbenaceae and genus Lantana (GISIN, 2011). Stems are square in outline, covered with bristly hairs when green, often armed or with scattered small prickles (Figure 2a). *Lantana camara* possesses a strong root system (Figure 2b). The roots even after repeated cuttings give new flush of shoots. Leaves are opposite, simple, with long petioles, oval blades which are rough and hairy and have blunt toothed margins (Figure 2c). The leaves of *Lantana camara* have a strong aroma. Its flowers are small, multi-colored, in stalked, dense in flat-topped clusters with a corolla having narrow tube with four short spreading lobes (Figure 2d & e). Their flowers undergo color change subsequent to anthesis. These flowers occurs in cluster which includes white-pink-lavendar or yellow-orange-red mix. The yellow coloration of the flower provides visual cue to pollinators and change in color is initiated on the act of pollination. Berries of *Lantana camara* are round, fleshy, 2-seeded drupe with initially green in color and turning purple and finally to blue-black color (Figure 2f). However, the berries are very poisonous in nature though these are attractive to insects and birds. Seeds germination is easy and faster in *Lantana camara*. Table 2 summarizes the general characteristics of *Lantana camara*.

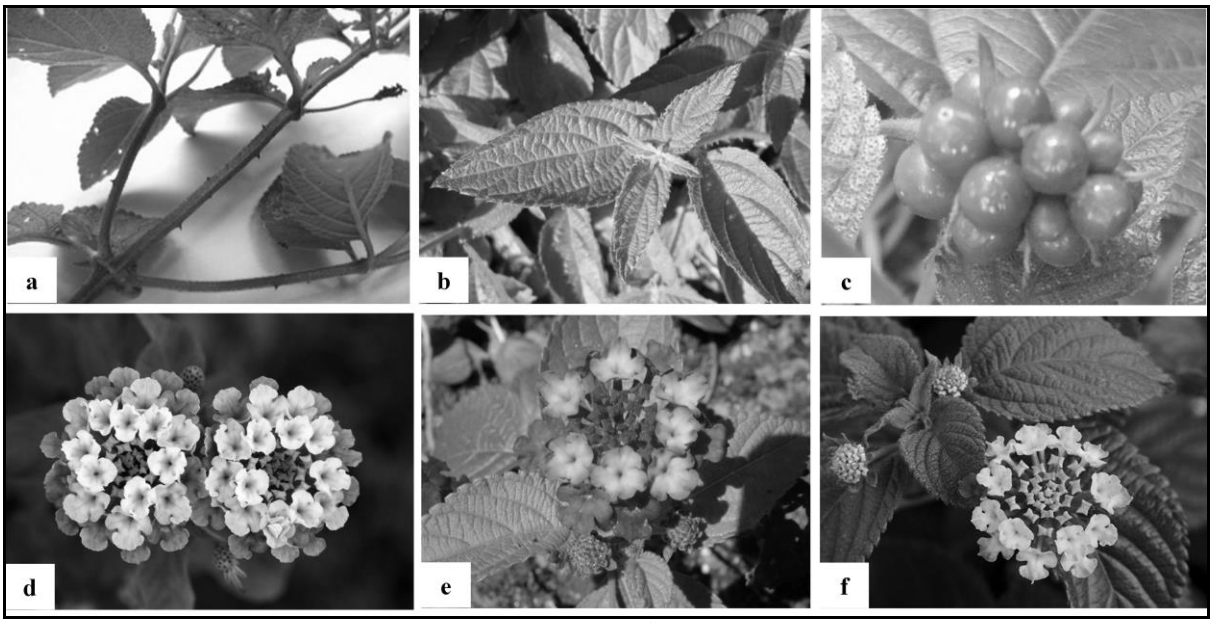

Figure 2: Characteristics of *Lantana camara*

Table II: General characteristics of *Lantana camara*

Characteristics	Description
Native	Tropical region in Central and South America
Synonym	*Camara vulgaris, Lantana scabrida*
Distribution	Naturalized in countries/islands between 35^0N and 35^0S latitudes
Conservation Status	Alien
Plant Category	Annuals and biennials, ground covers, perennials, shrubs
Plant Characteristics	Poisonous
Foliage Characteristics	Fragrant, evergreen, poisonous
Foliage Color	Dark green
Flower Characteristics	Long lasting, showy, unusual
Flower Color	Pink, yellow, orange
Tolerances	Drought, heat and humidity, pollution, slope, wind
Propagation Methods	From herbaceous stem cuttings
Pollinators	Lepidopteran species and thrip

C. Ecology

Lantana camara's widespread and diverse distribution is a reflection of its wide ecological tolerances. The species occurs in varied habitats ranging from open unshaded regions which include wastelands, rainforest edges, beachfronts, and forests disturbed by activities such as fire or logging (Thakur et al., 1992, in Rishi, 2009 cross ref). The species also thrive well in disturbed areas which

includes roadside, railway tracks and canals (Sharma et al., 2005; Kohli et al., 2008; Dogra et al., 2010). Anthropogenic activity further aggravates the invasion and allows it to spread (Day et al., 2003). The two principal ingredients for successful establishment are its growth under varied climatic conditions and no cap on temperature or rainfall limit. Table 3 summarizes habitat requirements of *Lantana camara*.

Table III: Habitat description of *Lantana camara*

Habitat Parameters	Requirements
Light Range	Sun to full Sun
pH Range	4.5 - 8.5
Temperature	Intolerant of frequent or prolonged freezing
Annual Rainfall Range	1000 - 4000mm
Soil Range	Mostly sandy to clay loam
Water Range	Semi-Arid to Normal
Altitude	Less than 2000 m above sea level
Light conditions	Prefers unshaded habitats, can tolerate some shade

D. Life Cycle

A typical life cycle of *Lantana camara* commences with dispersal of seeds by various dispersal agents such as fruit-eating birds and few mammals (Figure 3). An individual plant produces up to 12,000 fruits each year (Mack et al., 2000). Various studies illustrates that the process of germination process starts once the seed has travelled through the gut of a bird or mammal (Khoshoo and Mahal, 1967). Pollination by insects such as butterflies, moths, bees and thrips are common (Goulson and Derwent, 2004). Besides these, vegetative mode of propagation includes, spread through layering, or reshooting. *Lantana camara*'s repetitive growth at base of stems confirms its tenacity. Various studies have attributes seed viability ranging from 2-5 years (Wijayabandara et al., 2011). However, exact time of seed viability is still unknown and is mostly dependent on plant varieties, soil types and moisture levels (Raizada and Raghubanshi, 2010). Anthropogenic disturbances (burning, slashing, clearing, construction activities) facilitate its germination and propagation. The growth of the plant occurs all year round but the peak is reached after summer rains. The species takes only few weeks to germinate. The dryness and open canopy promotes early germination. The mature thickets once established, continue to persist for long. The plant starts producing seeds after completing one season. In the area of its establishment, it competes with native flora and subsequently smothers pasture through its allelopathic nature. The species die only under extreme. A typical life cycle of species is depicted in Figure 3.

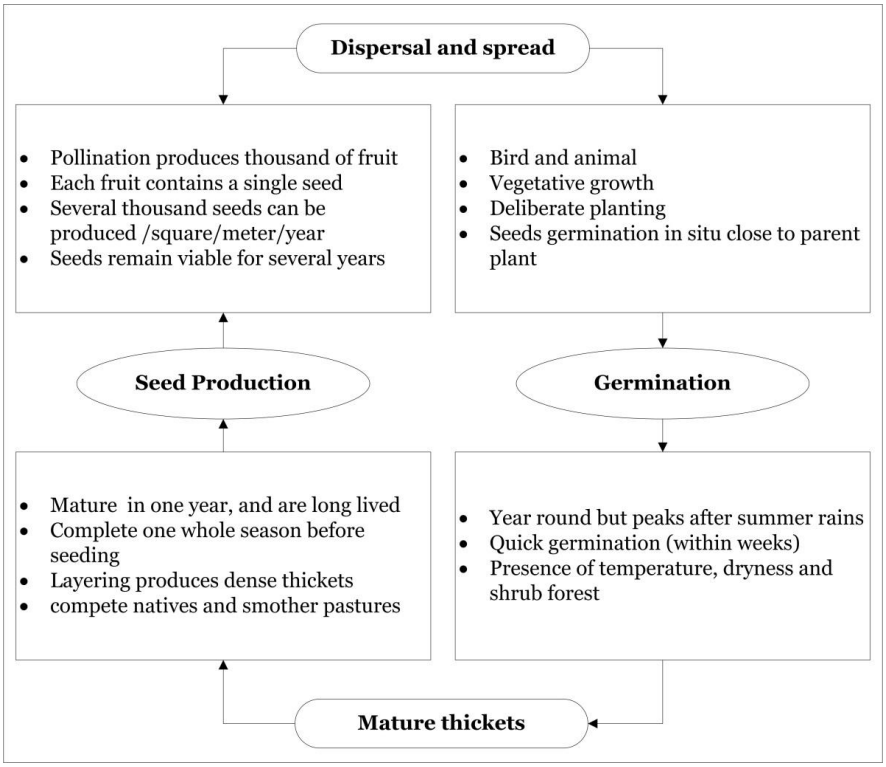

Figure 3: Life cycle of *Lantana camara*

E. Uses

Lantana camara though being a noxious weed has several minor uses, mainly in herbal medicine. There are series of research studies conducted on the exploitation of chemical constituents present in different parts of the plant species. Table 4 summarizes uses of *Lantana camara*. The studies demonstrate that extracts from the leaves can be employed to combat antimicrobial, fungicidal, insecticidal and nematicidal problems. Its potential to serve as biocide has also been illustrated in several researches (Begum et al., 2004; Dharmagadda et al., 2005). Table 4 summarizes the uses of *Lantana camara*.

Table IV: Uses of *Lantana camara*

Parts Used	Uses	References
Plant	Act as hedge plant, provide perch sites and cover	Ghisalberti et al., 2000; Day et al., 2003
Flower	Nectar source for butterflies and moths	Mohan Ram and Mathur, 1984; Day et al., 2003
Bark	Astringent and used as a lotion in cutiginous eruptions, leprous ulcers	ISSG, 2008; TrekNature, 2009
Stalks	Raw material for paper pulp which is used for wrapping, writing and printing paper	Ray et al., 2006; Naithani and Pande,2009
	Making baskets and temporary shelters	Kannan et al., 2008
	Used as Biofuel	Sharma et al., 1988; Prasad et al., 2001
Leaves	Boiled and applied for swellings and pain in the body	Singh et al., 1996; Noble et al., 1998; Nagao et al., 2000
	Alkaloidal fractions lower blood pressure, accelerate deep respiration and stimulate intestinal movements	Singh et al., 1996; Noble et al., 1998; Nagao et al., 2000
Plant extracts	Drought-tolerant plant so good candidates for xeriscaping	Rauch, and Weissich, 2000
	Used in folk medicine for the treatment of cancers, chicken pox, measles, asthma, ulcers, swellings, eczema, tumors, high blood pressure, bilious fevers, catarrhal infections, tetanus, rheumatism and malaria	Chavan and Nikam 1982; Sharma and Sharma, 1989; Day *et. al.*, 2003; Begum et al., 2003; Sharma, 2007

F. Impacts

Lantana camara have many negative impacts including potential to disrupt succession cycle, displacing native biota resulting in decreased biodiversity (Murali and Setty, 2001). Its infestations alter the structural and floral composition of native communities (Sharma and Raghubanshi, 2010). As the density of *Lantana camara* in forest increases, allelopathic interactions increase and hence there is decline in species richness (Day et al., 2003). It is a major problem in agriculture lands in various regions of India because once established the species forms dense and impenetrable thickets thereby outcompeting native pastures, blocking the movement of grazers in addition to causing poisoning. *Lantana camara* has numerous secondary impacts as it harbors serious pests such as malarial mosquitoes and tsetse flies, resulting in grave health issues. These alter fire regimes significantly by providing fuel load provided. The species has been implicated in destructive wildfire in various regions of India (Hiremath and Sundaram, 2005). The summary of impacts caused by *Lantana camara* is enlisted in Table 5.

Table V: Impacts of *Lantana camara*

Impact	References
Disrupts succession and decreases biodiversity	Ghisalberti, 2000; Saxena, 2000; Day et al., 2003
Understorey competitor for forestry	Asner, 2005; Sharma et al., 2005; FSI, 2006; ISSG, 2009
Reduce the economic viability of the crops	Day et al., 2003; Sharma et al., 2005
Allelopathic qualities reduces the vigor of native plant species and limits their productivity and interferes with harvesting	Sharma et al., 1988; Sharma and Sharma, 1989; Sharma et al., 2005
Loss of pasture in grazing areas	Humphries and Stanton, 1992; Weber, 2003; Walton et al., 2006
Poisoning of Livestock by plants	Pass and Heath, 1978; Mcsweeny et al., 1982; Sharma et al., 1999; Sharma et al., 2007
Seeds are poisonous if ingested	GISP, 2008
Affect agriculture by outcompeting native pastures	Sharma et al., 2005; Walton et al., 2006; GISP, 2008
Handling plant may cause skin irritation or allergic reaction	Day et al., 2003
Interferes with the mustering of cattle causing death of stock by poisoning	Yadava and Verma, 1978; Sharma, 1994; Swarbrick et al., 1998
Reduce productivity in orchards	Holm et al., 1991
Harbors Pests	Day et al., 2003

G. The Problem

Lantana camara is considered a problem weed in many parts of India in which it has been introduced (Iyengar, 1933). Due to its prolific nature of flowering and dispersal, the species tends to alter the structure of the terrestrial ecosystem by gregarious presence. The species forms dense thickets and tends to eliminate the native species (GISIN, 2011). *Lantana camara* become the understorey species in disturbed native forest thus dominating the flora, causing disruption in succession and loss in biodiversity. The allelopathic activities of plant tend to reduce the vigor of other species in its proximity. In addition to its impact on grazing lands, *Lantana camara* often causes a reduction in yield or impedes harvesting in plantations. Also, species has potential to contaminate the gene pool of the

rare plant species. Elsewhere the native species of *Lantana camara* belong to the section Calliorheas, so the major threat is competition rather than hybridization. It is a very effective competitor against native colonizers in presence of light, soil moisture and soil nutrients. One of the obvious changes that occur with the replacement of forest understorey is decrease in community biomass. Allelopathy characteristics of species enable it to survive secondary succession and become monospecific thickets. For example, allelopathic effects resulting in either no growth or reduced growth close to *Lantana camara* have been demonstrated in Christella dentata (fern), Morrenia odorata L. (milkweed vine), Lolium multiflorum L. (rye) and various crops such as wheat (Triticum aestivum), corn (Zea mays) and soyabean (Glycine max) (Sharma et al., 1997).

Fire regimes are altered immensely by the presence of the *Lantana camara* in natural systems (Hiremath and Sundaram, 2005). The species burns readily in hot and dry conditions. Its occurrence on forest margins are seen as major threat to community, as a result of increased inroads of fire into the forest. This is particularly so when the species occurs on edges of forest tracks and creeks in natural forests such as in national parks.

On social frontage, *Lantana camara* affects human health. The species harbors malarial mosquitoes in bushes resulting in health problems. These pests were previously brought under reasonable control through clearing of vegetation that harbored them. Subsequently, these species colonizes these cleared grounds resulting in disease carrying pests reinvading cleared areas inhabited by humans and domestic stocks (Greathead, 1971).

Lantana camara is a major problem in agricultural areas in most regions of India as it forms dense thickets, spread gregariously, outcompete pasture species, and affects both flora and fauna. The field cases occur mainly in young animals that have either been newly introduced into an area where *Lantana camara* grows (Sharma, 1997), or are without access to other fodder. Children and adults in many countries often consume ripe fruits of *Lantana camara*, without any ill effects. However, consumption of green fruit has proved to be fatal in some parts of India (Sharma, 1997). Apart from causing death of livestock, sub lethal doses of *Lantana camara* toxin causes reduction in potential production, manifested abortion, loss of milk production in dairy cows, and chronic wasting in beef cattle.

Thus, in summation, *Lantana camara* invasion in natural ecosystem results in widespread loss of native species diversity and disrupts ecosystem structure and functioning (Iyengar, 1933; Khoshoo and Mahal, 1967; Murali and Setty, 2001; Dixon, 2003; Sharma et al., 2005; Tumaneng-Diete, 2007; Sahu and Singh, 2008; Kohli, 2009; Dobhal et al., 2011; Sharma and Raghubanshi, 2012; Taylor et al., 2012). However, very little quantitative evidence is available to validate these claims in Indian settings. Information on potential harm caused by anthropogenic induced activities facilitating invasion is also lacking. The studies relating to techniques adopted to combat *Lantana camara* invasion potential in India have been reviewed in greater details in the subsequent section and an attempt has been made to identify gaps in existing studies. This would further help in aligning future research directions so that an informed and target specific management and planning can be implemented.

FRAMEWORK FOR LANTANA CAMARA MANAGEMENT IN INDIA – GAP ANALYSIS

Lantana camara tends to defy classic life-history theory through embodying contrasting traits such as by being good colonizers as well as good persisters (D'Antonio and Meyerson 2002); or may benefit from their homoclimatic origins and from the scarcity of natural enemies in the areas it invaded and become established (Colautti et al. 2006). Various attempts have been made in curbing the *Lantana camara* invasion however these techniques have suffered a setback in one or the other aspects.

A. Control and Manage

Till date, various control measures have been employed to curb *Lantana camara* infestations in India, but none have been able to completely curtail its invasion. Control measure involving mechanical methods are coupled with certain drawbacks such as problem of re-growth which is imminent if the rootstock is not removed while weeding (Babu et al., 2009); suitability of such method is for smaller areas only and not recommended in areas susceptible to erosion (Babu et al., 2009).

Various authors have proposed control of *Lantana camara* through application of chemicals (Achhireddy et al., 1985; Sharma et al., 1988). Glyphosate is marginally effective as a foliar spray and regrowth is common. Fluroxypyr (Vista) plus aminopyralid when applied twice within 6 months is effective, but costly. Even, Fluroxypyr applied as a basal application is consistently effective. However, these suggestions are still in documentation stage and little has been done in this regard to serve as effective measure to combat the growth of the species. Secondly, the use of such chemicals tend to cause harm to the native biota of the ecosystem thereby affecting food chain, soil health, causing water pollution and giving genesis to ancillary problems.

A number of biological control organisms have been studied for controlling *Lantana camara* spread. There are no effective agents available on an operational scale till date. Biological organisms for controlling *Lantana camara* include Ophiomyia Lantanae (fruit-mining fly), Calycomyza lantanae (agromyzid seedfly), Teleonemia elata (leaf-sucking bug), Teleonemia scrupulosa (leaf-sucking bug) but mostly failed as they have several varieties or forms resulting in complicating the introduction and establishment of exotic insects. Several other host specific insects such Diastema tigris (flower-mining moth), Salbia haemorrhoidalis (leaf-floding caterpillar), Uroplata girardi (leaf-mining beetle), Octotoma scabripennis (leaf-mining beetle) and Epinotia Lantanae (flower-mining moth) have been introduced from time to time for the biological suppression of *Lantana camara* but have not been effective in controlling its infestation. The main reasons for failures being the extreme variability of the plants, the extensive climatic range it invades and high level of parasitism on the natural enemies. Several researches on other candidate agents undergoing host specificity and potential impact studies are underway (Rao et al., 1971; Sankaran et al., 1971; Sen-Sharma and Mishra, 1986; Thakur et al., 1992; Sharma et al., 2005) and no concrete results have been reported despite the efforts of entomologists worldwide. The failure of

biocontrol program directs to think that long-term management will rely on integrated management approach which not only involves control measures, instead strategies directed to intercept species at each stage of invasion to be adopted to combat invasive species. All conventional control methods require extensive management and continuous follow-ups and this is an ongoing process. Table 6 summarizes use and when not to use of all above cited control measures. Thus, it is important for control programs to focus on techniques which would be effective and less cost intensive for better and sustainable management of *Lantana camara*. One such technique include mapping and modeling *Lantana camara* which would act as early detection tool and help manage invasion in current and future scenarios.

Table VI: Impacts of *Lantana camara*

Techniques	When to use	When not to use
Biological Control	• Biocontrol agents are available and not already present	• Biocontrol agents, if affect important species
Mechanical control	• Area suitable for access by machinery without significant damage and action • Not leading to further land degradation	• Close to rivers, creeks and drainage and lines, as damage to soil will impair water quality and increase erosion • If not possible to follow up with treatments such as chemical or manual removal
Manual removal	• Cheap labor available • Limited area to clear • When used as a follow-up technique after fire or mechanical removal	• Cost of labor outweighs land value
Fire control	• Extensive area • Little risk of fire spreading	• Species may increase the intensity and frequency of fire inappropriately. Not to be used unless treatment with chemical

B. Early detection and management

There are few empirical studies in India that look at *Lantana camara* for its ability to invade, despite it widespread distribution (Mohan Ram and Mathur 1984; Mathur and Mohan Ram 1986; Bambaradeniya et al. 2002; Napompeth et al. 2003; Sahu et al. 2008; Raghubanshi and Tripathi 2009). With the advent of satellite based remote sensing, many workers have recognized the possibility of mapping the distribution of invasive species (Tucker 1979; Anderson et al. 1998; Zhang et al. 2002; Underwood et al. 2003; Yang et al. 2007). However such techniques have not been of much use for mapping invasive species forming the forest understory. Despite being a serious threat to the ecosystem, *Lantana camara* has not been systematically mapped due to the difficulties posed by the technology. There is insufficient information of its distribution and the impact of its associated harm, which is critical for planning conservation. There are a few studies that have demonstrated the application of remote sensing in studying *Lantana camara* (Prasad et al. 2006; Kandwal et al. 2009). However for such accurate mapping of invasive species, it is important to consider the phenological stage of species at the time of satellite image acquisition. A combination of remote sensing techniques, GIS and expert knowledge offer potential to detect understory invasion through development of models and risk maps. However, till date, no such attempts have been reported in this direction to develop invasion risk map of *Lantana camara*.

C. Legislation

India has several statutes addressing issues associated with invasive alien species. However, there is neither a core policy nor legislative framework of common elements, goals and definitions. Also there has not been a concerted attempt made to harmonize the relevant laws and regulations to ensure uniform and consistent practice. Also, there are gaps in addressing management and control of invasive species in legislation and policy. Relevant legislation includes The Destructive Insects and Pests Act, 1914 and amendments; Indian Forest Act, 1927; Wildlife (Protection) Act, 1972; Forest (Conservation) Act, 1980; Environment Protection Act, 1986; The Plants, Fruits and Seeds (Regulation of Import into India) Order 1989 (PFS Order 1989); Livestock Importation Act, 1898 and the Livestock Importation (Amendment) Ordinance, 2001; National Policy and Macrolevel Action Strategy on Biodiversity, 1999; The Biological Diversity Act, 2002; The Plant Quarantine (Regulation of Import into India) Order, 2003; National Environment Policy, 2004; The Prevention and Control of Infectious and Contagious Disease in Animals Act, 2009; but none is exclusively intended to deal with the invasive alien species and in particularly for *Lantana camara* control and management (FAO 2003; CBD 2005; CITES 2005; MoEF 2008; CIA 2008; APFISN 2009; GISP 2009). In addition, there is no full proof system of reporting about the existence of invasive in India either through the government officials or the general public. Thus, only when a species becomes invasive and starts affecting socio-economically, measures are taken for its eradication and control (Asia-Pacific Forest Invasive Species Network report 2009). Several attempts to assess the risks posed to ecosystems, habitats and species by some invasive species within India have been carried out. However, most assessments are done at the local level only. Thus, it is important to develop control and management framework that focuses on strategies and actions which would be effective and less cost intensive for better and sustainable management of *Lantana camara*.

ALTERNATIVE APPROACHES TO CURTAIL LANTANA CAMARA INVASION

As discussed in previous sections, fully effective control techniques are not currently available for this notorious weed. In many areas, the sheer size of the infestations coupled with low land values makes conventional control not feasible. However mechanical clearing and hand pulling are suitable for small areas and fire can be used over large areas. Also there are several control chemicals which are most effective when applied to re-growth following other treatments. Given the limited success of bio-control till date in most areas, it is therefore important for planners and managers to develop strategies aimed at best utilization of the species. This may include planning to use the species as means of generating livelihood opportunities through craft making, creating market for herbal medicine or serve as biofuel agents through involvement of community. These practices will likely not only curb the invasion but simultaneously make people aware of the consequences of plant invasion. With this purview, some of the potential commercial uses of *Lantana camara* are enlisted below.

A. Handicrafts

Lantana camara has not only made itself ubiquitous it has also made itself indispensable. Some unpublished literature has apparently suggested that certain species rely on *Lantana camara* and a crash will be imminent if there is uncontrolled removal of this weed. Thus this call for attention in removal of this weed and many parameters will have to be considered when attempting such an exercise. Thus instead of eliminating, its advised to utilize such species as means of generating livelihoods or put it to various commercial use.

In the Male Madeshwara Hills in Karnataka, the project to control *Lantana camara* is an interesting mix of community involvement into conservation practices with payoffs for both (Aravind et al. 2006; Kannan et al. 2008). *Lantana camara* parts are being used effectively in making furniture which is cheaper than cane and equally sturdy. The furniture lasts long and does not get easily eaten away by termites. Soligas, the tribal artisans of South India are ingeniously utilizing the invasive weed *Lantana camara*, as a substitute for rattan and W. tinctoria, and converting it into value added products such as furniture, toys and articles of household utility (Kannan et al. 2008). Currently, nearly 50 replicas of cane furniture and 25 designs of toys produced by these artisans from *Lantana camara*. ATREE is helping the tribals in marketing and certification of *Lantana camara* products, marked *Lantana camara* crafts (LCC). This innovative idea won the Global Development Marketplace award in 2003. Through recent support from Rainforest Concern, the use of *Lantana camara* has been extended to additional communities in south India to develop their own administrative structures and formalize market linkages. Attempts are also being made to design and diversify the range of products.

Lantana camara seemed to have overrun Lachhiwala village, 24 km from state capital Dehradun, occupying almost one lakh hectares of land. Lantana's reputation did not daunt the villagers as they have given it an economic value. They use Lantana and mud to make the walls of their houses as well as chicken coops. Stripped of the bark, the insect- and pest-resistant Lantana stems are put to varied use-the sturdier ones make good furniture, the pliant are fashioned into trays and baskets. The pungent Lantana leaves have been used to make excellent mosquito repellents and incense sticks. Such innovative use of the weed brings in Rs 75,000 a year for each of the families there. And it has earned the village a new name: Lantana village. The credit for the success of this experiment goes to the scientists of the Dehradun-based NGO Himalayan Environmental Studies and Conservation Organization (HESCO) which provides logistic and marketing support to the villagers. Experiments like that of Lantana village shows that innovation can perk up a weak economy.

B. Herbal Medicine

Lantana camara has several therapeutic uses, mainly as herbal medicine (Sharma et al. 1988; Sharma and Sharma 1989; Ghisalberti 2000; Sharma et al. 1999). There has been much work conducted in India on the chemical constituents of *Lantana camara*; extracts from the leaves exhibit antimicrobial, fungicidal, insecticidal, nematicidal, biocidal activity (Sharma and Sharma 1989; Begum et al. 2000; Saxena 2000; Sharma et al. 2007). Lantana oil is used externally for leprosy and scabies (Ghisalberti 2000). Plant extracts are used as medicine for the treatment of cancers, chicken pox, measles, asthma, ulcers, swellings, eczema, tumors, high blood pressure, bilious fevers, catarrhal infections, tetanus, rheumatism, malaria and atoxy of abdominal viscera (Begum et al. 2000).

C. BioFuel

Lantana camara twigs and stems serve as useful fuel for cooking and heating in many regions of India (Sharma et al. 1988), although it is less important than other fuel sources such as windrows, woodlots or natural bush (Varshney et al. 2006). Its use for fuel ethanol production is recommended in various research findings (Sharma et al. 1988; Inada et al. 1997; Varshney et al. 2006). Biofuels obtained from twigs and stems serve useful fuel for cooking and heating in many regions of India.

D. Kraft Pulping

Paper industries are in search for possible non wood renewable raw material that can replace traditional forest based species like wood and bamboo. *Lantana camara*, having 75.03% hollo-cellulose, 8.461%Extractive, 18.21% lignin and 2.31% silica can be a good potential source of raw material for paper making (Ray et al. 2006). Researches by Ray et al. (2006), Naithani and Pande (2009), Bhatt et al. (2011) have demonstrated *Lantana camara* as potential source of raw material for paper making. Thus, it is important to develop a management framework keeping in purview benefits and limitations of various control techniques for sustainable management of *Lantana camara*.

CONCLUSION

Lantana camara is one of the notorious weeds causing dramatic and apparently irreversible degradation of natural communities in India. Much has been done on the chemical, mechanical and biological control of the species without identifying the target sites and prioritizing the same. Given the ecological value of the native community, preventing detrimental impacts of invasion is of utmost importance. Early detection is the most effective way to reduce the impact of such species. Currently, there is little information available on spatial distribution of *Lantana camara* invasion and its potential geographic spread. Creating spatially explicit model of *Lantana camara* invasion risk will allow planners and managers to undertake appropriate measures. This will enable to counter negative change to sustain conservation efforts for the progeny. The more promising areas for future research are the modeling and mapping invasion risk potential. Integration of such techniques is likely to result in improved control and mitigation strategies.

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Association between Dopamine Gene and Alcoholism in Pategar Community of Dharwad, Karnataka

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Abstract: Alcoholic intoxication is a major social problem of public health all over the world. It is also related to a complex genetic association. The allele A9 of the dopamine transporter gene (DAT1; SLC6A3) was examined for association with alcoholism. The present study determines the distribution of the variable number of tandem repeat (VNTR) polymorphism in the 3'untranslated region of DAT1 in Pategar community of Dharwad. A group of 100 healthy controls (nonalcoholic) and 100 alcoholic patients were examined and genotyping study was done. The genotyping in individual gender was examined. The four allele frequencies 7, 9, 10 and 11 repeats of the DAT1 40-bp VNTR were detected. The analysis was carried out by using PCR and electrophoresis. The frequency of the allele A9 [f (A9+)] was significantly higher (P = 0.01) in the group of alcoholic patients [f (A9+) = 0.52] when compared with healthy controls (nonalcoholic) [f (A9+) = 0.30].The heterozygosity indices were low and varied from 0.090 to 0.390. This research study shows that the frequency of individuals carrying the allele A9 was significantly higher in the group of alcoholic patients compared with healthy controls. The results demonstrate the variability of the DAT1 40-bp VNTR polymorphism in Pategar community, Dharwad.

Index Terms: alcoholism, allele frequency, dopamine gene, dharwad, pategar community

I. INTRODUCTION

Alcoholic intoxication is a major social problem of public health all over the world. It is also related to a complex genetic association. Dopamine is a biogenicamine and is a key neurotransmitter in the brain tissue involvedin cardiovascular, renal, endocrinal and central nervoussystem regulation.The gene encoding DAT1SLC6A3 consistsof 15 exons,solute carrier family 6and spanning 60 kb on chromosome 5p15.32. Several studies have examined the associationsbetween variants in DAT1 gene and psychiatric disorders.The dopamine transporter gene (DAT) is essential for the regulation of dopaminergic neurotransmission. In most populations, A9 and A10 alleles repetition are common, although the A3, A5, A7, A8, A11 repeat alleles were also observed in various populations.This study is conducted to find out the association of allele A9 carrier status of DAT1 with a diagnosis of alcoholism in a case control design. The SLC6A3 genotypes in alcoholic patients show significant enhanced homozygote (genotypes 9/9 and 10/10) and reduced heterozygote (genotype 9/10) frequencies in contrast tohealthy controls.

Figure 1: Map of India showing the geographical location of the sampled area of the populations. The lines within the map indicate the borders of different states.

II. MATERIAL AND METHODS

The 200 individuals were selected fromPategar community of Dharwad and written informed consent was obtained from each of them.The screeningevaluations of all participating individuals were conducted by interview and clinical examination. Those were based on Structured Clinical Case Taking Proforma, MAST and AUDIT questionnaires. A group of 100 healthy controls (non-alcoholic) and 100 alcoholic patients were selected.Inclusion criteria for the healthy control group were: (1) absence of any neurological or psychiatric illnesses, (2) absence of pregnancy, (3) informed consent.Inclusion criteria for alcoholic patients were as follows: (1) diagnosis of alcoholic dependence (2) no history of severe medical conditions (3) absence of pregnancy (4) informed consent.

DNA isolation and genotyping:
The SDS- proteinase K method was used for extraction of DNA from a blood sample.

Statistical analysis:
The Fisher's exact test was used for comparison of allele A9 frequencies of the DAT 1 polymorphism between alcoholic patients and healthy controls.A significance level of 5% was considered for a type 1 error.Hot Water Distribution System Model program (HWSIM)and GENEPOP program were used for assessment of Hardy–Weinberg equilibrium (HWE) deviations.Using the FSTAT programcalculations of allele frequencies were observedand expected heterozygosity levels and F statistics were calculated.

III. RESULT AND DISCUSSIONS

All the 200 study subjects were genotyped for the DAT1 polymorphism. For all analyzed study subjects the genotype frequencies did not differ significantly from HWE ($P > 0.21$ in all cases). Table 1 exhibits the comparison between healthy controls and alcoholic patients on the basis of A9 allele. It is clear from the table that allele A9 was significantly ($P = 0.01$) higher in the group of alcoholic patients [f (A9+) = 0.52]when compared with healthy controls [f (A9+) = 0.30].

The male and female group exhibit variation in the expression of A9 allele; hence males and females wereanalyzedseparately and compared.Table 2 shows the distribution of A9 allele among male alcoholic patients and controls.It is clear from the table that, the frequency of the allele A9 was significantlyhigh [f (A9+) = 0.54] as compared to controls ($P = 0.02$).

Table 3 shows the distribution of A9 allele among female alcoholic patients and controls. The frequency of allele A9 issignificantly high [f (A9+) = 0.55] among alcoholic patients when compared to controls($P = 0.18$).

Table I:The Distribution of A9 alleles among the alcoholic patients andcontrols.

Sample	N	f(A9+)	P [f (A9+)]
Alcoholic patients	100	0.52	0.01
Healthy controls	100	0.30	

Table II: The comparison between male alcoholic patients and controls on the basis of A9 alleles.

Sample	N	f(A9+)	P[f (A9+)]
Malealcoholic patients	85	0.54	0.02
Malehealthy controls	75	0.32	

Table III. The comparison between female alcoholic patients and controls on the basis of A9 alleles.

Sample	N	f (A9+)	P[f (A9+)]

Female alcoholic patients	15	0.55	0.18
Female healthy controls	25	0.34	

Table IV: The Allele frequencies and Hardy – Weinberg proportions of the DAT1; SLC6A3 polymorphism in Pategar community of Dharwad.

Pategar community of Dharwad	**Allele frequencies**				**HW X^2**	***P* value**
	7	9	10	11		
Alcoholic patients		0.250	0.720		7.177	0.066
Healthy controls	0.012	0.089	0.909		2.945	0.499

The frequency distribution of alleles is shown in Tables 4. This study clearly shows Hardy-Weinberg equilibrium and the analysis identified four alleles 7, 9, 10 and 11 -repeats. The 9 and 10-repeat alleles were more common in the Pategarcommunity. The frequency of 9 and 10-repeat allele is 0.250 and 0.720 in alcoholic patients. In healthy controls the frequency of 9 and 10-repeat allele is 0.089 and 0.909. The 11-repeat allele was not detected in the Pategar community. The 7-repeat allele was only observed in healthy controls with the frequency of 0.012.

Table V: The genotype frequencies and observed heterozygosity of the DAT1; SLC6A3 gene in Pategar community of Dharwad.

Pategar community of Dharwad	**Genotype frequencies**							**Observed heterozygosity**
	7/7	**7/9**	**9/9**	**9/10**	**10/10**	**10/11**	**11/11**	
Alcoholic patients			0.059	0.039	0.574			0.390
Healthy controls		0.032	0.090	0.890	0.710			0.090

Table 5 shows the distribution of the genotype frequencies and observed heterozygosity of the DAT1; SLC6A3 gene in the Pategar community. The heterozygosity indices were observed comparatively low in the healthy controls. These results demonstrate the variability of the DAT1 40-bp VNTR polymorphism in alcoholic patients and healthy controls among the Pategar community.

IV. CONCLUSIONS

It is clear from the present findings that there is an influence of DAT1 VNTR polymorphism in the etiology of alcoholism amongPategar community of Dharwad. This study also shows that most frequent nine and ten-repeat allele deviate significantly from alcoholic patients. The present research study establishes the association between allele A9 carrier status of DAT1 and alcoholism.

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The Effects of Alpha Emitters on Powder Blood for Women's Infertility in Kurdistan –Iraq

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Abstract- Blood samples were acquired from 60 women aged 20 to 44 years having decreased fertility, infertile or with uterine tumors in the Iraqi Kurdistan region. A pilot experiment was performed to determine alpha radionuclides in powder blood. The concentrations of alpha emitters in powdered blood ranged from 0.0036ppm in Eiskan to 0.0096 ppm in Halabjay–Kon in Sulaymania Governorate, with average (0.0085 ppm) that was high significant difference in concentration($p<0.001$). And the alpha emitter concentrations in powdered blood ranged from 0.0031 ppm in Shorsh to 0.0146 ppm in Sedakan in the Erbil Governorate, with average (0.0062 ppm) that was high significant difference in concentration($p<0.001$). The average results of concentration in Erbil was higher than the concentration in Sulaymania. Exposure to ionizing radiation higher than the environmental radiation levels causes different diseases. To prevent dysfunction and decreases in the life span of red blood cells, the concentrations must be determined because the high concentration and degree of exposure to alpha particles are more damaging to the living tissue and gonads, most of data have been significant, therefore, the result shown that the radiation effect on women fertility.

Index Terms- Women fertility, powder blood, alpha emitters, ionizing radiation and Kurdistan region

I. INTRODUCTION

The Uranium enters the bodies through the food, water and air. When you breathe uranium dust. The size of the uranium dust particles and how easily they dissolve determines where in the body the uranium goes and how it leaves y our body, they may gradually dissolve and go into blood. If the particles do dissolve easily, they go into the blood more quickly (Fernando et al., 2011). The soluble particles will be absorbed in the blood and remove from it to other organs (Tanabo et al., 2001)

Blood is one of the most widely used and accepted matrices for environmental toxicology (Fernando et al., 2011). The alpha emitting radioactive substances are harmful to normal human tissues because of their high attenuation power. Alpha particles cause damage to various organs through their chemical and radioactivity toxicity effects (Kendall et al., 2002).

Alpha particles are more damaging to living tissues because they are more massive and more highly charged than other types of ionizing radiation (Baker et al., 1992, Meo 2004) White blood cells and other hematopoietic cells are constantly regenerating; therefore, the hematopoietic organs are few of the most sensitive organs to radiation. The effective degree of ionization caused by incident alpha particles depends on their energy and length of exposure, and causes excitation of molecules in the blood. Ionization and excitation occur because of absorption by biological materials. The extent of absorption is strongly depend on radionuclide dermal absorption. The damage to living cells affects the gonads, which may lead to infertility in women (Meo et al., 2004).

New and elaborate techniques for low-level alpha particle detection have been developed over the past years. These techniques have wide potential applications in the study of radioactivity in biological systems, but their crucial role depends on their ability to monitor alpha emissions in human tissues, particularly in women. In this paper, we report a pilot experiment to determine the feasibility of monitoring radioactivity in the bloodstream by immersion of CR-39. Concentrated and powdered blood samples were used to detect the background levels of ^{222}Rn and daughter nuclei from ^{222}Rn decay and alpha emitters. Tracks of ionizing particles were detected using CR-39 detectors. In the present work, this technique was utilized to the study blood (Nsiahet al., 2011). When charged particles pass through CR-39 detectors, they break the molecular bonds of CR-39 to form nuclear damage trails with high ionization (Libinaki et al., 2006).

The samples were collected from women who have symptoms of infertility from different locations in the Iraqi Kurdistan region who were prepared suitably for practical work under the supervision of the medical authority and institutions. Then, the physical study was conducted to investigation

II. MATERIALS AND RESEARCH METHODOLOGY

Blood

The function of the blood is to deliver nutrients, hormones and oxygen to tissues (Kendall) The blood consists of cells surrounded by a liquid matrix, which circulates through the heart and blood vessels. Total blood volume in females is (4-5) litters, cells and cells fragments it is about (55%) (Tanabo et al., 2001). Blood is a circulating tissue composed of fluid plasma and cells (red blood cells, white blood cells, platelets). Anatomically, blood is considered as connective tissue because of its origin in the bones and its function. Radiation and chemotherapy adversely affect blood cell counts (Puchala et al., 2004).

Sample collection and preparation

Collection of fresh blood

Blood samples were collected from 90 women, who have decreased fertility, infertile and who suffer the tumor in uterus of

women in the Iraqi Kurdistan region. The age women ranged from 21 years to 43 years. Three 3 mL blood samples were aseptically collected from each subject using disposable syringe. Each sample blood was immediately transferred into a tube containing ethylenediamine tetraacetic acid (EDTA) in order to prevent blood clotting. The personal information of each woman was recorded and labeled. The samples were stored at 4 °C (Zhu) because the blood should be stored at 2–4 °C (Zhu et al., 2009, Roussetski et al., 2004).

Preparation of powder blood

Blood samples were heated at 70 °C for six hours to dry and oxidize organic material. The samples were then ground and pulverized several times, and sieved through a fine mesh (0.5 mm) to obtain a powder with a homogenous grain size distribution. The alpha concentrations were measured using the long tube technique with the plastic detector (CR-39) to record the tracks of α-particles from radon during exposure. Then, 0.5 g from each powder blood samples were placed in PVC tubes with one CR-39 detector placed on the samples inside the tube, shown in figure 1

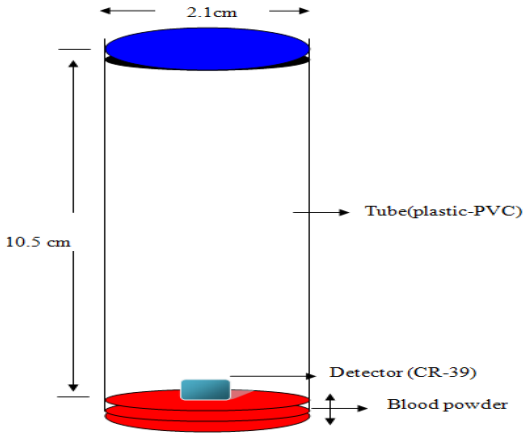

Figure 1. A long-tube PVC designed to record alpha emitters in laboratory.

The tubes were stored for about 60 days and left in the same medical refrigerator. After a period of 60 days, all detectors (CR-39) were etched chemically at the same laboratory in 6.25N of NaOH solution at temperature of 60 ^{0}C for 8 hours, and the tracks density were recorded using the optical microscope. The density of the tracks (ρ) in the samples was calculated according to the following relation (Meo 2004).

Track density (ρ) = Average number of total pits (tracks) /Area of field view…….1

The concentrations of alpha emitters in the blood samples were measured by comparison between track densities registered on the detectors and that of the standard blood sample from the relation (Karim et al., 2010).by the following relation:

C_X (sample) / ρ_X (sample) = C_S (standard) / ρ_S (standard) ……...2

$C_X = C_S . (\rho_X / \rho_S)$ ……..…. 3

where :

C_X : Uranium concentration of blood in unknown sample (ppm).

C_S : Uranium concentration of blood in standard sample (ppm).

ρ_X: Track density of unknown sample (tracks/mm^2).

ρ_S: Track density of standard sample (tracks/mm^2)

III. Statistical Analysis

All statistical calculations were performed using SPSS for Windows, Standard version 20.0. by used Independent t test and Paired t test.

IV. Result and Discussion

An in vitro study was conducted to determine the track density of alpha emitters in powdered blood from women. Each detector was scanned using an optical microscope. The alpha emitters concentration in the powdered blood samples were calculated using the formula (3) using a uranium standard. The results of the experiment confirmed the feasibility for determining the activity of individual radionuclide's in the samples by put the CR-39 NTDs on the powdered blood. The detection of surplus activity in the blood of women indicates that alpha emitters are detectable in the blood.

To prevent dysfunction and decreases in the life span of red blood cells, the concentrations must be determined because the high concentration and degree of exposure to alpha particles Alpha particles enter cells, it can cause an excitation of molecules in the blood, Whenever alpha particles, which are emitted from radon decay products, pass through a cell, DNA will likely be damaged (ionized) because the penetrating alpha particles causes genomic changes, that are more damaging to the living tissues because they are more massive and more highly charged than other types of ionizing radiation, which results in somatic effects or genetic damage to cell (Meo, 2006). Most important of which are the chromosomal changes that ultimately lead to conversion of normal cells into non normal cell , therefore, the damaged cells affect the gonads, which may decrease fertility in women (Nsioh et al. 201). These changes depend on the energy of alpha particles inside the blood, as well as the energy loss and concentration of alpha particles in the blood.

The concentration of alpha emitters in blood powder samples of women with problem's infertility in Sulaymania showed in the Table 1

The maximum concentration of alpha emitters in blood of women was found (0.0096 ppm) (43 years old) in Halabjay kon / Sulaymania governorate, and minimum concentration of alpha emitters in blood of women was found (0. 0036ppm) (22 years old) in Eiskan/ Sulaymania governorate, with average (0.0062 ppm).

Table 1: Evaluation of concentration of alpha emitters in powder blood for women in Sulaymania governorate in Iraqi Kurdistan region.

N.S.	Location	Age/ Years	Track density of alpha emitters track /mm^2	Concentration of alpha emitters (ppm)
1	Eiskan	22	8.061	0.0036
2	Khurmal	26	8.469	0.0038
3	Chamchamal	27	9.581	0.0043
4	Shekhan	28	9.924	0.0044
5	Darbandikhan	28	9.996	0.0045
6	Rzgary	29	10.317	0.0046
7	Bakhteary	30	10.317	0.0046
8	Reaea	31	11.044	0.0049
9	Takea	33	11.393	0.0051
10	Kalar	33	11.480	0.0051
11	Khalakan	34	11.743	0.0052
12	Bazean	34	11.931	0.0053
13	Kfry	35	12.193	0.0054
14	Sharawany	36	12.993	0.0058
15	Zaraeen	36	14.352	0.0064
16	Toymalek	36	14.917	0.0067
17	Said sadiq	36	14.958	0.0067
18	Penjween	36	15.277	0.0068
19	khormal	37	15.729	0.0070
20	Zargata	39	15.913	0.0071
21	Bardarash	38	16.208	0.0072
22	Mawat	39	16.282	0.0073
23	Dukan	39	16.849	0.0075
24	Qaladza	39	17.314	0.0077
25	Halabjay taza	40	17.547	0.0079
26	Rania	40	18.196	0.0081
27	Mamostayan	41	19.133	0.0086
28	Sulaymania	41	19.496	0.0087
29	Arbat	42	20.049	0.0090
30	Halabjay kon	43	21.387	0.0096
**			14.413	0.0062

**=Mean

The concentration of alpha emitters in blood samples of women with problem's fertility in Erbil showed in the Table 2 The maximum concentration of alpha emitters in blood of women was found (0.0146 ppm) (42 years) in Sedakan / Erbil governorate, and minimum concentration of alpha emitters in blood of women was found (0. 0031 ppm) (21 years) in Shorsh / Erbil governorate, with average (0.0085 ppm).

Table 2: Evaluation of alpha emitters concentration powder blood for women in Erbil governorate in Iraqi Kurdistan region, by passive method

N.S.	Location	Age/ Years	Track density of alpha emitters track /mm^2	Concentration of alpha emitters (ppm)
31	Shorsh	21	6.958	0.0031
32	Kas-Nazan	22	7.019	0.0031
33	Shaqlawa	25	7.077	0.0032
34	Salahadden	26	13.010	0.0058
35	Nazanen	26	13.436	0.0060
36	Holy- Zatd	27	13.473	0.0060

37	Kareat- Zanko	27	15.336	0.0069
38	Nawato dw	27	15.432	0.0069
39	Erbil Center	28	16.053	0.0072
40	Khalefan	28	16.073	0.0072
41	Rzgary	29	16.516	0.0074
42	Aeen-Kawa	29	16.868	0.0075
43	Saed -Taqan	29	17.430	0.0078
44	Sarsang	30	18.496	0.0083
45	Qshtapa	31	18.610	0.0083
46	Makhmur	31	19.212	0.0086
47	Shaqlawa	32	19.639	0.0088
48	Haji-Omaran	33	19.948	0.0089
49	Rawanduz	34	20.550	0.0092
50	Barzan	34	20.686	0.0093
51	Harer	35	21.131	0.0095
52	Taq-Taq	36	22.875	0.0103
53	Shekholla	37	23.108	0.0104
54	Prdea	38	24.427	0.0109
55	Ronaki	38	25.182	0.0113
56	Koya	38	25.920	0.0116
57	Barsren	40	26.132	0.0117
58	Deana	41	26.965	0.0121
59	Eiskan	42	27.625	0.0124
60	Sedakan	42	32.509	0.0146
**			18.923	0.0085

**=Mean

Alpha particles are more damaging to the living tissue and exposure of the gonads leads to decreased fertility in women

3. Differences in participants' laboratory outcomes between Erbil and Sulaymania

Significant differences found in participants' laboratory results between Erbil and Sulaymania. Track density of powder blood of Erbil's participants had significantly higher means than participants of Sulaymania. And powder blood concentration of alpha emitter, the means was found lower in results of Sulaymania' participants than results of Erbil' participants, the result of the alpha emitter concentrations of the blood powdered of women's problem fertility in Sulaymania was high significant difference ($p<0.001$), also the result of the alpha emitter concentrations of the blood powdered of women's problem fertility in Erbil was high significant difference ($p<0.001$), as shown in Table 3

Table3: Differences of participants' laboratory outcomes between Erbil and Sulaymania

Variables		Mean ± SD	Mean difference	*p* value
Track density in powder blood	Sulaymania	14.102 ±3.703	-4.822	**0.001**
	Erbil	18.923 ±6.200		
Conc. of alpha emitters in powder blood	Sulaymania	0.0062 ±0.029	-0.0077	**0.001**
	Erbil	0.0085 ± 0.048		

Independent t test

2- Correlations between participants' age and their laboratory results

Pearson correlation used to find out the correlations among the parametric results. Significant strong positive correlation found for age to track density of powder blood, powder blood concentration of alpha emitter. Significant positive correlation also found for track density of powder blood, powder blood concentration of alpha emitter, as shown in Table 4.

Table 4: Correlations between participants' age and their laboratory ou

		Age	Track density of alpha emitters	Co. of alpha emitters in powder
Age	Pearson Correlation	1	**0.723**	**0.944**
	p value		**<0.001**	**<0.001**
Track density of powder blood	Pearson Correlation	**0.723**	1	**0.612**
	p value	**<0.001**		**<0.001**
Concentration of alpha emitters in powder blood	Pearson Correlation	**0.944**	**0.612**	1
	p value	**<0.001**	**<0.001**	

Correlation is significant at the 0.01 level (2-tailed)

V. Conclusion

The finding from this research shows that alpha concentration level in powdered blood in two places were different, the concentration of alpha emitters in blood of women with weakness in fertility in Iraqi Kurdistan region is higher in Erbil more than the concentration of alpha emitters of blood in Sulaymania. The alpha particles are more damaging to the living tissue, because they are more massive and more highly charged than other types of ionizing radiation, resulting in cell somatic effect or genetic damage, and destroy the living cells causing impact in gonads, leading weakness in women fertility. Most of data have been significant, therefore, the result shown that the radiation effect on women's fertility

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Efficient Association Rule Mining using Fuzzy Weight on Fuzzy Values

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Abstract- One of the most important challenges of HR professional is to manage organization's talents, especially to ensure the right person for the right job. This paper presents an idea of identifying leadership quality in a person, which is a potential contribution that Data Mining (DM) could make within the Human Resource (HR) function in organizations, using association rule mining which is one of the most important techniques in the field of Data Mining. The original idea derives from attempts to deal with quantitative attributes in a database, where subdivision of the quantitative values into crisp sets would lead to over or underestimating values. The concept of Fuzzy will help to overcome the problem by allowing partial memberships to variable values**.**

Index Terms- Data mining, Association rule, Fuzzy value, Human resource

1. INTRODUCTION

Human Resource application that are embedded with artificial intelligent (AI) techniques can be used to help decision makers to solve unstructured decisions [1].In the advancement of technology many techniques are used to advance the HR application capabilities. Data mining may be regarded as an evolving approach to data analysis in very large databases that could become a useful tool to HR professionals. Data mining involves extracting knowledge based on patterns of data in very large databases. Yet, data mining goes beyond simply performing data analysis on large data sets [2].

Today's competitive marketplace requires human resource professionals to have an expanded role in the organization due to increasing importance of social and relationship capital. [7] There are many researches on solving HRM problems that uses Data Mining approach.

High risk requires high control. As situations grow more complex and challenging, power needs to shift to the top with the leaders who know what to do [8]. Such an important role should be played by a leader, for which organizations strives to find the right person for the right place at right time. The following figure shows the roadmap of a leader in which we are going to concentrate on the second part. [7]

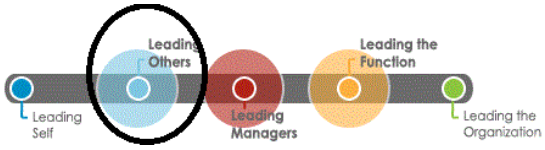

Figure.1. Leader Roadmap

2. ASSOCIATION RULES

2.1 Basics

In data mining, association rule learning is a popular and renowned method for discovering interesting relations between variables in large databases. A standard association rule is a rule of the form X→Y which says that if X is true of an instance in a database, so is Y true of the same instance, with a certain level of significance as measured by two indicators, support and confidence[6].

2.2 Definition

Let $\mathbf{I = \{i_1, i_2, ..., i_n\}}$ be a set of *n* binary attributes called *items*. Let $\mathbf{D = \{t_1, t_2, ..., t_n\}}$ be a set of transactions called the *database*. Each transaction in **D** has a unique transaction ID and contains a subset of the items in **I**. A rule is defined as an implication of the form

X→Y where **X, Y ⊆ I** and X ∩Y =Ø**.** The sets of items **X** and **Y** are called *antecedent* (left-hand-side or LHS) and *consequent* (right-hand-side or RHS) of the rule respectively. To select interesting rules from the set of all possible rules, constraints on various measures of significance and interest can be used. The best-known constraints are minimum thresholds on support and confidence [6].

1.**Support**-The support of a rule is defined as

Supp(X) **= no. of transactions which contain the item set X / total no. of transactions** **(1)**

2.**Confidence**-The ***confidence*** of a rule is defined as

$$\text{Conf}(X \rightarrow Y) = \text{Supp}(X \cup Y) / \text{Supp}(X) \quad \textbf{(2)}$$

3. FUZZY ASSOCIATION RULES

Based on classical association rule mining, a new approach has been developed expanding it by using fuzzy sets. The new fuzzy association rule mining approach emerged out of the necessity to mine quantitative data frequently present in databases efficiently. When dividing an attribute in the data into sets covering certain ranges of values, we are confronted with the sharp boundary problem.

Elements near the boundaries of a crisp set will either be ignored or overemphasized. For example, one can consider a set representing persons of middle age, ranging from 30 to 50 years old (Fig.2). In this example, a person aged 29 years would be a 0% representative and a 31 year old would be 100%. In reality, the difference between those ages is not that great. Implementing fuzziness can overcome this problem. The same problem can occur if one is dealing with categorical data. Sometimes, it is not ultimately possible to assign an item to a category. As an example, one can say that a tomato is a vegetable but also, in a way, a fruit. Crisp sets would only allow assigning the item to one single category, fuzzy sets allow different grades of membership to more than one set [10].

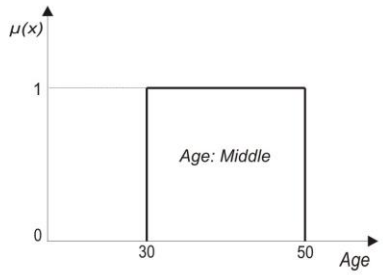

Figure. 2.Crisp Set

3.1 Quantitative Approach

Kuok et al. describe fuzzy association rules as follows [12], "Mining fuzzy association rule is the discovery of association rules using fuzzy set concepts such that the quantitative attribute can be handled" As in classical association rules, $I=\{i_1, i_2, \ldots, i_m\}$ represents all the attributes appearing in the transaction database $T=\{t_1, t_2, \ldots, t_n\}$. I contain all the possible items of a database, different combinations of those items are called item sets. Each attribute i_k will associate with several fuzzy sets. In order to represent the fuzzy sets associated with i_k , we use the notion $F_{i_k} = \{f_{i_k}^1, f_{i_k}^2, \ldots, f_{i_k}^l\}$ where $f_{i_k}^j$ is the j^{th} fuzzy set in F_{ik} . Fuzzy sets and their corresponding membership functions have to be defined by domain experts. Each of the fuzzy sets can be viewed as a [0,1] valued attribute, called fuzzy attribute. A fuzzy association rule has the following form: If X is A then Y is B. In this case, $X = \{x_1, x_2, \ldots, x_p\}$ and $Y = \{y_1, y_2, \ldots, y_q\}$ are item sets which are subsets of I . It is important to notice that those two sets must be disjoint and thus do not have any attributes in common. $A = \{f_{x_1}, f_{x_2}, \ldots, f_{x_p}\}$ and $B = \{f_{y_1}, f_{y_2}, \ldots f_{y_q}\}$ contain the fuzzy sets that are associated with X and Y .Known from classical association rules, *X is A* is the antecedent, *Y is B* is the consequent. If a sufficient amount of records approves this rule, we will call it satisfied.

3.2 Item set

The task of mining frequent item sets deals with discovering frequent episodes in a sequence of events [11]. The data can be viewed as a sequence of events associated with a certain time of occurrence. Speaking of a frequent episode, we mean a collection of events that frequently occurs jointly. A basic problem of the analysis of such episodes is to discover them in the first place. Episodes are partially ordered sets of events. Looking at these episodes enables to discover regularities, for example an event *X* is followed by an event *Y* in most of the cases. The crucial problem here is the definition of how close together two items have to be in a timely manner in order to qualify as an episode.

4. THE PROPOSED WORK- APPLYING FUZZY WEIGHT ON FUZZY ATTRIBUTE VALUES

Leadership is a topic on which huge amount of literature has been produced over the past decades. Many different management experts have developed theories and concepts on what leadership essentially is all about, what makes a person a good leader, how leaders could become better leaders, etc.[3] In this regard mining association rule with various attributes can determine a person how much he is capable of being a leader. After a vast search 12 attributes are selected as top qualities for leadership. Usually the presence and absence of a quality is represented as a binary value. Using binary value for these quality will not be a right way to determine the result since human being will have the quality in fuzzy[9] nature. The percentage and level of quality may vary but it cannot be determined by the values 'yes' or 'no'. In this situation relying on fuzzy values will be a better approach to determine the attribute values for the leadership qualities derived.

Once the fuzzy values are determined the next step is to assign weight for those values according to the priority and importance of the quality. For instance Integrity and creativity are most important characteristics for a person to be a leader than the others. So the importance of a quality is represented as weight to determine the result. In this research a vast survey has been made to determine the attributes and its corresponding weight. Having all the data in hand, the next step is to determine how much a person is eligible to be a leader (LQ) is given as follows.

$$LQ = \sum \; I_i \times W_i \div \text{Total No of I} \qquad (3)$$

where I is the attribute value, W is the weight assigned for the corresponding I, and i varies from 1 to N(12) which is the number of attributes derived for leadership quality. Table 1 represents the attributes, attribute values in fuzzy, the corresponding fuzzy weights for the attributes which has been calculated by taking the maximum of n number of values and finally the product of attribute value and weight respectively. The frequent itemset identified using apriori algorithm[6] on the following table data when applied with weight(I_iW_i) are {0.3},{0.6},{0.2},{0.7}.In absence of weight the frequent item set found are {0.5},{0.7},{0.9}.

Table 1 .Attribute, value and weight

Attribute	Value(I)	Fuzzy Weight(W)	I_iW_i
Attr1	1.0	1.0	1.0
Attr2	0.5	0.6	0.30
Attr3	0.7	0.9	0.63
Attr4	0.7	0.9	0.63
Attr5	0.5	0.6	0.30
Attr6	0.5	0.5	0.25
Attr7	0.8	0.9	0.73
Attr8	0.6	0.4	0.24
Attr9	0.7	1.0	0.70
Attr10	0.9	0.9	0.81
Attr11	0.9	0.8	0.72
Attr12	0.7	0.7	0.49

Method 1:Applying Fuzzy weight on attribute values.

For the following table data, when the algorithm (equation 3) is applied i.e., with fuzzy weight the result obtained is 0.5, which states that a particular person is capable to be a leader only by a membership value of 0.5 ,which can be further interpreted as his leadership may be fruitful of 0.5 and he may fail on his duties by 0.5.Here the risk factor in selecting such a person as leader is 50%. An organization must be very careful in taking such a person whose efficiency is such uncertain.

Method2: No Fuzzy weight applied

When this fuzzy weight is not applied the result obtained is 0.7, which states that the same person is capable to be a better leader by 0.7 and he may fail only by 0.3, which implies that the risk factor here is only 30%. When decision making comes in, organization obviously go for this person since the risk is lesser here. But actually he is of high risk to the company according to our algorithm discussed above.

Results:

Method1 :When weight applied the calculation goes as follows: the sum of product of attributes and corresponding weight divided by N = 6.6/12= 0.5.
Method 2: When weight not applied the calculation goes as follows: the sum of attributes divided byN =8.5/12 = 0.7.

In Method 2 the same data is providing a result ignoring the efficiency and accuracy of the person's leadership quality by 0.2 membership value high ,which is not at all a negligible factor for an organization's decision making to choose the right person for right job. When the organization takes a decision with Method 2, then they are at risk in choosing the lead. If they go with Method 1 they could identify that the person is uncertain and cannot be a leader for the team. This will help them to find a better leader who is really fit and suits the job as well.

5. CONCLUSION

Association rule mining has a wide range of applicability such market basket analysis, medical diagnosis/ research, Website navigation analysis, homeland security and so on. Advantage of apriori [5,6] is its easy implementation. In this paper we presented a new approach to mine better association rules by using fuzzy values and appropriate fuzzy weights [9] for the attributes. By using such technique the result obtained will be useful to make decision on leadership issues which is the prime factor necessary for today's corporate.The idea of empowering classical association rules by combining them with fuzzy set theory has already been around since several years. But the application of fuzzy weight on fuzzy values brings a better and more accurate result for the above application of finding a correct person as leader to lead the team which directly reduces organization's risk.

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Residential Solar Cooker with Enhanced Heat Supply

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***Abstract*-** Energy has become the utmost necessity of our life. It is required from dawn to dusk to fuel the world. Energy is scattered everywhere around the Earth. Man has always desired to capture it and use it for mankind. One of the most important sources of energy is solar energy. Several methods of capturing solar energy and its usage are practised. The intensity of solar rays is immense and ways are still being discovered to harness the full potential of the rays. Focussing the rays to a point will cause generation of heat. Transferring the energy towards cooking is one such method. Usually a solar cooker is a device that is placed in the open ground under direct sunlight. This causes inconvenience to the users. Recent developments are in progress to make it possible to cook under shelter harnessing energy from the solar rays.

There is extensive potential in the solar rays yet to be harnessed. The existing methods, apart from being inefficient in transferring energy, it fails to store the heat effectively. Introduction of Phase Change Materials (PCM) has done the trick of harnessing sun's energy to cook. By doing so the heat energy storing efficiency is increased and thereby effectively increases the process of cooking. With prices of LPG elevating, using this method proves to be cost effective and energy conserving. Unlike induction stoves, the residential solar cooker uses energy from the solar rays and is cost effective. In the absence of sunlight, the PCM setup still increases the efficiency of heating the utensils.

***Index Terms*-** solar cooker, phase change material, wax, solar mini pond, parabolic point solar collector.

I. INTRODUCTION

THe present day solar cooking promises in our expense.It could promise future technology when it comes user friendly.the usage of solar cooker is not predominantly found everywhere because of its seasonal changes.

The intensity of the solar rays is unpredictable and often plays truant during rainy and winter seasons. The harnessed energy is transferred and poorly stored. This reduces the overall efficiency of the device. The time required to cook the food is increased because of lacking in heat storage.

To overcome these major problems, a new design has been devised to heat efficiently using the sunny days and as well as the other dusky situations. This device not only transfers energy efficiently and stores it for continuous usage. The PCM material layered around the vessel stores heat effectively and heats up the vessel. This helps in reducing the fuel consumption to a greater extent during non-sunny days. The harnessed energy is not liberated thus assuring fast heating process.

II. EXISTING SYSTEMS

A. Box Cookers

Box cookers are the most common type made for personal use. They consist of an enclosed inner box covered with clear glass or plastic, a reflector, and insulation. There is a wide variety of patterns and plans that can be adapted to work with available materials. While they do not heat quickly, they provide slow, even cooking. Box cookers are very easy and safe to use, and fairly easy to construct.

B. Panel Cookers

Panel cookers are flat reflective panels which focus the sunlight on a cooking vessel without the inner box common in box cookers. Panel cookers are the easiest and least costly to make, requiring just four reflective panels and a cooking vessel, but they are unstable in high winds and do not retain as much heat when the sun is hidden behind clouds.

C. Parabolic Cookers

Parabolic cookers reach higher temperatures and cook more quickly than solar box cookers, but are harder to make and use. Parabolic cookers require more precision to focus the sunlight on the cooking vessel. If the sunlight is not focused exactly on the cooking vessel, the food will not cook. When the parabolic oven is used, the temperature must be watched so the vessel does not overheat, burning the food. The risk of burns and eye injury is greater with homemade parabolic designs. While they provide excellent results when used correctly, they are not easy to build at home and require great care to use.

III. DESCRIPTION

Cooking is vital and it has to be done in all places. Energy required for this operation is only from either LPG or electricity. Troubles will be faced in the production of both LPG and electricity. The effective cooking is also done by the alternative resources like solar energy which is explained below. The intact unit consists of vacuum tubes, phase change materials, cooker surrounded by the jacket, small tank, insulated tubes and parabolic collector. The system is designed with the assumptions of 5 persons in a domestic house.vaccum cube is taken and copper tubings is done inside it.The intent for choosing PCM is that it has superior latent heat storage. The volume of phase change material is calculated. According to the pondered

volume, phase change materials are crammed into insulated cubical box. The cubical box is chosen as it has lower value of surface area to volume (SA/V) ratio compared to other standard shapes. Hence heat loss will be minimum at the night time. The copper tubes are placed inside the vacuum tube which is bent for greater surface contact and to enhance the better heat transfer and water is promulgated inside the copper tube. This entire setup is positioned in the point focus of the parabolic collector.

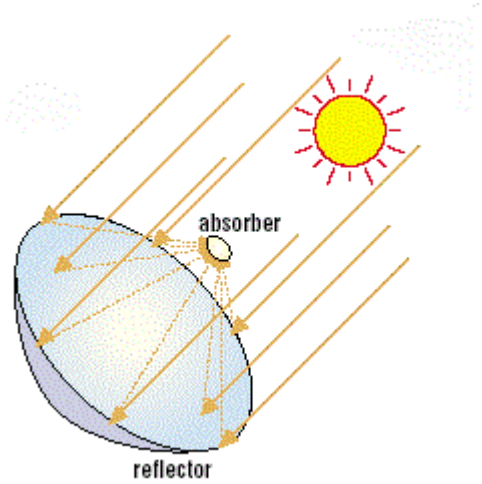

Figure 1:parabolic point collector

The area of parabolic collector is calculated by considering available solar irradiation per unit area and the energy required. Seven coils of copper tube are to be found for better surface area contact in the cube of phase change material located in the centre.since 57kg of PCM is required ,so two parabolic point solar collectors are used. The small tank is sited next to the cooker for condensation of the wet mixture. A pump is also built-in for the circulation of water and it completes one cycle. The temperature of water increases aggressively and it cooks the food in the cooker. If this system is erected in the universe, we can easily face the LPG and electrical power demand. By eliminating the usage of LPG, we can control the carbon emissions in large quantity.

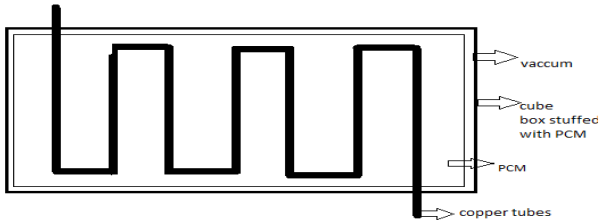

Figure 2: Cube box sectional view placed in parabolic trough

IV. WORKING

The entire arrangement works by utilizing heat from the solar irradiation and the efficiency relies upon the effective ways which harness the full potential of the sun. The parabolic collector is selected for the rationale of obtaining point focus in it. The parabolic collector reflects sun rays and converge it into a point where the vacuum tube packed with phase change material is positioned. Copper tubes are mounted inside the phase change material. The water as a working substance is circulated inside the copper tube which absorbs the heat extracted by the vacuum tube. In between the vacuum tube, cube of PCM is located which is well insulated from the surroundings which also plays effective role in heat transfer. Hot water is transferred to the cooker by insulated pipes to eliminate transmission heat loss. Due to the solar irradiation, water gets heated up in step by step process.since preheating is done in the first parabolic point solar collector,its is passed through non radiating pipes towards the second parabolic point collector to acquire required temperature as shown in layout Figure[3]. This hot water is made circulated through the jacket in the cooker. The small tank is sited next to the cooker for the condensation of the wet mixture of water vapour. A pump is used to drive the system of fluids. A valve is fitted for the adjusting of mass flow rate of water. This mass flowrate will controls the cooking temperature. If the mass flow rate is higher, it obtains lower cooking temperature and vice versa. This system surely meets the demand of LPG and power consumption and it also reduces pollution.The process is explained in Figure[3]

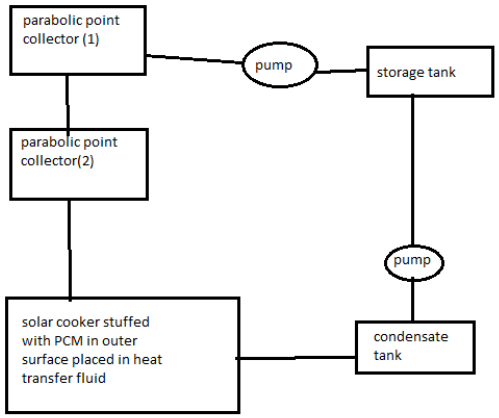

Figure 3:Model layout

V. .CALCULATION

ASSUMPTIONS:

1) It is assumed that 7L cooker is suited for 5 people in a house
2) The cooking food is considered to be water
3) The location for cooking is chosen to be Madurai, Tamilnadu, India
4) It is assumed that maximum final temperature of the food is 130-150C

5) Parabolic collector to be designed for PCM to attain maximum temperature of 160C
6) Optimum melting point of PCM is 120C
7) Time required to cook food during night time is assumed to be 1½ hours

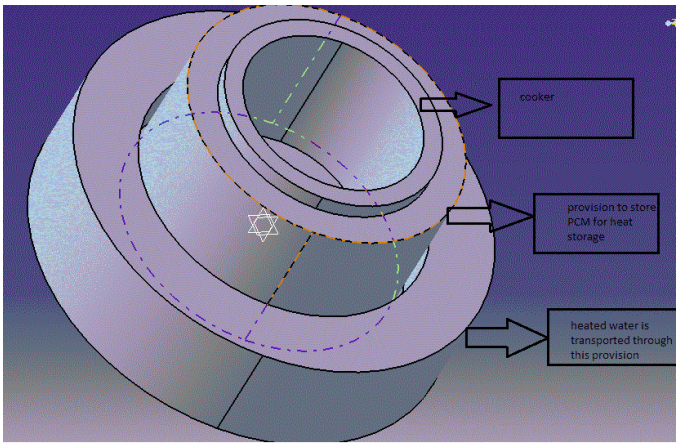

Figure 4:CAD MODEL OF COOKER

1.ENERGY REQUIRED TO COOK FOOD:
Volume of the Cooker V = 0.007 m
For water,
Density = 1000 kg/m^3
Mass m = 7 kg
Specific heat (at constant pressure) C
= 4.187 kJ/kg K
Initial temperature of food Ta = 30C (room temperature)
Maximum final temperature of food Tb=130C
Temperature difference dT = 100C
Required heat energy Q = m * C
dT = 7 * 4.187 *100
Q = 2930.9 kJ

2.TIME FOR BACKUP
Due to absence of sunlight during night time cooking,
let maximum time required to cook during night time = 1 ½ h

3.TEMPERATURE:
Maximum Cooking temperature T1 = 150C
Maximum temperature of PCM T2 = 160C

4.PCM SELECTION:
Required melting point of PCM = 120C
Name = S117
Melting point = 117C
Density = 1450 kg/m^3
Latent heat L = 160 kJ/kg
Specific heat capacity Cp = 2.61 kJ/kgK
Thermal conductivity k = 0.7 W/mK

5.MASS OF PCM REQUIRED:
Heat energy required to boil 1L q = 291.14kJ
By experiment,
Time taken to reach boiling point of water = 20 min
For 20 min energy supplied = 291.14 kJ
Let us assume backup time t = 1 ½ h
For 1 ½ h energy required Q = 1310.13 kJ/L
For 7 Litre,
Total energy required Q = 9170.91 kJ
Q = m * L
m = Q/L
m=57kg

57kg of PCM can be filled in 77.11cm side of cube .but we have used two parabolic point collector troughs,so two evacuvated cubes with copper pipings is made.eventually a cube has a side of 36 cm(approx).two cuboids are used because of getting PCM to obtain its phase change temperature quickly .

7.DESIGN OF COIL ASSUMPTIONS:
* Copper pipe diameter d = 12 mm
*Coil diameter D = 150 mm
* Free gap G = 10 mm
*No. of turns n = 7
*Secondary Length of the coil l = 100 mm
* Total length of the coil,
L = n * ((2 * p * r) + G) + (2 * l)
L = 53 cm

8.MASS OF CO2 EMISSION BY LPG;
LPG contains 70% propane and 30%butane
The chemical reactions are:
Propane :
C3H8 +5O2 ->3CO2+4H2O
Butane:
2C4H10+13O2->8CO2+10H2O
By atomic weight calculation,it is found 1 ton of LPG emits 3.04 ton(approx)

FURTHER WORK:
Since cooker is covered with PCM for cooking at night time with enhanced heat supply system.we can make it to keep fresh to serve by incorporating PCM inside cooker ,at surface where it is supposed to ignited.CAD drawings of proposed further work is shown here in Figure[5].PCM is filled in some extended surface which doesn't affect the cooking methods helps to utilize the waste energy and make it Go Green.

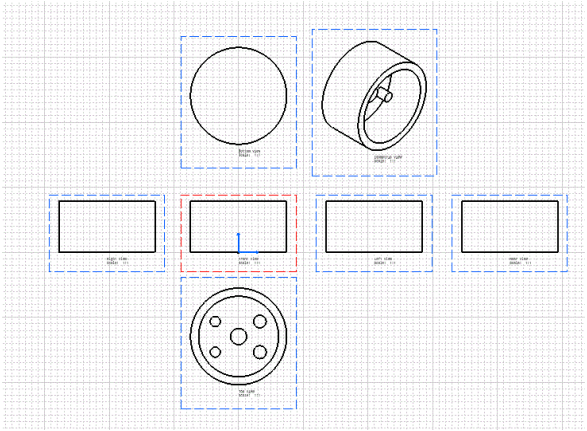

Figure 5:proposed work draft model

RESULTS AND DISCUSSION:

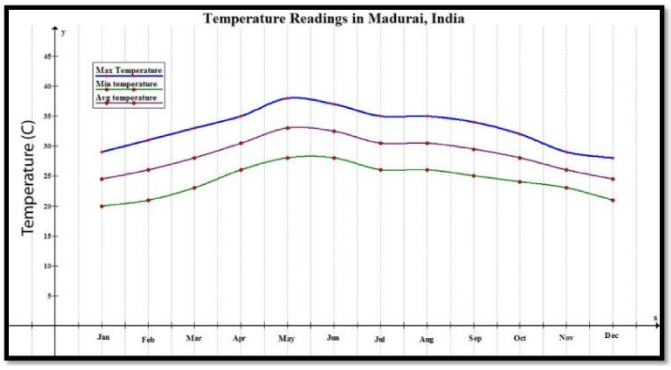

Figure 6:temperature reading in madurai

The above graphs shows the temperature readings in Madurai with average day time
temperature as maximum temperature and minimum temperature to be a night time temperature.
This graph shows that there will be enough solar irradiation in the tropical regions especially in India
to implement the steam cooking which is more suitable for houses and also hotels.

VI. CONCLUSION

The calculation is performed for above all assumptions and the total system is designed for
the domestic house. From the graph, it is found that the average day temperature of Madurai is 35degree celcius. hence it meet the cooking requirements by adopting the above design. The drawbacks in this system
will be little more investment than other systems. But the payback period will be few years
which total cost of cooking will be only the maintenance cost of the system. By improving the design
of vacuum tubes, PCM selection, tracking mechanism collector shapes etc., will have a great scope in market.

As our demand for LPG and electrical energy are escalating day by day, the amount of fossil
fuel will become scarce on one day. By implementing this system, it eradicate for cooking in night time. the overall system will work only during the daytime then it will not be compact and there will be cooker in each and every house will replace LPG and electric stove. Installation of this system in India reduces more than millions of temperature can be greatly reduced in the future.to this hectic world. The effects of thermo physical properties of PCM, installation methodology,location of pcm are scope of future work.

ACKNOWLEDGEMENT

We hereby declare that the paper above is our own thoughts developed into a model and working for future works.

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STOCK MARKET VOLATILITY: AN EVALUATION

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Abstract - The paper evaluated the multidimensional framework of stock market volatility. High indices of stock market in every aspect of measurement implied less variability of volatility. A country's depression or recession turned into severe volatile stock market which cannot be cured in the short run. Political turmoil or instability or chaos made negative impact on stock market which spurs volatility. The stock market volatility has the negative nexus with the growth rate of a nation i.e. high volatility reduces growth rate. There is causality between them. Since stock market volatility brings forth economic crisis which has ultimately spill over on growth inversely to other countries as well. The international trade and stock market volatility is negatively related in the sense that volatility reduces the volume of trade and increases current account and capital account deficits.

Index Terms – Stock market volatility, impact of volatility, factors of volatility, growth and volatility, trade and volatility

I. INTRODUCTION

Behaviour of stock market is uncertain, volatile and probabilistic although it is related with the major macroeconomic indicators of the economy. The stability of the stock market needs the strong capital market with high macro fundamentals. In the globalization era, the international trade plays a key role in changing stock market efficiency in the areas of banking and finance. The extreme volatility in the stock market produces instability in the capital market, destabilize the value of currency, as well as hampers international trade and finance. Even, the growth and the stock market volatility are inversely related where causality was found. A developed stock market should be fundamentally more competitive with any other international stock markets in which floating exchange rate mechanism is determined. The monetary and trade policy of a country crucially help in finding factors of stock market volatility to work properly although the patterns of behavior of investors and savers of the stakeholders are unknown where the political super structure and process of the economy are given. But the political factors may change parametrically. This paper evaluated the studies of the major works on stock market volatility on such multidimensional issues.

II. VOLATILITY AND ITS MEASUREMENT

"Volatility is basically a function of uncertainty."-say's John Bollinger. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index. Commonly, the higher the volatility, the riskier is the security. One measure of the relative volatility of a particular stock to the market is its beta. A beta approximates the overall volatility of a security's returns against the returns of a relevant benchmark (usually the S&P 500 is used). For example, a stock with a beta value of 1.1 has historically moved 110% for every 100% move in the benchmark, based on price level. Conversely, a stock with a beta of .9 has historically moved 90% for every 100% move in the underlying index. Volatility is measured by the Chicago Board of Options Exchange (CBOE), primarily through the CBOE Volatility Index (VIX) and, to a lesser extent, the CBOE Nasdaq Volatility Index (VXN) for technology stocks. Seasoned traders who monitor the markets closely usually buy stocks and index options when the VIX is high. When the VIX is low, it usually indicates that investors believe the market will head higher. The standard deviation tells us how tightly the price of a stock is grouped around the mean or moving average (MA). When the prices are tightly bunched together, the standard deviation is small. When the price is spread apart, you have a relatively large standard deviation. For securities, the higher the standard deviation, the greater the dispersion of returns and the higher the risk associated with the investment. As described by modern portfolio theory (MPT), volatility creates risk that is associated with the degree of dispersion of returns around the average. In other words, the greater the chance of

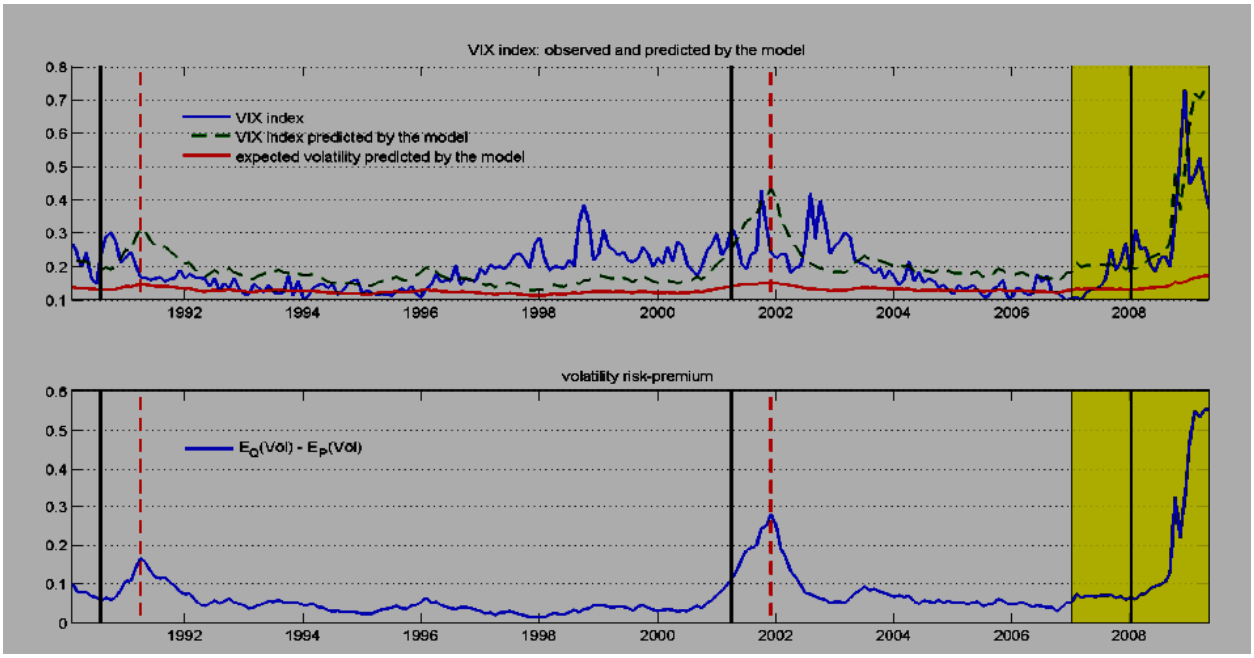
a lower-than-expected return, the riskier is the investment. Volatility tends to decline as the stock market rises and increase as the stock market falls. When volatility increases, risk increases and returns decrease. Risk is represented by the dispersion of returns around the mean. The greater the dispersion of returns around the mean, the larger is the drop in the compound return.
Crestmont Research used the average range for each day to measure the volatility of the Standard & Poor's 500 Index (S&P 500) index. Their research tells us that higher volatility corresponds to a higher probability of a declining market. Lower volatility corresponds to a higher probability of a rising market. The VIX is used as a tool to measure investor risk. A high reading on the VIX marks periods of higher stock market volatility. This high volatility also aligns with stock market bottoms. Low readings on the VIX mark periods of lower volatility. As a general trend, when the VIX rises the S&P 500 drops. When the VIX is at a high, the S&P 500 is at a low, which may be a good time to buy. The higher level of volatility that comes with bear markets has a direct impact on portfolios. It also adds to the level of concern and worry on the part of investors as they watch the value of their portfolios move more violently and decrease in value.

We've gone through some periods where that VIX Index got to almost record levels, especially after the financial crisis. But it mean-reverts. We didn't have a VIX Index in the 1920s and 1930s and early 1940s, but the volatility in that period was more extreme, sustained, and longer-lived than we get nowadays. The volatility of stocks has generally gone down over time. In the current situation, it's been particularly frustrating for politicians and those who run economies to see that the stock markets did recover but the labor markets, with a much stickier structure, have not. As investors get interested in a stock, trading volume, volatility, and prices rise, but stocks that are already volatile and very liquid actually have the worst returns. Using trading data from 1990 to 2011,the visuals are designed from S&P 500 index option data replicating the implied volatility wave (or variance swap curve) extending to an expiration of one year. The front of the volatility wave contains the same data used to calculate the CBOE VIX index. The movement of this wave demonstrates changing trader expectations of the future stock market volatility. As the wave moves through time the expected (or implied) volatility surface transforms into a realized volatility surface derived from historical S&P 500 index movement. The worry is that if interest rates now increase too much, this circle will become a vicious one-----higher interest rates will lead to money flowing back to the US from emerging markets, consumption in the US will decline, world growth will slow, and stock markets across the world will decline, with emerging markets being particularly hard hit.

III. FACTORS AFFECTING STOCK MARKET VOLATILITY

The risk-premiums arising from fluctuations in this volatility are strongly countercyclical, certainly more so than stock volatility alone. In fact, the risk-compensation for the fluctuation in the macroeconomic factors is large and countercyclical, and explains the large swings in the VIX index during recessions. When the VIX reached a record high of more than 70%, the model successfully reproduced through a counter cyclical variation in the volatility risk-premiums. It is evident that the same volatility risk-premiums might help predict developments in the business cycle in bad times and the end of a recession.
Which macroeconomic factor matters? It was found that industrial production growth is largely
responsible for the random fluctuations of stock volatility around its level, and that inflation plays, instead, a quite limited role in this context. At the same time, inflation plays an important role as a determinant of the VIX index, through two channels: (i) one, direct, channel, related to the inflation risk-premium, and (ii) an indirect channel, arising from the business cycle propagation mechanism, through which inflation and industrial production growth are correlated. The second channel is subtle, as it gives rise to a correlation risk that it is significantly priced by the market.(Corredi,Distaso &Male,2010).

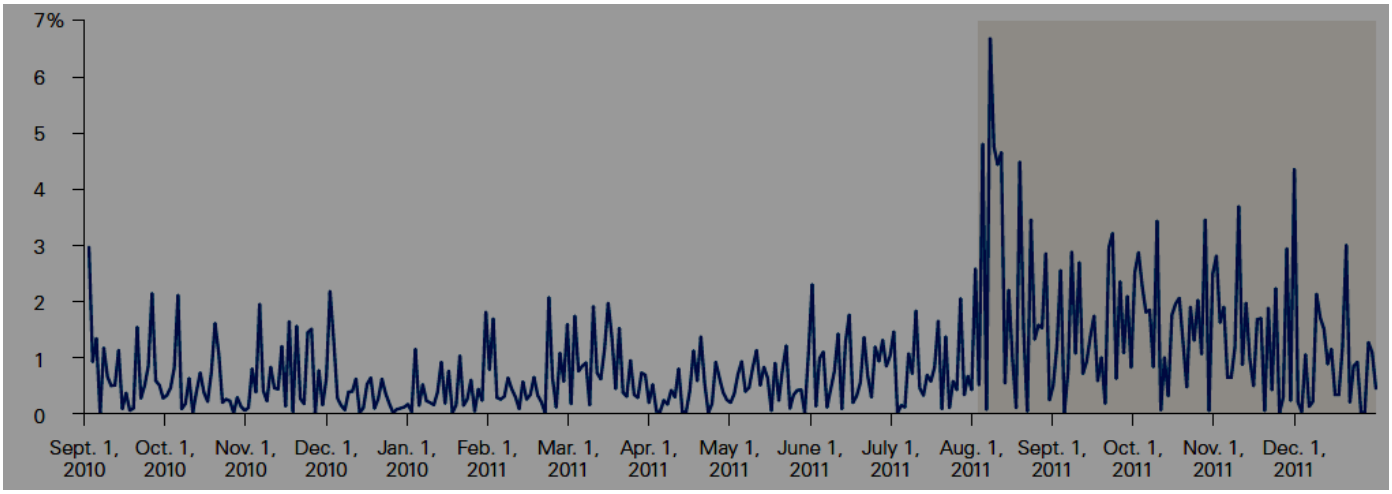
Fig.-1:VIX index and volatility risk premium



Source- Corredi, Valentina, Walter Distaso and Antonio Male,2010

In fact, stock volatility and volatility risk-premiums are driven by business cycle factors. An even more challenging and fundamental question is to explore the extent to which business cycle, stock volatility and volatility risk-premiums do endogenously develop. The volatility in global equity markets since late summer 2011 continues to attract widespread media and investor attention. Much of the commentary has focused on perceived causes for the volatility—such as the growth of hedge funds, high-frequency trading, quantitative investment programs, and vehicles such as exchange-traded funds (ETFs), specifically, leveraged and inverse ETFs. Little focus, meanwhile, has been placed on the global macro environment, which faces the continuing Euro zone debt crisis; the prospect of a slowing global economy; political brinkmanship in Washington, D.C., including the failure of the super committee created by the U.S. Congress to help reduce the national debt; and the rating downgrade of U.S. Treasury bonds from their AAA status by Standard & Poor's in early August 2011.

Fig-2:Volatility in the S&P index



Source- Corredi,Valentina,WalterDistaso and Antonio Male,2010

"Volatility in economic conditions" is defined here as the annualized rolling standard deviation over 36 months through December 31, 2011, in the Federal Reserve Bank of Philadelphia's Aruoba-Diebold-Scotti Business

Conditions Index, which is designed to track real business conditions at high frequency. The index's underlying (seasonally adjusted) economic indicators (weekly initial jobless claims, monthly payroll employment, industrial production, personal income less transfer payments, manufacturing and trade sales, and quarterly real gross domestic product) blend high- and low-frequency information and stock and flow data. Volatility in the S&P 500 Index is defined here as the annualized rolling standard deviation over the 36 months through December 31, 2011, in the price returns of the index.

To be sure, the 2000s have so far witnessed two severe bear markets and an extreme level of volatility and risk during the global financial crisis, yet it's important to note that between 2003 and 2007, stock market volatility and risk aversion were at all-time lows historically. And when we compared the first decade of the 2000s and 2011 with long-term history, do not support the theory. In fact, Table-1 shows that volatility since 2000 has been on a par with the long-term averages (i.e., 1929–1999).

Table-1: Standard deviation of S&P Index returns for selected periods:

Periods	Annual	Quarterly	Monthly	Daily
1929–December 31, 1999	19.36%	11.65%	5.67%	1.13%
2000–December 31, 2011	19.05	9.02	4.71	1.38

Source- Federal Reserve Bank of Philadelphia

The political history showed that during the Great Depression, aggregate stock market volatility in a large number of advanced economies reached so high levels not seen before or since. Schwert (1989b) estimates that in the US, there was a two- to threefold increase in variability. According to his measure, the monthly variation of stock returns peaked at over 20 percent in 1932. Other developed countries experienced similar increases in volatility. This is all the more puzzling since macroeconomic series such as money growth and interest rates showed markedly smaller increases in variability . As a general rule, neither wars nor periods of financial panic appear to lead to significantly higher variability of equity returns over an extended period — despite the highly unstable behavior of other macroeconomic series. Recessions, however, are clearly associated with higher volatility . The argument that political risk during the Great Depression is partly to blame is supported by the recent finding that unusually high levels of synchronicity of individual stock returns contributed substantially to aggregate volatility .

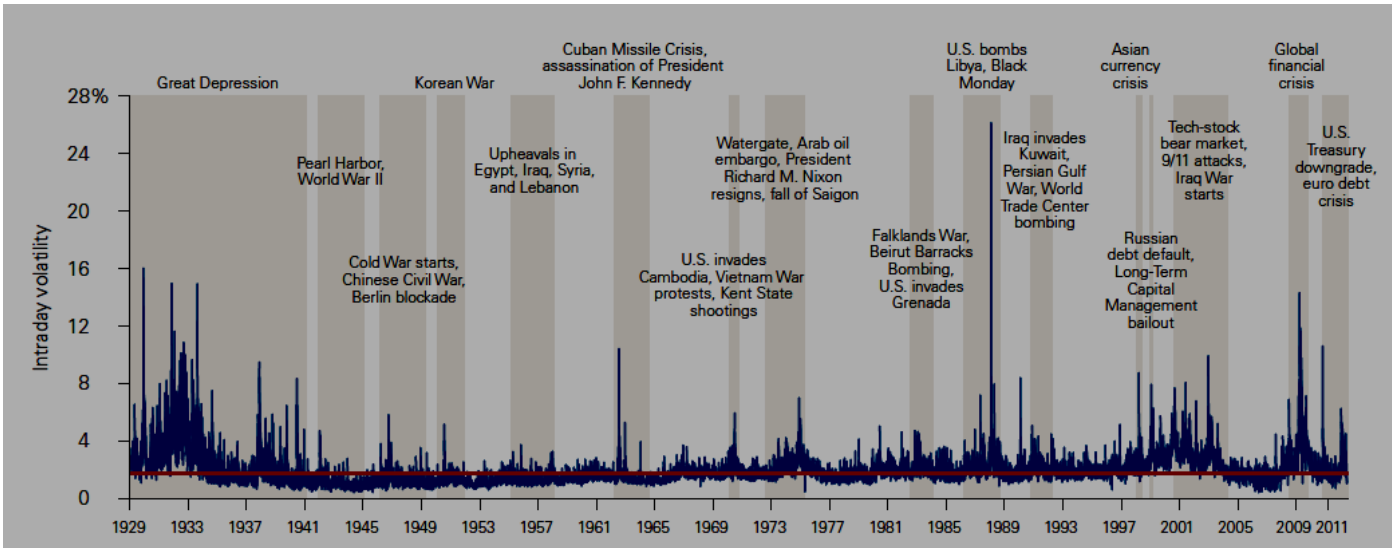
The cross national data set of New York University contains information on the nature of the political system and social instability for a set of 166 over the period 1815-1973. Overall, the interwar data set for a number of countries that are developed today shows a relatively high level of political instability and violence. For most indicators of political uncertainty, the levels are twice the average observed in the larger data set. This is true of the number of assassinations, of general strikes, government crises, riots, and anti-government demonstrations. In three categories, the subsample actually appears more stable - there were fewer revolutions, purges and acts of guerrilla warfare than in the 166 country sample. The variability of the measures of political instability is considerable, ranging from a coefficient of variation of 3.9 in the case of revolutions to 1.98 for government crises. While Germany scores very high on almost all measures of political fragility, recording a total of 188 events of unrest, Switzerland marks the opposite extreme. Only three acts indicating instability are recorded - two assassinations (in 1919 and 1923) and one riot (in 1932). There is also plenty of change over time. While 1919 saw, for example, four times the average number of assassinations in the subsample of 10 countries, there were none in 1936-38. The number of anti-government demonstrations reached more than twice is average level in 1932, and the number of riots peaked in 1934 at almost twice its normal frequency. Unsurprisingly, the tendency of governments to resort to violent acts of repression also peaked during the tumultuous years of the Great Depression, with the frequency of purges reaching a high of 2.6 times its average level in 1934. Europe and the US experienced two waves of turmoil and increasing uncertainty. Following the end of World War I and the Russian Revolution in 1917, chaos and civic unrest broke out in numerous countries. In the years 1919-23, there were 13 government crises, the same number of riots, and three general strikes. In France, there were waves of strikes in 1919 and 1920, considered by some observers as "a concerted attack upon the structure of bourgeois society". Nonetheless, these attacks ultimately failed -the trade union activist.

In the US and Britain, demobilizations and the end of war did not lead to the same degree of extreme instability as in continental Europe. However, the very sharp contractions in output and employment in 1920/21, engineered in part as an attempt to reduce prices and return to the gold standard at prewar parities, led to a considerable rise in worker militancy. This occurred against the background of a considerable strengthening of organized labor. As in the other belligerent countries, the position of labor had strengthened as a result of the war effort - governments recognized unions and encouraged cooperation between them and employers. Trade union membership in the TUC (Trades Union Congress) soared from 2.2 million in 1913 to 6.5 million in 1920. In the data set, Britain records 39 riots between 1919 and 1922, 12 assassinations, 6 general or politically motivated strikes, and 5 major government crises over the period. The average number of days lost in industrial disputes soared from 4.2 million in 1915-18 to 35.6 million in 1919- 23, the highest recorded value. Dissatisfaction with the established order could take a number of forms. In the US, there were 5 assassinations and four general or politically motivated strikes in 1919-23. Only one riot broke out, but 17 anti-government demonstrations were recorded. The total number of strikes increased sharply, to 3,630 in 1919, involving 4.2 million workers . Fear of a Communist takeover took the form of the so-called "Red Scare". Following the founding of the Third International in March, two Communist parties were formed in 1919, and quickly became active in propaganda . The second half of the 1920s saw a considerable decline in worker militancy and political violence. The 'roaring twenties' brought prosperity to many countries, with some exceptions. The US economy expanded rapidly, France reaped the benefits of currency stabilization under Poincare, and Germany, with the help of foreign loans, experienced an upsurge in activity after the end of the hyper inflation . At the same time, Britain's economy - tied to gold at an overvalued exchange rate - continued to languish . But even in those countries that didn't experience booms, labor militancy was on the wane. The second wave of unrest and politically motivated violence began in 1930, with the start of the Great Depression. Over the course of the crisis, industrial output in the US and Germany fell by 40-50 percent from peak to trough, and between a quarter and a fifth of all industrial workers were unemployed over the period 1930-38. In the face of massive capital outflows and pressure on reserves as a result of banking panics in Germany, Austria and the US, central banks first tried to defend the gold standard by a policy of deflation . Eventually, more and more countries abandoned the peg, either by devaluing or via a system of capital controls. Countries that remained on gold for a long time experienced the most severe contractions. France, which had initially avoided problems, eventually experienced major difficulties. Faced with a slump that extended into the second half of the 1930s, it was eventually forced to devalue in June 1937. Britain, which was amongst the first to abandon the gold standard, escaped relatively lightly." Recovery came faster and in a more robust way to the countries that abandoned gold first .

Economic difficulties were quickly reflected in the politics of the street and the factory floor. The total number of anti-government demonstrations soared from 22 in 1925-29 to 72 in 1930-34; riots rose from 62 to 108. The number of politically motivated general strikes increased from 7 to 10. In Germany, there is clear evidence that high rates of unemployment did much to boost the fortunes of the Communist party, already one of the strongest in the world . In the US, the Communist party expanded rapidly during the Great Depression, and union membership soared. Arthur Schlesinger noted about the year 1931 that "a malaise was seizing many Americans, a sense at once depressing and exhilarating, that capitalism itself was finished" . Perhaps even more importantly, the crisis rapidly increased the chances of Franklin D. Roosevelt gaining office. While even the most conservative businessmen did not equate this with a communist take-over, worries about the continued existence of "capitalism as we know it" were rampant. As Schlesinger noted, the "New York governor was the only presidential candidate in either major party who consistently criticized business leadership, who demanded drastic (if unspecified) changes in the economic system, who called for bold experimentation and comprehensive planning." Worries about future economic policy were compounded by the increasing realization that a return to the so-called "New Era" of prosperity and growth was impossible. Faced with growing labor militancy and an increasing willingness to contemplate central planning among the mainstream parties, right-wing radicalism also began to gain a following. Some observers and politicians, including

prominent US senators, began to call for a Mussolini-style government, and magazines such as Vanity Fair and Liberty argued the case for a dictatorship .(Voth,2002)

Fig-3: Political Factors of Volatility



Source- Mei,Jianping and LiminGuo,2002

IV. THE IMPACTS OF VOLATILITY

The conventional finance theory suggests that the stock market (excess) return, being a forward-looking variable that incorporates expectation about future cash flows and discount factors, contains useful information about investment and future output growth. Empirical literature provides substantial evidence in favour of this proposition .It is also seen from a number of recent studies that increased stock market volatility depresses economic activity and output .As per the existing literature, stock market volatility may affects output growth through several possible channels, such as, (i) its link with market uncertainty and hence economic activity, (ii) association between market volatility and structural change (which consumes resources) in the economy, (iii) link of volatility with cost-of-capital to corporate sector through expected return. It is, however, not clear to justify why volatility drives out return in predicting output growth . Guo (2002) has discussed major arguments put forward by the proponents of volatility effects on output and has reconciled the evidence provided by Campbell et al. (2001) with earlier empirical evidence on predictive power of the stock market returns and finance theory. Based on a small model he argues that volatility may influence output growth (or may drives out returns in predicting output) in some specifications possibly because of its influence on cost of capital through its link with expected return.

But if cost of capital is the main channel through which volatility affects output then returns should play more important role in forecasting output growth than volatility does. He also provides empirical results to support this hypothesis. He derives relevant results for three different time periods; one longer than (but covering), one identical with, and another adding more recent years but shorter in length than the Campbell et al. (2001) sample period. Interestingly, using Campbell et al. (2001) sample, he finds that the volatility drives out returns in predicting output growth because of the positive relation between excess returns and past volatility; if this relation is controlled for, excess returns show up significantly in the forecasting equation. In the liberalisation era, volatility in Indian financial markets is believed to have

increased/changed and thus there is a need to assess the impact of financial market volatility on output growth. Some recent studies have shown that elevated stock market volatility depresses output. As per the conventional finance theory, however, it is the stock market (excess) returns that should have impact on future output growth. Currently, the issue is important in India, as there has been a perception that the volatility in Indian financial

markets has increased/changed during the liberalisation era. Empirical results show that stock market volatility is strongly influenced by its own past values – pointing to the presence of significant volatility-feedback effects in the stock market.

The empirical observation that stock market volatility tends to be higher during recessions points toward a negative relationship between stock market volatility and output. Fig-4 shows a scatter plot of U.S. quarterly percentage growth of real GDP against implied U.S. stock market volatility together with a fitted regression line. The negative relationship between volatility and output growth is clearly visible. Scatter plots using historical volatility or GJR-based volatility instead of implied volatility show a similar negative relationship. Although the empirical evidence indicates a close relationship between stock market volatility and economic fluctuations, the evidence is only suggestive. However, several papers document similar linkages using more detailed empirical approaches. The empirical study of Romer (1990) deals primarily with the onset of the Great Depression. However, Romer also presents estimates of the relationship between stock market volatility and consumption in the U.S.A. Using annual U.S. data ranging from 1949 to 1986, she concludes that a doubling of stock market volatility reduces durable consumer goods output by about 6%, whereas the effect on nondurables is essentially 0. This ordering of the magnitudes of the effects is consistent with the idea that stock market volatility is closely related to uncertainty about future real economic activity.

Table-2: U.S. Ouarterly Stock Market Volatility in Periods of Expansion and Recession

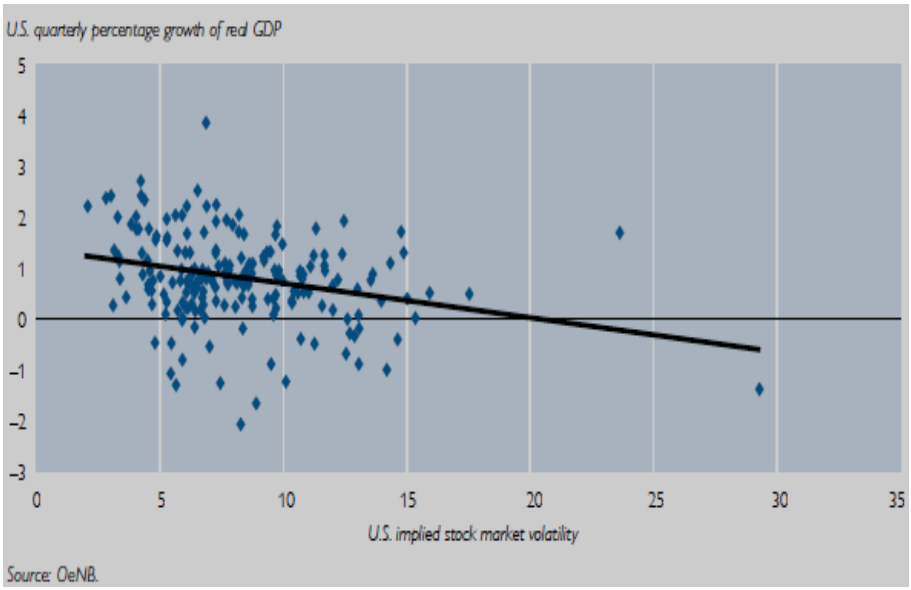
U.S. Ouarterly Stock Market Volatility in Periods of Expansion and Recession

No recession	HV	GJRV	IV
Mean	7.6	7.0	7.7
Median	6.8	6.6	7.0
Maximum	36.9	16.9	23.6
Minimum	2.2	5.8	2.1
Number of observations	160	160	160
Recession	**HV**	**GJRV**	**IV**
Mean	11.3	8.3	10.4
Median	10.4	8.0	10.3
Maximum	40.5	15.5	29.3
Minimum	4.9	5.2	4.5
Number of observations	36	36	36

Source: OeNB.

Source- Raunig and Scharler,2010

Fig-4:U.S. Stock Market Volatility and GDP Growth



Source-Raunig and Scharler,2010

Raunig and Scharler (2010) evaluate the uncertainty hypothesis by estimating the influence of stock market volatility on durable consumption growth, nondurable consumption growth and investment growth. Their analysis is based on quarterly time series data for the U.S.A. Based on a number of different estimates of time-varying stock market volatility, they find that stock market volatility exerts an economically and statistically significant effect on aggregate demand. Moreover, they find that the adverse effect of stock market volatility on aggregate demand depends on the extent to which decisions are reversible. Based on their richest specification (Table 3), they find that an increase in volatility by one standard deviation reduces the quarterly growth of durable consumption by around –0.70 percentage points, whereas the effect on the growth of nondurable consumption is only –0.14 percentage points. Investment growth responds with a lag of one quarter and declines by 1.12 percentage points.

Table-3:Effect of an Increase in Stock Market Volatility by one Standard Deviation on U.S. Consumption and Investment Growth

	Volatility	Lagged volatility
Growth of durable consumption	–0.70	x
Growth of nondurable consumption	–0.14	x
Investment growth	x	–1.12

Source: OeNB.

Source- Raunig and Scharler,2010

Choudhry (2003) analyzes the influence of stock market volatility on GDP and the components of GDP using an error-correction framework. Under the assumption that volatility follows a non -stationary stochastic process, he estimates the short-run and long-run dynamics of GDP components using an error-correction framework. His results confirm that stock market volatility has adverse effects on consumption and investment.

It was examined that the dynamic effects of monetary policy shocks, identified from Federal funds futures data, by employing a vector autoregressive (VAR) model. The use of market-based measures of monetary policy

shocks allows us to avoid the need to resort to identifying assumptions and circumvents dimensionality (degrees of freedom) problems in the estimated VAR. Our goal from this analysis is threefold. First, they assess the dynamic response of stock market volatility and the variance risk premium to monetary policy shocks. Second, their analysis allows us to characterize asymmetries in the return-volatility relationship. Third, they study the channels through which monetary policy shocks affect stock market volatility by analyzing the joint response of several financial variables to market-based measures of monetary policy shocks. By inspecting the channels of monetary policy transmission to volatility, we also identify the importance of changes in the risk premium or leverage on stock market volatility and therefore investigate in further detail the importance of the volatility feedback and leverage effect hypotheses.

Their results show a contemporaneous decrease in excess returns of 1% and an increase in stock market volatility which peaks one month following the shock at 0.8%. The results illustrate an asymmetric return-volatility relationship and demonstrate that monetary policy exerts an effect on the variance risk premium. They further explore the effect of monetary policy by estimating a bivariate GARCH model relating federal funds futures to stock market volatility. The bivariate GARCH model uncovers a novel and significant bidirectional volatility effect. Theoretically, volatility is a key component of many derivative pricing models and an understanding of the dynamic response of volatility to monetary policy shocks would allow for better derivative pricing. Using a VAR model that incorporates a futures-based measure of monetary policy shocks, their findings uncover a significant response of stock market volatility to monetary policy shocks. The results show an asymmetric return-volatility response to a monetary policy shock and reveal an important response of the variance risk premium, and by extension, of risk aversion, to monetary policy. They also study the channels through which monetary policy affects stock market volatility. Their findings suggest that while leverage and futures-trading volume display an increase following a monetary policy shock, the importance of these channels in affecting short term changes in volatility is limited. The longer-term dynamic response of volatility appears to be dominated by the persistent effect of monetary policy on stock market fundamentals (dividends). In light of the important dynamic response of stock market volatility to monetary policy, they investigate the volatility interaction among a futures contract written on the monetary policy rate set by the Fed, namely federal funds futures, and the stock market using a bivariate GARCH model. Their analysis points to a bidirectional volatility relationship between the federal funds futures and stock markets. This, in turn, suggests an important role for market participants' uncertainty about the future course of monetary policy in determining stock market volatility.

We find that the volatility of the stocks affected by the reform declines after the implementation of the reform, relative to other stocks, which means that the effect of retail trading on volatility is positive. We argue that this positive effect is consistent with the view that some retail investors behave as noise traders. In support of this claim, we show that the reform also triggers a drop in the size of price reversals and the price impact of trades for the stocks affected by the reform. All these observations are predicted by models of noise trading. One must be careful in interpreting these findings: they are consistent with the view that some retail investors play the role of noise traders but they do not imply that *all* retail investors are noise traders or that only retail investors are noise traders. Moreover, we do not identify the drivers of retail trades (misperception of future payoffs, risk aversion, or hedging needs). Thus, our findings should not be construed as evidence that retail investors are irrational traders. Our findings also raise new questions. The literature on retail investors pre dominantly finds that these investors follow contrarian strategies, on average. We use our data on retail investors to measure the contribution of contrarian and momentum trades to retail trading activity. The reform has a more negative impact on contrarian trades. This observation can be reconciled with our finding regarding volatility in one of two ways: either retail contrarian trades dampen volatility but their stabilizing effect is smaller than the destabilizing effect of retail momentum trades, or retail contrarian trades also have a positive effect on volatility. Both stories are plausible. The first story is consistent with Kaniel, Saar, and Titman (2008), who argue that retail investors act as liquidity providers. The second story is consistent with Bloomfield, O'Hara, and Saar (2009). They consider an experiment in which some participants have no specific reason to trade and have no information. Instead of staying put, these agents trade and realize losses. Interestingly, they use

contrarian trading strategies and contribute to mispricing by slowing down price adjustments to true values. There might be several reasons why noise traders may appear to act as contrarian investors.
For instance, they may be prone to behavioral biases such as the disposition effect or they may not realize that their limit orders are more likely to execute in the case of adverse price movements. Therefore amplify volatility. Our quasi-experiment cannot tell which story is correct. To do so, in keeping with the spirit of our study, one would need to find a separate instrument for contrarian retail trades and momentum retail trades. We leave this question to future research.

The findings in the other paper highlight the importance of information regarding stock market volatility in the monetary policy-making process, and also warn that the stock market boom stimulated by an accommodative monetary policy may easily turn into a financial bubble. If the bubble bursts, both the financial system and the real economy will be devastated. Therefore, the side effect of an accommodative monetary policy on the stock market should draw more attention from monetary authorities. From this perspective, the conclusion of the present paper may be generalized to take into account more nations across the world.
Christiano et al. (2008) find that the implementation of accommodative monetary policy can signal that a rebound of the stock market is just around the corner, and the imperfect rationality of investors can make the stock market fluctuate more frequently than is usual. To date, the literature has come to a general consensus that stock market volatility has a negative effect on the recovery of the real economy. What remains controversial is whether monetary policy may increase stock market volatility, and therefore central banks should take this possibility into account when setting monetary policies. For example, Bernanke and Gertler (1999) and Cecchetti et al. (2000) provide distinct conclusions. Bernanke and Gertler (1999) explore how the macro economy is affected by alternative monetary policy rules either with or without the stock market volatility being taken into account. Their results suggest that it is desirable for central banks to focus on inflationary pressures while stock market volatility becomes relevant only if it signals potential inflationary or deflationary forces. Therefore, monetary policy with additional focus on stock market volatility does not benefit the economy in any significant manner.
However, Cecchetti et al. (2000) raise several objections to Bernanke and Gertler's (1999) conclusion. Cecchetti et al. (2000) believe that one of the final goals of monetary policy is to maintain a stable financial system. Large fluctuations in the stock market can cause adverse shock to the real economy. Therefore, central banks should not only concentrate on inflation and real economic growth, but also set a goal to react to the stock market volatility. In addition, Gilchrist and Saito (2006) employs a general equilibrium model on the basis of the Real Business Cycle theory and shows that it is necessary for monetary policy to consider stock market volatility. However, leverage has no impact on asymmetric volatility at the daily frequency and, moreover, we observe asymmetric volatility for stocks with no leverage. Also, expected returns may vary with the business cycle, that is, at a lower than daily frequency. Trading activity of contrarian and herding investors has a robust effect on the relationship between daily volatility and lagged return. Consistent with the predictions of the rational expectation models, the non-informational liquidity-driven (herding) trades increase volatility following stock price declines, and the informed (contrarian) trades reduce volatility following stock price increases. The results are robust to different measures of volatility and trading activity.
Prasad and Terrones (2003) suggest that financial integration (due mainly to the removal of capital controls) is responsible for an increase in the relative volatility of consumption and asset returns, especially in countries that have liberalized their capital accounts only relatively recently and partially. When negative shocks hit these countries, these authors observe, they tend to lose access to international capital markets. The rapid reversal of capital flows in response to these events amplifies the volatility of their consumption and asset market outcomes. Dellas and Hess (2002), on the other hand, find that the removal of capital controls is associated with less output and stock market volatility. This runs counter to the thesis that financial integration increases stock market volatility.
We found a positive association of monetary volatility with stock market volatility; an interpretation is that the conduct of monetary policy and the nature of the monetary regime are important for stock market volatility.

That monetary policy became increasingly volatile in a number of countries in the 1970s and 1980s thus may be part of the explanation for why stock markets have been more volatile in recent decades. Probing deeper, we found that fixed exchange rate regimes are associated with relatively low levels of stock market volatility, flexible exchange rate regimes with relatively high ones. This makes it tempting to conclude that the collapse of currency pegs and the transition to floating explain the recent rise in stock market volatility. But not only the official exchange rate regime but also the conduct of monetary policy under that regime appear to matter, in that we find a positive effect of monetary volatility on stock market volatility even after controlling for the exchange rate regime.

The study of Prashant Joshi, I-Shou University, Taiwan (2011) examines the return and volatility spillover among Asian stock markets in India, Hong Kong, Japan, China, Jakarta, and Korea using a six-variable asymmetric generalized autoregressive conditional heteroskedasticity. The magnitude of volatility linkages is low indicating weak integration of Asian stock markets. The study finds that own volatility spillover is higher than cross-market spillover. The overall persistence of stock market volatility is highest for Japan (0.931) and lowest for China (0.824).

V. TRADING VOLUME AND STOCK MARKET VOLATILITY

The fluctuations in stock market and trading volume are influenced by the flow of information. The higher the volume, the narrower are the spreads, as a result there is less slippage, and less volatility. Traders keep a close eye on trading volume because it reflects the dynamic interplay between informed traders and uninformed traders who interact with each other in the market place in light of their own trading strategies and, ultimately, set market clearing prices. Trading volume is termed as the critical piece of information in the stock market because it either activates or deactivates the price movements. Stock prices are usually influenced by positive trading volume through the available set of relevant information in the market. A revision in investors' expectations usually leads to an increase in trading volume which eventually reflects the sum of investors' reaction to news.

There are extensive empirical studies which support the positive relationship between price, trading volume and volatility of a tradable asset. Various theoretical models have been developed to explain the relationship between price and trading volume. These include sequential arrival of information models, a mixture of distributions model , asymmetric information models , and differences in opinion models. All these models advocate the positive relationship between price, trading volume and volatility. In a similar strand of literature, the asymmetric nature of volume response to return (volatility) i.e. the trading volume is higher in which price ticks up than volume on down tick, has been explained.

Studies since 1970's have indicated a strong positive contemporal correlation between volume and volatility. However, two very recent papers challenged this stylized fact using the volatility decomposition technique. Giot et al. (2010) finds that only the continuous component shows a positive contemporal volume-volatility relation, while the jump component shows negatively correlation. Amatyakul (2010) also presents the evidence showing similar negative correlation. Campbell et al. (1993) showed, a positive correlation between current volatility and lagged trading volume is likely to be observed in liquidity trading. When informed traders trade their stocks due to private information, that information will spread over the market through price signal.

Using 50 Indian stocks, Kumar and Sing (2011) analyze the returns and volume relationship, focusing on the contemporaneous relation between absolute returns and trading volume, the asymmetric behavior of trading volume in response to price changes and dynamic (lead-lag) relationship between returns and trading volume. They model the dynamic relationship using VAR model. This study also investigates the contemporaneous relationship between volatility and trading volume. Lamoureax and Lastrapes (1990) supported the influence of trading volume on the persistence of GARCH effects on the returns of the financial assets. Their findings indicate evidence of positive contemporaneous correlation between absolute price changes and trading volume in Indian stock markets. However, they get mixed result on asymmetric relationship between trading volume and returns. Most of the stocks show asymmetric behavior which is in line with the findings of Assogbavi et al.

(1995) and Brailsford (1996). Some of the stocks, where we do not find asymmetric behavior, are consistent with the findings of Assogbavi (2007) that clearly indicated the absence of asymmetric relationship in emerging markets. The results of dynamic relationship between returns and trading volume show very interesting results. They find strong evidence that in Indian market, past returns Granger cause trading volume, which can easily conceived in an emerging market (Assogbavi, 2007) where the state of development of the market possibly does not allow instantaneous information dissemination. Their results are further supported by the variance decomposition. However, in most of the cases the relationship lacks economic significance even when statistically significant. The results of impulse response analysis indicate that both returns and volume are mostly affected by their own lag and the volume is more autoregressive than returns i.e. any shock in either returns or volume does not affect the return series beyond one lag.

Brailsford (1994) paper presents an empirical analysis of the relationship between trading volume and stock return volatility in the Australian market. The initial analysis centres upon Karpoff's (1987) model of the volume-price change relationship. Evidence is found which supports the model. The relationship between price change and trading volume, irrespective of the direction of the price change, is significant across three alternative measures of daily trading volume for the aggregate market and individual stocks. Furthermore, evidence is found supporting the hypothesis that the volume-price change slope for negative returns is smaller than the slope for positive returns, thereby supporting an asymmetric relationship. Trading volume is then examined in the context of conditional volatility using a GARCH framework. Similar to the results of Lamoureux and Lastrapes (1990), the findings show a reduction in the significance and magnitude of the conditional variance equation coefficients, and a reduction in the persistence of variance when trading volume is added as an exogenous variable. Hence, there is *prima facie* evidence that if trading volume proxies for the rate of information arrival, then ARCH effects and much of the persistence in variance can be explained.

Karanasos and Kyrtson (2011) investigate the Korean stock volatility-volume relation for the period 1995-2005 and hence contribute to the study of emerging markets' liberalization after the financial crisis in 1997.In this work they have studied the volume-volatility relationship and they have taken into account the highly complex endogenous structures of the Korean stock market by employing the MG-GARCH model of Kyrtsou and Terraza (2003). Therefore, heteroscedasticity is interpreted endogenously while heterogeneity of expectations about future prices and dividends is the main source of fluctuations in returns. Its performance over traditional stochastic alternatives such as the simple GARCH model sheds ore light on the link between the two variables. They have also provided strong empirical support for the argument made among others by Karanasos and Kartsaklas (2004) that instead of focusing only on the univariate dynamics of stock volatility one should study the joint dynamics of stock volatility and trading volume. Moreover, as Kim, Kartsaklas and Karanasos (2005) have pointed out, they have shown that in investigating the interdependence of the two variables it is important to distinguish between domestic and foreign investors' trading volume. Finally, by conducting sub-sample analyses it was found that there are structural shifts in causal relations. Specifically, before the financial crisis in 1997 there was no causal relation between domestic volume and stock volatility whereas during and after the crisis a positive relation began to exist. Additionally, the effect of either foreign or total volume on volatility was negative in the pre-crisis period but turned to positive during and after the crisis. For the foreign volume the effects become weaker when they include the Mackey-Glass term. Such findings confirm the high interest in using the MG-GARCH approach, since improper filtering of the stock returns by simple GARCH models can lead to erroneous conclusions about the volume-volatility link.

Asai and Unite (2007) reconsider the relationship between stock return volatility and trading volume. Based on the multi-factor stochastic volatility model for stock return, they suggest several specifications for the trading volume. This approach enables the unobservable information arrival to follow the ARMA process. They apply the model to the data of Philippine Stock Exchange Composite Index and find that two factors are adequate to describe the movements of stock return volatility and variance of trading volume. They also find that the weights for the factors of the return and volume models are different from each other. The empirical results show (i) a negative correlation between stock return volatility and variance of trading volume, and (ii) a lack of

effect of information arrivals on the level of trading volume. These findings are contrary to the results for the equity markets of advanced countries.

VI. Conclusion

The paper studied various dimensions of stock market volatility including measurement and nature of impact of volatility with the help of important economic literatures. It emphasized also on the political factors of volatility and attempted to relate economic growth with stock market volatility in the long run process reviewing a few econometric models and concludes that political instability and depression catapulted the stock market volatility which dwindled the growth rate of a country including a strong negative spillover effects of volatility from other countries on growth rate .The nexus between international trade and volatility was explained through econometric models showing asymmetric in nature where volatility reduces both volume of trade and increases current account and capital account deficits.

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Cellular Automation: A discrete approach for modeling and simulation of Artificial Life Systems

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Abstract- **Cellular Automation**

"Cellular Automation" (CA) is a decentralized computing model providing an excellent platform for performing complex computation with the help of only local information. Researchers, scientists and practitioners from different fields have exploited the CA paradigm of local information, decentralized control and universal computation for modeling different applications.

This article provides a survey of available literature of some of the methodologies employed by researchers to utilize cellular automata for modeling purposes. The survey introduces the different types of cellular automation being used for modeling and the analytical methods used to predict its global behaviour from its local configurations. It further gives a detailed sketch of the efforts undertaken to configure the local settings of CA from a given global situation; the problem, which has been traditionally termed as the inverse problem. Finally, it presents the different fields in which CA have been applied. The extensive bibliography provided with the article will be helpful to the new entrant as well as researchers working in this innovative field of computer science.

Cellular Automation are those mathematical models that are used for developing and understanding those systems in which several components acts and interact together to produce rather complicated patterns that reflects / possesses a complex behaviour. Cellular Automata may be viewed as computers, in which data represented by initial configuration is processed by time evolution. Cellular Automata is a model that can be used to show that how the elements of a system interact with each other. Each element of the system is assigned a cell. The cell can be 2D square, 3D blocks, or another such as hexagonal.

A Cellular Automata is an n-dimensional array of simple cells where each cell may be in any one of k-states. At each tick of the clock a cell will change its state based on the states of the cells in a local neighbourhood. Typically, the rule for updating the state does not change over time, and is applied to the whole grid simultaneously. So Cellular Automata is a regular grid of cells, each cell is one of finite number of k possible states. States of the cell is updated synchronously by identical iteration rules. Due to its simplicity the CA rules can be used for modeling and simulating the complex behaviour of living and as well as non-living systems.

Artificial Life Systems

"Artificial Life" (ALife) is a Life made by Human rather than Nature. i.e. The study of man made systems that exhibit characteristics of natural living systems. "ALife is the study of non-organic organisms, beyond the creations of nature, that possess the essential properties of life as we understand it, and whose environment is artificially created in an alternative media, which very often is a programmable machine, i.e. none other than a digital computer." "ALife is study about the evolution of agents, or populations of computer-simulated life forms in artificial environments." In particular we describe an attempts concerning three main properties of living beings:

- Reproduction
- Emergent Properties
- Evolution

Modeling & Simulation of ALife Systems can be done very effectively via Cellular Automation, because both of these two paradigms are discrete in nature. CA & ALife are the modern, emergent, and advance technologies of computer science and are used

to study the evolution, changes, and survival of various life forms (natural as well as artificial). Almost during the last five decades the various researches have shown that Cellular Automation & Artificial Life, both have their deep roots within Computer Science.

Here our attempt is just to explore the implementation possibilities of Alife Systems via Cellular Automation. The issues, which we will discuss later on in this research paper, are still going on in the field. In this research paper we not only described the "Fundamental concepts of CA", but also discussed "Its correlation with ALife" in different aspects, which is no doubt the most advanced, sophisticated, and appealing areas of Computer Science. Besides this, the research paper also highlights the flavor of the kind of the work that is being done by various researchers to understand, develop, and implement the ALife Systems via Cellular Automation in synthetic world.

Index Terms- Cellular Automation, Artificial Life Systems, Reproduction, Emergent, Evolution, Wetware, Torus, Universal Constructor, Neighborhoods, Lyapunov- Exponent, Perturbations

[1] INTRODUCTION & CORELATION OF CELLULAR AUTOMATA & ALIFE

This article guides a stepwise walk. Study into Artificial Life is conducted primarily at three levels, these are:

1. Wetware – Using bits from biology (e.g. RNA, DNA) to investigate evolution.

2. Software – Simulating biological systems.

3. Hardware – For instance, robotics.

Besides this there are two distinct philosophies:

1. Strong ALife – Life is not just restricted to a Carbon-based chemical process. Life can be created in silicon.

2. Weak ALife – Computer simulations are just simulations and investigations of life.

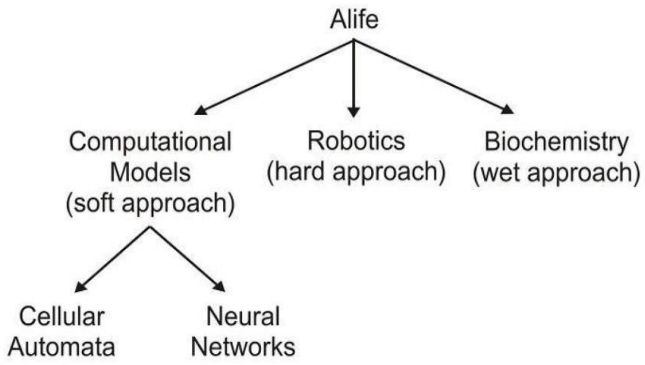

Figure (a): ALife Study

II. HISTORICAL BACKGROUND OF CELLULAR AUTOMATION

The concept of Cellular Automation was originally discovered in the 1940's by Stanislaw Ulam and John von Neumann, while they were contemporaries at Los Alamos National Laboratory. While studied some throughout the 1950s and 1960s, it was not until the 1970's and Conway's Game of Life, a two dimensional cellular automation, that interest in the subject expanded beyond academia.

In the 1980's, Stephen Wolfram engaged in a systematic study of one-dimensional cellular automata, or what he calls elementary cellular automata; his research assistant Matthew Cook showed that one of these rules is Turing-complete. Wolfram

published *A New Kind of Science* in 2002, claiming that cellular automata have applications in many fields of science and technology. These include computer processors and cryptography.

The primary classifications of cellular automata as outlined by Wolfram are numbered one to four. They are, in order, automata in which patterns generally stabilize into homogeneity, automata in which patterns evolve into mostly stable or oscillating structures, automata in which patterns evolving in a seemingly chaotic fashion, and automata in which patterns become extremely complex and may last for a long time, with stable local structures. This last Class are thought to be computationally universal, or capable of simulating a Turing machine. Special types of cellular automata are those which are *reversible*, in which only a single configuration leads directly to a subsequent one, and *totalistic*, in which the future value of individual cells depend on the total value of a group of neighboring cells. Cellular automata can simulate a variety of real-world systems, including biological and chemical ones. There has been speculation that cellular automata may be able to model reality itself.

Cellular automata are often simulated on a finite grid rather than an infinite one. In two dimensions, the universe would be a rectangle instead of an infinite plane. The obvious problem with finite grids is how to handle the cells on the edges. How they are handled will affect the values of all the cells in the grid. One possible method is to allow the values in those cells to remain constant. Another method is to define neighbourhoods differently for these cells. One could say that they have fewer neighbors, but then one would also have to define new rules for the cells located on the edges. These cells are usually handled with a *toroidal* arrangement: when one goes off the top, one comes in at the corresponding position on the bottom, and when one goes off the left, one comes in on the right. (This essentially simulates an infinite periodic tiling, and in the field of partial differential equations is sometimes referred to as *periodic* boundary conditions.) This can be visualized as taping the left and right edges of the rectangle to form a tube, then taping the top and bottom edges of the tube to form a torus (doughnut shape). Universes of other dimensions are handled similarly. This is done in order to solve boundary problems with neighbourhoods, but another advantage of this system is that it is easily programmable using modular arithmetic functions. For example, in a 1-dimensional cellular automation like the examples below, the neighbourhood of a cell x_{i-1}^{t} is:

$$\{x_{i-1}^{t-1}, x_{i}^{t-1}, x_{i+1}^{t-1}\}$$

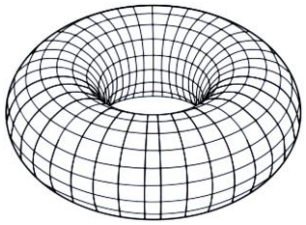

Figure (b): A torus, a toroidal shape

III. JOHN VON NEUMANN'S MODEL OF CELLULAR AUTOMATION

John Von Neumann is widely credited with the origination of the "Stored Program Concept", that forms the basis of working of a vast majority of machines in today's era. But his contribution to the advancement in ALife studies is no less compelling, although relatively unknown.

"Can a machine reproduce itself?" This question was first posed by John Von Neumann in the early 1950's and explored by him before his untimely death in 1957. Specifically he asked whether a machine could create a copy of itself, which in turn could create more copies (in analogy to nature).

John Von Neumann wished to investigate necessary logic for the reproduction/self-reproduction. He was not interested, nor he did have the tools, in building a working machine at the bio-chemical or genetic level. Remember that at that time DNA had not yet been discovered as the genetic material in nature.

One such example is John Von Neumann's model of

"Cellular Automation", where the basic units are the "Grid Cells" and the observed phenomena involve composite objects consisting of several cells. A machine in the Cellular Automata model is a collection of cells that can be regarded as operating in unison. For example if a square configuration of four black cells exists, that appears at each time step one cell to the right, then we say that square acts as a machine moving right.

John Von Neumann used this simple model to describe a universal constructing machine, which can read assembly instructions of any given machine, and construct that machine accordingly. These instructions are the collection of cells of various colors, as the new machine after being assembled – indeed any compound element on the grid is simply a collection of cells.

John Von Neumann's "Universal Constructor" can build any machine when given the appropriate assembly instructions. If these consist of instructions for building a universal constructor, then the machine can create a duplicate of itself; that is, it will reproduce. Should we want the offspring to reproduce as well, we must copy the assembly instructions and attach them to it. In this manner the John Von Neumann showed that a reproductive process is possible in Artificial Machines (ALife Systems). One of the John Von Neumann's main conclusions was that the reproductive process uses the assembly instructions in two distinct manners:

1. As interpreted code.
   (During actual assembly).

2. As uninterrupted data.
   (Copying of assembly instructions to offspring).

During the following decade when the basic genetic mechanisms began to unfold, it became clear that nature had adopted the John Von Neumann's conclusions. The process by which assembly instructions (i.e. DNA) are used to create a working machine (i.e. proteins), indeed makes dual use of information: As interpreted code and as uninterrupted data. The former is referred to in biology as "Translation" and later is referred to as "Transcription" in the terminology of computer science.

This description demonstrates the underlying principle of ALife. The field draws researchers from different streams such as computer science, physics, biology, chemistry, economics philosophy and so on. While biological research is essentially analytic, trying to break down the complex phenomena into their basic components, ALife is synthetic, attempting to construct phenomena from their elemental units. As such ALife complements traditional biological research by exploring new paths in the quest toward understanding the grand and ancient puzzle called "What is Life?"

IV. COMPONENTS OF CELLULAR AUTOMATA

Cellular automata may be considered as information processing systems, their evolution performing some computation on the sequence of site values given as the initial state. Cellular Automation has four components:

(1) The Physical Environment: The term physical environment indicates the physical platform on which CA is computed. It normally consists of discrete lattice of cells with rectangular, hexagonal etc shown in Figure (e). All these cells are equal in size. They can be finite or infinite in size and its dimensionality can be 1 (a linear string of cells called an elementary cellular automation or ECA).

(2) The Cell's States: Every cell can be in a particular state where typically an integer can determine the number of distinct states a cell can be in, e.g. (binary state). Generally, the cell is assigned with an integer value or a null value based upon its state. The states of cells collectively are called as "Global configuration". This convention clearly indicates that states are local and refer to cells, while a configuration is global and refers to the whole lattice.

(3) The Cell's Neighbourhoods: The future state of a cell is mainly dependent on its state of its neighbourhood cell, so neighbor-hood cell determines the evolution of the cell. So generally, the lattices vary as one-dimensional and two-dimensional. In one-dimensional lattice, the present cell and the two adjacent cells form its neighbourhoods, whereas in the context of two-dimensional lattice there is four adjacent cells which acts as the neighbourhoods. Therefore, it is clear that as the dimensionality (entropy) increases the number of adjacent cells also increases.

(4) A Local Transition Rule: This rule (function) acts upon a cell and its direct neighbourhood, such that the cell's state changes from one discrete time step to another (i.e., the system's iterations). The CA evolves in time and space as the rule is subsequently applied to all the cells in parallel. Typically, the same rule is used for all the cells (if the converse is true, then the term hybrid CA is used). When there are no stochastic components present in this rule, we call the model a deterministic CA, as opposed to a stochastic (also called probabilistic) CA.

V. MATHEMATICAL MODEL OF CELLULAR AUTOMATION

Formally, a Cellular Automation is represented by the 4-tuple

{ Z, S, N, f } where:

Z: is the finite or infinite lattice.

S: is a finite set of cell states or values.

N: is the finite neighbourhood.

F: is the local transition function defined by the transition table or the rule.

The lattice is a finite or infinite discrete regular grid of cells on a finite number of dimensions. Each cell is defined by its discrete position (an integer number for each dimension) and by its discrete value (one of a finite set of integers). Time is also discrete. The future state of a cell (time t+1) is a function of the present state (time t-1) of a finite number of cells surrounding the observed cell called the neighbourhood.

VI. EMERGENT BEHAVIOUR OF CELLULAR AUTOMATION

"Global behaviour or pattern arises from the local interactions."

A fundamental precept of CA is that the local transition function determining the state of each individual cell at a particular time step should be based upon the state of those cells in its immediate neighbourhood at the previous time step or previous time steps.

Thus the rules are strictly local in nature and each cell becomes an information-processing unit integrating the states of the cells around it and altering its own state unison with all the others at the next time step in accordance with the stipulated rule.

Thus many global patterns of the system are an 'emergent' feature' of the effect of the locally defined transition function. that is, complex global featurescan emerge from the strictly local interaction of individual cells each of which is only aware of its immediate environment.

VII. CELLULAR AUTOMATION AS A TRANSITION FUNCTION

Number of neighbors of a cell including that cell also

$= 2r + 1$, Where $r = 1, 2, 3, \ldots\ldots$

Basically r is the dimension of C.A. Besides this the number of allowable states also play an important role in Cellular Automata. Here it is denoted by k. For the simplest case k=2 (binary states). The states of the cell are represented by:

0 : Dead State

1 : Live State

Usually we keep fix the value of k= 2, for all cases.

If r=1, It results 1D-CA.

If r=2, It results 2D-CA.

VII. CELLULAR AUTOMATA MODEL: FUNDAMENTAL FEATURES, AND SPECIFICATIONS

CA: The Fundamental Features

The three most fundamental features of Cellular Automation are:

(1) Uniformity: All cell states updated by same set of rules.

(2) Synchronity: All cell states updated simultaneously.

(3) Locality: The rules are local in nature.

CA: The Specification

(1) A neighbourhood function that specifies which of the adjacent cell affects its state.

(2) A transition function that specifies mappings from state of neighbor cells to state of given cell.

VII. NEIGHBOURHOOD STRUCTURES USED IN CELLULAR AUTOMATION

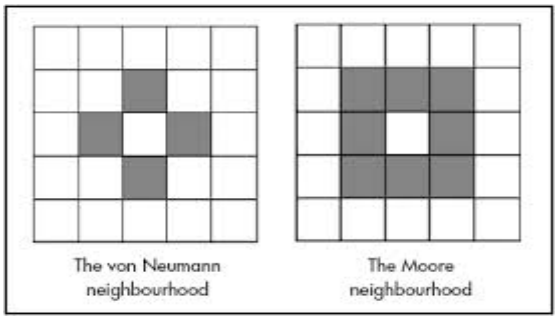

Figure (c): Examples of neighbourhood structures

Some commonly used neighbourhood structures usually considered for two-dimensional cellular automata are shown in Figure (c). In the cellular automation evolution, the value of the center cell is updated according to a rule that depends on the values of the shaded cells. Cellular automata with Von Neumann neighborhood are termed "five-neighbor square", and those with Moore neighborhood are termed "nine-neighbor square". Totalistic cellular automation rules take the value of the center site to depend only on the sum of the values of the sites in the neighbourhood. With outer totalistic rules, sites are updated according to their previous values, and the sum of the values of the other sites in the neighbourhood. Triangular and hexagonal lattices are also possible, but are not used in the examples given here. Notice that five-neighbor square, triangular, and hexagonal cellular automation rules may all be considered as special cases of general nine-neighbor square rules.

VIII. ONE-DIMENSIONAL CELLULAR AUTOMATION (SOME EXAMPLES)

Rule Number: 30

Current Pattern	111	110	101	100	011	010	001	000
New State for Center Cell	0	0	0	1	1	1	1	0

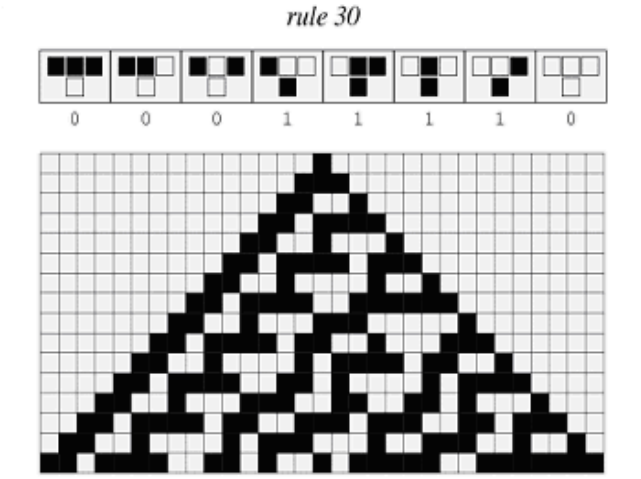

Figure (d): Rule - 30

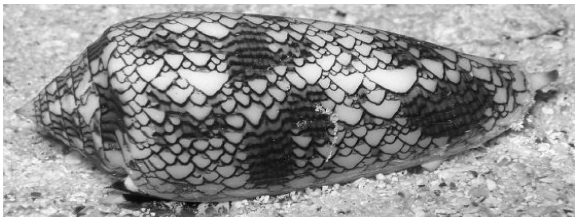

Figure (e): Conus textile exhibits a cellular automation pattern (Rule-30) on its shell.

For example the widespread species *ConusTextile* bears a pattern resembling Wolfram's Rule-30 cellular automation.

Rule Number: 126

Current Pattern	111	110	101	100	011	010	001	000
New State for Center Cell	0	1	1	1	1	1	1	0

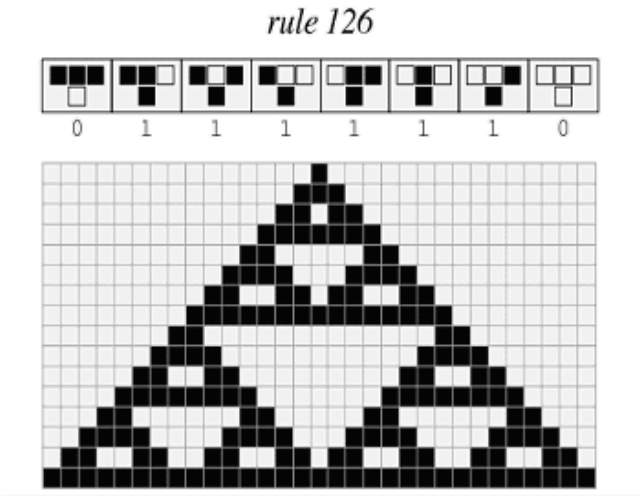

Figure (f): Rule - 126

IX. CELLULAR AUTOMATION RULES: AT A GLANCE

CELLULAR AUTOMATION WITH BINARY STATES			
NEIGHBORS (N)	**(1+N)**	**NO. OF PATTERNS**	**NO. OF RULES**
1-D TWO (L, R)	1+2=3	2^3= 8 (3 Bit Pattern)	2^8= 256 Rules
2-D FOUR (L, R, U, D)	1+4=5	2^5= 32 (5 Bit Pattern)	2^{32} Rules
2-D EIGHT (Boundary Cells)	1+8=9	2^9= 512 (9 Bit Pattern)	2^{512} Rules
3-D TWENTY SIX (Cells lies on all six surfaces)	1+26=27	2^{27} (27 Bit Pattern)	2^{27} 2 Rules

Table (a): Cellular Automata Rules

X. THE CLASSIFICATION WITHIN ONE DIMENSIONAL CELLULAR AUTOMATA MODEL

Empirical studies strongly suggest that the qualitative properties of one-dimensional cellular automata are largely independent of such features of their construction as the number of possible values for each site, and the size of the neighbourhood.

In order of complexity the four qualitative classes of behaviour have been identified by Wolform in one-dimensional cellular automata. While earlier studies in cellular automata tended to try to identify type of patterns for specific rules, Wolfram's Classification was the first attempt to classify the rules themselves. Starting from typical initial configurations, these are:

- **Class-l Cellular Automata-** It evolves to homogeneous final states. Class-l cellular automata evolve from almost all initial states to a unique final state, analogous to a fixed point. Nearly all initial patterns evolve quickly into a stable, homogeneous state. Any randomness in the initial pattern disappears.

- **Class-2 Cellular Automata-** It yields separated periodic structures. Class-2 cellular automata evolve to collections of periodic structures, analogous to limit cycles. The contraction of the set of configurations generated by a cellular automation is reflected in a decrease in its entropy or dimension. Starting from all possible initial configurations (corresponding to a set defined to have dimension one). Nearly all initial patterns evolve quickly into stable or oscillating structures. Some of the randomness in the initial pattern may filter out, but some remains. Local changes to the initial pattern tend to remain local. So for Class-2 type the stable or oscillating structures may be the eventual outcome, but the number of steps required to reach this state may be very large, even when the initial pattern is relatively simple. Local changes to the initial pattern may spread indefinitely. Wolfram's Class-2 can be partitioned into two subgroups:

  (1) Stable (fixed) Rules
  (2) Oscillating (periodic) Rules

- **Class-3 Cellular Automata-** It exhibits chaotic behaviour, and yield aperiodic patterns. Small changes in initial states usually lead to linearly increasing regions of change. Class-3 cellular automata yield sets of configurations with smaller, but positive, dimensions. These sets are directly analogous to the chaotic (or "strange") attractors found in some continuous dynamical systems. Nearly all initial patterns evolve in a pseudo-random or chaotic manner. Any stable structures that appear are quickly destroyed by the surrounding noise. Local changes to the initial pattern tend to spread indefinitely.
- **Class-4 Cellular Automata-** It exhibits complicated localized and propagating structures. It is conjectured that Class-4 cellular automata are generically capable of universal computation, so that they can implement arbitrary information-processing procedures. Nearly all initial patterns evolve into structures that interact in complex and interesting ways, with the formation of local structures that are able to survive for long periods of time. Wolfram has conjectured that many, if not all Class-4 cellular automata are capable of universal computation. This has been proven for Rule-110 and Conway's Game of Life.

Wolfram, in *A New Kind of Science* and several papers dating from the mid-1980s, defined four classes into which cellular automata and several other simple computational models can be divided depending on their behaviour.

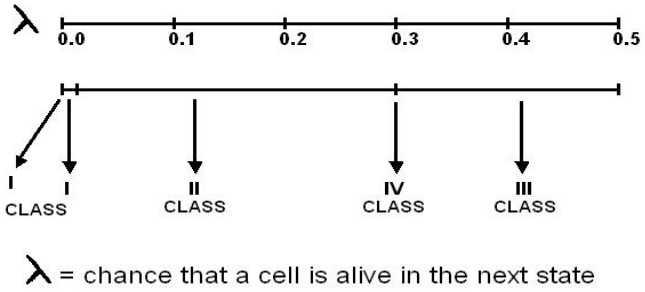

Figure (g): Wolform's Classes for Elementary Cellular Automation

Wolfram's Classification has been empirically matched to a clustering of the compressed lengths of the outputs of cellular automata. There have been several attempts to classify cellular automata in formally rigorous classes, inspired by the Wolfram's Classification. For instance, Culik and Yu proposed three well-defined classes (and a fourth one for the automata not matching any of these), which are sometimes called Culik-Yu Classes; membership in these proved to be undecidable.

These definitions are qualitative in nature and there is some room for interpretation. According to Wolfram, "…with almost any general classification scheme there are inevitably cases which get assigned to one class by one definition and another class by another definition. And so it is with cellular automata: there are occasionally rules...that show some features of one class and some of another."

Dynamical systems theory methods may be used to investigate the global properties of cellular automation. One considers the set of configurations generated after some time from any possible initial configuration. Most cellular automation mappings are irreversible (and not surjective), so that the set of configurations generated contracts with time.

XI. 1-D Vs 2-D CELLULAR AUTOMATA

Entropy or dimension gives only a coarse characterization of sets of cellular automation configurations. Formal language theory provides a more complete and detailed characterization. Configurations may be considered as words in a formal language; sets of configurations are specified by the grammatical rules of the language. The set of configurations generated after any finite number of time steps in the evolution of a one-dimensional cellular automation can be shown to form a regular language: the possible configurations thus correspond to possible paths through a finite graph. For most Class-3 and Class-4 cellular automata, the complexity of this graph grows rapidly with time, so that the limit set is presumably not a regular language. This paper reports evidence that certain global properties of two- dimensional cellular automata are very similar to those of one-dimensional cellular automata.

Many of the local phenomena found in two-dimensional cellular automata also have analogs in one dimension. However, there are a variety of phenomena that depend on the geometry of the two-dimensional lattice. Many of these phenomena involve complicated boundaries and interfaces, which have no direct analog in one dimension.

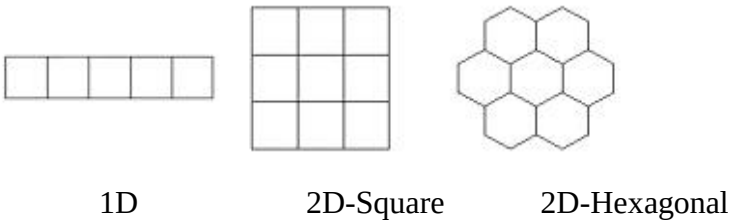

Figure (h): Various arrangements of neighbor cells in 1-D and 2-D spaces

Many definitions are carried through directly from one dimension, but some results are rather different. In particular, the sets of configurations that can be generated after a finite number of time steps of cellular automation evolution are no longer described by regular languages, and may in fact be no recursive. As a consequence, several global properties that are decidable for one-dimensional cellular automata become undecidable in two dimensions.

XII. COMPLEXITY OF ALIFE SYSTEMS

"Life is a complex system: It is a dynamic system that can keep on changing and evolving over a great period of time without dying."

If the amount of information exchange in a system is varied from low to high, it gives "Fixed", "Periodic", and "Chaotic" systems in that order. Somewhere in between, a system exhibits "Complex" behaviour. Accordingly, each unit (cell) in a system dies, freezes, pulsates, or behaves in a very complex manner.

	CHANGE	**EVOLUTION**	**DEATH**
FIXED	NO	NO	NO
PERIODIC	YES	NO	NO
CHAOTIC	YES	YES	YES
COMPLEX	YES	YES	NO

Table (b): Complexity of ALife Systems

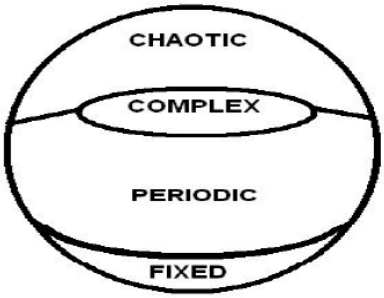

Figure (i): Various models of Life

XIII. FUNDAMENTAL APPROACHES USED TO IMPLEMENT ARTIFICIAL LIFE SYSTEMS

- NEURAL NETWORKS
- EVOLUTIONARY ALGORITHMS

    1. Genetic Programming
    2. Evolutionary Programming
    3. Classifier Systems
    4. Lindenmeyer Systems

- CELLULAR AUTOMATA

XIV. TWENTY PROBLEMS IN CELLULAR AUTOMATION

1. What overall classification of CA can be given?
2. What are the exact relations between entropies and Lyapunov exponents for CA?
3. What is the analogue of geometry for the configuration space of a CA?
4. What statistical quantities characterize CA behaviour?
5. What invariants are there in CA evolution?
6. How does thermodynamics apply to CA? (broken time symmetry problem)
7. How is different behaviour distributed in the space of CA rules?
8. What are the scaling properties of CA?
9. What is the correspondence between CA and continuous systems?
10. What is the correspondence between CA and stochastic systems?
11. How are CA affected by noise and other perturbations?
12. Is regular language complexity generically non-decreasing with time in 1-D CA?
13. What limit sets can CA produce?
14. What are the connections between the computational and statistical characteristics of CA?
15. How random are the sequences generated by CA?
16. How common are computational universality and undesirability in CA?
17. What is the nature of the infinite size limit of CA?
18. How common is computational irreducibility in CA?
19. How common are computationally intractable problems about CA?
20. What higher-level descriptions of information processing in CA can be given?

XV. CONCLUSION

Cellular Automation & ALife thus are advanced innovative and interesting field of computer science. The above detailed description of activities is sufficient to show that the activities pursued under this label are aimed at replicating some of the very basic activities of living beings. The basic issues of Artificial Life and Artificial Intelligence pertain to the issues investigated. Whereas AI has traditionally concentrated on the complex functions of human beings, such as chess playing, text comprehension, medical diagnosis, and so on. ALife mainly concentrates on basic natural behaviours, emphasizing survivality in complex environments. According to Brook's, an examination of the evolution of life on earth reveals the most of the time was spent developing the basic intelligence. The elemental faculties evolved to enable mobility in a dynamic environment and sensing of the surroundings to a degree sufficient to achieve the necessary maintenance of life and reproduction.

The issues dealt with by AI appeared only very recently on the evolutionary scene and mostly in humans. This suggests that the problem-solving behaviour, language, expert knowledge, and reason are all rather simple once the essence of being and reacting is available. This idea is expressed in the title of one of the Brook's papers, 'Elephants Don't Play Chess', suggesting that these animals are no more highly intelligent and able to survive and reproduce in a complex dynamic environment.

Celluar Automation is thus a powerful approach for studying the behaviour of Alife Systems by simply assuming the real environment, its objects, and activities (which are of course continuous in nature) as suppose to existing and happening in discrete manner. Most of the species and their behaviour have been simulated successfully via Cellular Automation. Alife Systems are basically complex in nature and their behaviour totally depends on the creativity and interest of the developer. Alife Systems are just "Machines with Life".

On the other hand in context to the Cellular Automation, every cell is treated as a logical machine. As far as if we talk about the scope of developing such type of machines that possesses life, we must believe that these machines can do a lot of tasks of different domains with significant accuracy and effeciency. Artificial Life based Systems can even does those tasks that are hard and almost impossible for most of us. So from the implementation point of view, Cellular Automation is a milestone in the field of Artificial Life. But this is not the limit, because a lot of researches on real and artificial world have shown that human beings and nature also obeys the "Principles of the Cellular Automation". The only thing that is being left is that, upto how much extent we are able to explore the unexplored world via Cellular Automation.

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Flood Management in Assam, INDIA: A review of Brahmaputra Floods, 2012

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Abstract- Brahmaputra is an important river for irrigation and transportation in the state of Assam, India. About 2,900 km long and with an average depth of 38 m mighty river is prone to catastrophic flooding in spring when the Himalayan snows melt. The average discharge of the river is about 19,300 cubic metres per second and floods can reach over 100,000 cubic metres per second. It is a classic example of a braided river and is highly susceptible to channel migration and avulsion. It is also one of the few rivers in the world that exhibit a tidal bore. The river drains the Himalaya east of the Indo-Nepal border, southern-central portion of the Tibetan plateau above the Ganges basin, south-eastern portion of Tibet, the Patkai-Bum hills, the northern slopes of the Meghalaya hills, the Assam plains and the northern portion of Bangladesh. The basin, especially south of Tibet is characterized by high level of rainfall.

Present study is an account of the devastation caused by the flooding in the Brahmaputra during 2012 and a case of Barpeta district Assam with an emphasis to the mitigation and management done by the district administration. The challenges faced by the district officials during flood are one of the prime aspects covered in the study. The study also depicts the probable mitigation measures could be beneficial for the region and henceforth for the flood prone states.

Index Terms- Brahmaputra, Disaster Management, Flood, Hazard, Vulnerability.

I. INTRODUCTION

By virtue of geo-climatic conditions about 60 percent of the landmass of India is prone to flood and it is the most common of all environmental hazards. Flood regularly claims over 20,000 lives per year and adversely affects around 75 million people worldwide (Smith, 1996). The reason lies in the widespread geographical and geomorphological distribution of the tracks of rivers and floodplains and low-lying coasts, together with their longstanding attractions for human settlement. Death and destruction due to flooding continue to be all too common phenomena throughout the world today, affecting millions of people annually. Floods cause about one third of all deaths, one third of all injuries and one third of all damage from natural disasters (Akew, 1999).

Among all natural disasters, floods are the most frequent to be faced by India. Floods in the eastern and northeastern part of India (Orissa, Bengal, Andhra Pradesh, Bihar and Assam) in the recent past, are striking examples. The annual precipitation, in India, including snowfall is estimated at 4,000 Billion Cubic Meter (BCM). Out of this, the seasonal rainfall in monsoon is of the order of 3,000 BCM (Report by Central Water Commission (CWC)). The rest includes sparse rainfall, lower depression and rain due to cloud bursts.

The records of the last century show a trend of widening of the Brahmaputra in Assam. The Brahmaputra occupied around 4000 sq. km in the 1920s and now the Brahmaputra occupies about 6000 sq. km (WRD, 2008). Based on the satellite image estimation of area eroded in the Brahmaputra for the recent years of 1997 to 2007-08 (WRD, 2008), the total land loss per year (excluding avulsion) is reported to be from 72.5 to 80 Sq. km/year. Bank erosion has been continually wiping out more than 2500 villages and 18 towns including sites of cultural heritage and tea gardens affecting lives of nearly 500,000 people. In north India numerous streams and rivulets rise in the Himalayan foothills and sub-mountain region from Kashmir in the west to Assam in the east. These streams are subject to flood due to the incidence of heavy rainfall in their respective catchment areas during monsoon. The instant rainfall over the steep terrain causes sharp rise in the water level of streams resulting flood in the sub-mountain region downstream. The rainfall in India shows great temporal and spatial variations, unequal seasonal distribution and geographical distribution and frequent departures from the normal. As reported by Central Water Commission (CWC) under Ministry of Water Resources, government of India, the annual average area affected by floods is 7.563 million ha. This observation was based on data for the period 1953 to 2000, with variability ranging from 1.46 million ha in 1965 to 17.5 million ha in 1978. On an average, floods have affected about 33 million person between 1953 and 2000. There is every possibility that this figure may increase due to population growth. The National Flood Commission (1980) has reported that the total flood prone area of India was 34 million ha. It has also mentioned that an area of 10 million ha has been protected, but the effective protection may be available to only 6 million ha. Main problems in India with respect to floods are inundation, drainage congestion due to urbanization and bank erosion. The river system, topography of the place and flow phenomenon are the different contributing factors responsible for flooding. Being a vast country, the flood problems in India may be visualized on regional basis.

II. STUDY AREA

Barpeta district in the State of Assam was created and started functioning since 1983. The district is spread across 3245 sq.kms. It is surrounded by Bhutan Hills in the north, Nalbari and

Baksa districts in the east, Goalpara and Kamrup districts in the south and Bongaigaon and Chirang districts in the west. Total population of the district is 16,93,190 (2011 census) with a population density of 632 per sq.km. and sex ratio of 1000:951. The major rivers flowing through the district are Brahmaputra, Beki, Manas, Pahumara, Kaldia, Palla, Bhelengi and Chaulkhowa. The rivers flowing through the district are also causes annual floods and riverbank erosion particularly in the char areas (flood plane), leading to a considerable loss of life and property. Barpeta district has overall flat topography with gentle slope towards south (Figure 1). The northern part of the district is slightly elevated, while the southern part close to the northern bank of the river Brahmaputra is low lying and flood prone.

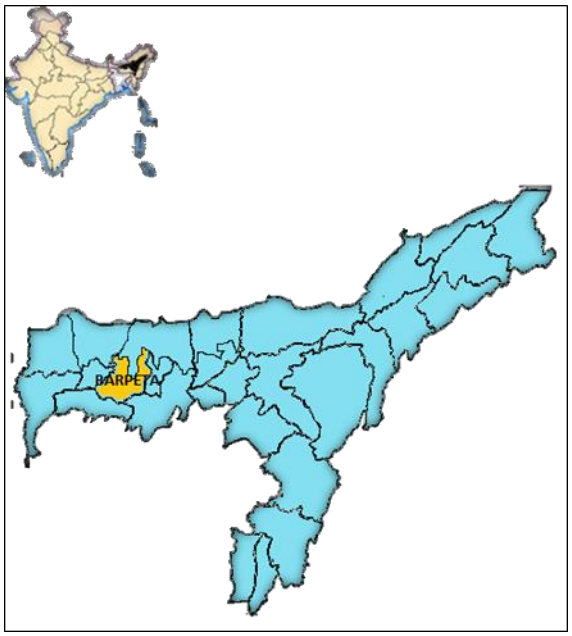

Figure 1: Schematic map of the district

III. 2012 BARPETA FLOOD INCIDENT

Berpeta district experienced three waves of flood during the year 2012. These were one of the most severe floods in the Barpeta history. The river Brahmaputra touched the highest flood level of 43.62 m in the history of last nine years. The brief impacts of the floods are as in Table 1.

Table 1: Impacts of 2012 Brahmaputra flood waves

	Duration of the flood	**Rivers Responsible for Flooding**	**Major Revenue Circles affected**
First Wave	7th to 24th June, 2012,	Pahumara, Kaldia, Bhellengi and Tihu	• Sarthebari (in continuation) • Bajali • Sarupeta • Barpeta (small part)
Second Wave	25th June to 14th August, 2012	Brahmaputra, Nakhanda, Mora Chaulkhowa and Bhellengi	• Barpeta • Sarthebari • Baghbar • Chenga • Kalgachia • Barnagar
Third wave	21st Sep to 15th Oct, 2012	Pohumara, Kaldia, Bharamputra, Nakhanda and Mora chaulkhowa.	• Barpeta • Chenga • Kalgachia • Sarthebari • Baghbar • Bajali

Three waves of flood at Barpeta affected almost entire district. A large number of people and livestock were faced the devastation of flood and large area of agricultural land inundated for a long period of time.

2012 floods of Assam had created severe economic, human and livestock losses. A total number of 686 villages were affected by the floods. Death toll of Human was raised to 36 out of which 23 were males and 13 females. About 4,25,732 livestock and poultry had also been affected.

There was hardly any circle in the district, which has not been affected during the flood period (June-Oct, 2012). Barpeta, Chenga and Baghbar circles were affected entirely and only Barnagar circle was affected least where 5 out of 97 villages were affected.

Since the district is grossly depends on the agriculture, the livelihood of the local communities shattered by the impact. A total of 1,56,480 hectares of agricultural land inundated and about 26,842 hectares of non-agricultural land was also worst affected by the flood. A significant amount of infrastructural damage was also recorded, which includes 12508 completely damaged house, 3521severely damaged house, and 28891 partially damaged house. Large number of roads, bridges, culvert had been damaged along with the losses in other sectors i.e., fishery, water resource etc. Most of the State Highway, PWD roads have been affected by the incessant rains either being inundated or waterlogged causing communication disruption and obstruction in relief and rescue operations.

IV. FLOOD MANAGEMENT BY DISTRICT ADMINISTRATION

Early Warning:

In Barpeta district early warning dissemination was quite effective to connect the last mile. Central Water Commission (CWC), the agency responsible for monitoring of all the rivers in the state, released the first early warning for 2012 flood. In case of rise in water level or any probability from the catchments area, CWC issues the warning to the SDMA/DDMA for further dissemination through EWS established by the DDMA. For each village State Government has appointed a resource person (village head man), who is responsible for the dissemination of early warning in his/her villages during flood situation. Early warning has been disseminated on time for the quick response and evacuation for all the three flood waves.

Rescue and Response:

Since flood is a regular phenomena in the district, District Administration and all the concern departments was prepared in advance to manage the flood situations. As soon as department received the early warning from the CWC, the information has been quickly disseminated to each village in a well planned manner for the evacuation of the people and cattle living in the places have probability of inundation. National Disaster Response Force (NDRF), State Disaster Response Force (SDRF) and District Administration Officials closely administered the relief and rescue works. Major steps towards the relief and rescue explained in Table 2

Table 2: Administrative Response during 2012 Brahmaputra floods.

Step 1	On receipt of warning of the impending flood for all the three waves, part of the immediate response an early warning has been disseminated in each village to warn the people.
Step 2	Emergency Operation Centre (EOC) has been activated in the District on 24 x7 basis.
Step 3	District Administration has been disseminated early warning in the likely affected areas especially to those people who have no access to mass media.
Step 4	Immediately after inundation evacuation activities has been started from the worst affected circles on the priority basis.
Step 5	Adequate number of Disaster Management staff, rescue swimmers, boats, and equipment had been deployed to all the affected villages for quick rescue and relief operations.
Step 6	Flood affected people had been shifted to pre-identified safe places at higher elevations i.e. schools, Panchayat Ghar, embankments.
Step 7	As a key responsibility, food, safe drinking water, hygiene and sanitation facilities etc. has been provided to all the affected people by the District Administration.
Step 8	Search and Rescue activities were also carried out through out the district along with the relief work. All the injured and people needed medical attention had been administered by the medical care unit.
Step 9	Damage assessment has also been carried out for the assessment of loss due to flooding for private and public infrastructures and crops etc.
Step 10	Cost of damages has also been sent to the State Govt. for release of funds from the "Calamity Relief Fund" as per the prescribed norms.

As the 2012 floods were severe as compare to the previous years, the requirement of the boats were comparatively high. About 292 boats were deployed with the rescue teams to evacuate the people and cattle. Approximately 83,731 people were evacuated safely and a total of 105 relief camps were established with all the necessary arrangements and as many as thousands of others have taken shelter on roadsides, embankments, highlands etc. About 40 medical teams had been formed to provide medical assistance to the affected people.

Mitigation Measures by the District:

District Administration was regularly monitoring the early sign of impending flood and rising water level in the rivers on day-to-day basis. Since flood is the regular phenomena in the district so it is essential to monitor the situation in advance for better preparedness. According to the rainfall in the catchment area and prediction of IMD, there was high possibility of the flood hitting the district this year, a number of necessary arrangements / exercises have been carried out i.e. identification of potentially weak areas along embankments and river banks, capacity building, quick response, early warning etc. All the potentially weak embankments were identified as vulnerable sites and mapped by the Water Resource Department (Figure 2). After identification of such sites, repair works in advance has been completed especially for the most vulnerable sits like Pazarbhanga, Manikpur etc. As a next step towards the effective flood management the District administration was done the assessment of available resources in hand and the resources required for worst case. Immediately after the warning for severe rainfall at the catchment areas and speculation of flooding of the district, a 24x7 Emergency Control Room has been established with adequate number of supporting staffs and officers.

Figure 2: Breach and river erosion on the bank of river Bharamputra

Major Challenges Faced by the District Administration:

The 2012 flood situations at the district were significantly well managed but still there were challenges to reach the final goal of zero casualties. During the entire flood management (June-October 2012), number of issues had been identified which need to be addressed on the priority basis to deal the future

floods efficiently. Some major issues and challenges identified by the District Administration are discussed below,

Problem Concerned with People's Return to Home:

Since the embankments are on higher elevation than flood plains, people have taken immediate shelter during the floods. The flood affected victims, who have lost their homes stayed back on the embankment for a long time, some stayed back permanently. Though the people on the temporary embankment are protected physically but on the flip side the temporary embankments are highly vulnerable to erosion and breaching.

Disease Surveillance and Control:

During the entire flood period (June-Oct, 2012), no disease outbreak was reported. District Administration, Medical and Public Health Department were prepared in advance to deal with any disease outbreak situation. A total number of 40 medical teams have been deployed to the various sites for the surveillance and monitoring purpose.

Adverse Meteorological Conditions:

The northeastern part of India generally receives high precipitation primarily due to the Southwest monsoon. Average annual rainfall in the region is very high and ranges from 1750 mm in the plains to about 6400 mm in the hills, this huge volume of water rushes through the narrow bowl shaped valley of Assam to the Bay of Bengal ravaging the area through floods and land erosion. The recurring floods in the state of Assam devastate about 20% of the plain area to as high as 67 %.

River Erosion and Breaching of Embankments:

River erosion and breaching of embankments are major cause for the rapid inundation. Roads and embankments have been breached or overtopped at various places, with the worst breaches developed at places.

Management of VIP visits:

VIP visits during and after flooding have been identified as one of the major challenges for district administration. During the flood situation it is very difficult to manage the necessary arrangements (i.e., security, logistics etc.) for the VIPs as most of the resources are deployed in the rescue, relief and other important work related to flood management.

Coordination among the Agencies

Interdepartmental coordination during disaster situation is one of the important issues need to be addressed. In normal practice majority of the NGOs are trying to reach the affected sites in proximity of roads and headquarter with the similar type of relief materials. Hence, a good coordination mechanism among the NGOs is high priority need.

Boat Management:

Availability of the adequate number of boats during the relief and rescue work at the time of flood was a challenge for the administration. All the resources i.e. boats men, rescue swimmers etc. need to put in loop in terms of regular meetings and exercises especially during the non-flood period.

Relief Camp Management:

During flood managing relief camps were a major challenge for the department especially distribution of food, hygiene and sanitation at the campsite etc. Even each relief camp context presents different unique challenges, which require improvisation and quick problem solving techniques.

Damaged Roads:

Most of the roads were severely damaged including the State Highways, PWD roads due to the inundation and waterlogging caused serious communication disruption in relief and rescue operations. The district administration has planned alternative solution to combat with these situations through the deployment of adequate number of boats for the relief and rescue operations. But restoration of road connectivity is the challenge to pursue quick relief and rescue operations.

Waterlogged Agricultural Land:

In many cases, the temporary small embankments were made to stop the high flow of water inside the town. After the flood is over the same small embankments were acted as barrier to stop the backflow of trapped water. District administration faced huge challenge to drain out the trapped floodwater in the agricultural lands. Finally the administration removed the temporary embankments to help the trapped water for backflow.

Conclusions and Recommendations:

Barpeta is regularly affected by floods due to high discharge in the Brahmaputra and other river system of the district. The main causes of floods are widespread heavy rainfall in the catchment areas and inadequate capacity of the river channel to contain the flood flow within the banks of the river.

Flood hazard and potential flood risk from all sources need to be identified and considered at the initial stage in the planning process. Disaster Risk Reduction need to be mainstreamed in the developmental processes of the district and should preferentially be located in areas with little or no flood hazard thereby avoiding or minimizing the risk. Identification and mapping of all the resources, alternative routes is required in advance in view to the worst flood scenarios along with the capacity building exercises for all the stakeholders including the community. Flood awareness among the communities need improvement along with the concept of community based disaster risk management. Launching public awareness campaigns on flood safety and risk reduction and sensitizing all stakeholders to flood problems and mitigation in flood prone areas is essential.

Water Management is another major identified issue by the District Administration. Presently administration is working on the planning phase of this issue. Since the area is too big, so instead of making embankments, Administration and PWD planning to do the proper channelization of the rivers and tributary system. During the flood time, instead of creating flooding excess water will be distributed in different channels to avoid inundation. Proper channelization of water is an effective and long-term solution for the flood management. In case of embankment development, the concern is the regular increase in riverbed height, as much as big embankments we develop, it will be shorter each year due to the high quantity of sedimentation in

the riverbed. So development of embankments may not be a long-term solution for the problem.

Geographical Information System (GIS) based database need be prepared to map, analyze, plan and manage all the hazards and resources for the better management of future floods. Flooding becomes a major hazard to life and property only when people live on the floodplain. Identification of the unplanned and unauthorized construction in the riverbed areas could be mapped through GIS for planning. Flood hazard maps will be showing flood boundary based on different magnitudes of flood with specific return periods. These maps can be used to regulate developmental activities within the floodplain, so that damages could be minimized. Some of the data required for hazard mapping is difficult to obtain from ground measurements and it is time consuming; in such cases satellite imageries plays an important role. Satellites provide synoptic and frequent coverage of flood affected areas and thus become valuable for monitoring flood disaster. Thus satellite data can be directly used for deriving the flood inundation limits. If satellite data sets during flood times are available over a period of time for a floodplain, they can be conveniently used for hazard zone mapping.

A GIS based detailed mapping and modeling will be useful for flood hazard. Flood zones are geographical areas likely to be flooded in a particular range and they are also a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. The basic concept of flood plain zoning is to regulate land use in the flood plains in order to restrict the damage due to floods, while deriving maximum benefits from the same.

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A Study of Development of Language Socialization in Children of Working and Non-working Mothers

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Abstract- The present study is aimed at examining language socialization in the early childhood development for working and non- working mothers. Socialization is a learning process that begins shortly after birth. Early childhood is the period of the most intense and the most crucial socialization. It is then that we acquire language and learn the fundamentals of our culture. Language socialization research shows that language plays a crucial role in the process of novice becoming a member of any cultural community. In order to become active and competent members of their community, novices must learn to understand and use these linguistic structures in appropriate ways. The sample of the study consisted of 20 mothers (10 working and 10 non- working) hailing from Delhi region on the basis of Random Sampling technique. The measures taken for collecting data is extensive interview, both formal and informal interviews were taken. The data was further qualitatively analyzed by thematic analysis and result was found. The hypothesis were:- a) Language socialization in children of working mothers was more than in the children of non-working mothers b) Socialization in children of working mothers is more than in the children of non-working mothers and lastly c) Overall development of children of non- working mothers will be better than children of working mothers.

Index Terms- Language development, Language socialization, Social development, Socialization

I. Introduction

Socialization is the life-long process of the learning of expectations, habits, skills, beliefs, values and other requirements necessary for participation within society (Winston, 1995). One of the major tools used in socialization is language. Through such tools as language and how it is used in different contexts, caregivers play a key role in introducing a child to a complex social world.

For a bilingual child, language socialization is particularly important. Scheffilin & Ochs (1986) define language socialization as an interactional display (covert or overt) to a novice [child] of expected ways of thinking, feeling, and acting. In order to understand, interact, and negotiate the child socio cultural context successfully, the child must learn not only how but also when a language is used in the community, and the social meanings behind such linguistic practices.

Schecter & Bayley (2002) define language socialization as the process by which children become socialized into the interpretive frameworks of their culture. Researchers working within this framework see both the context of interaction and the culturally sanctioned roles of the participants [in an activity] as major determinants of the language forms and strategies used.

One way parents socialize a child on the importance of a language is through linguistic attitudes and practices that they convey on a daily basis through interaction. Both beliefs and practices are central explanatory constructs to understanding how parents socialize their children to interpret their particular socio cultural context. Researchers recognize that the social environment that a child is exposed to on a daily basis is in fact a rich context for learning.

Various linguistic resources are available to children in bilingual communities (i.e. peers, parents, and other family or community members). The study focuses on the parents' (both the mother and the father) roles in language socialization because many researchers agree that parents play a critical role in their child's language development. Some researchers see the process as a negotiated activity where children and their parents are key players in each other's language socialization (Vásquez, 1989; 1992; Vásquez, Pease-Alvarez, & Shannon, 1994). Many language studies focus on the mother's role because she is often the primary caregiver who has the responsibility of socializing children.

Objective

- To study the process & development of language socialization in children
- To understand the dynamics of the socialization process
- To analyze the overall growth of the child in context to working & non working mothers

Hypothesis

- Language socialization in children of working mothers will be more than in the children of non-working mothers
- Socialization in children of working mothers will be more than in the children of non- working mothers and lastly
- Overall development of children of non- working mothers will be better than children of working mothers.

II. Methodology

Sample: The sample of the study consisted of 20 mothers (10 working and 10 non- working) hailing from Delhi region on the basis of Random Sampling technique.

Procedure: The measures taken for collecting data was extensive interview, both formal and informal interviews were

taken. The data was further qualitatively analyzed by thematic analysis and result was interpreted accordingly

III. Results & Discussions

Table 1: Thematic analysis of the Interview

SUBTHEMES	CONCEPTS	THEMES
• Sources of Language development whether its better learnt at home or day care centers/ crèche • Multiple sources of learning language as contributor to social growth • Language centralization is predominant with non working mothers due to the effect of only the use of mother tongue	We acquire language in early childhood and learn the fundamentals of our culture. Language as a medium of social connectivity and expression to the outside world.	Language forms the core of the socialization process. Children of working mothers are culturally more advance in language usage
• Pattern of growth in socialization of the child in reference to the amount of time spend with working & non working mother • Observable differences in approaching towards the socialization process of the child with working & non working mothers • Social adjustment in children of working mothers as an important feature of growth	Socialization is a learning process that begins shortly after birth. Early childhood is the period of the most intense and the most critical socialization. Social adjustment is the achievement of balance in social relationships usually aided by the appropriate application of social skills.	Children of working mothers have better social adjustment than children of non working mothers
• Amount of emotional, cognitive and behavioral support provided by non working mothers is more than working mothers • Time given by non working mothers as contributors to holistic development in the child • Complete attention provided by non working mothers is an asset in the growth of the child	Multiple factors affect the growth of the child. The holistic development of the child is dependent on both the nature and nurture provided to the child.	Overall development of children of non-working mothers will be better than children of working mothers

Hypothesis 1: Language socialization in children of working mothers will be more than in the children of non-working mothers

As per the results of the thematic analysis, it was observed that Language forms the core of the socialization process. Working mothers stated that their children represented more patterns of symbolic communication & explicit use of language due to their proximity to their social surroundings.

Children of working mothers are culturally more advance in language usage because of the gradual effect of the environmental stimulus. Working mothers stated children developing multilingual effect due to their early reception of various stimuli from the social environment. Non working mothers reported restricted multilingual effect in early childhood due to limited contact of the children with the outside world & close contact with the mother.

Therefore, the present findings support the hypothesis that language socialization in children of working mothers will be more than the children of non working mothers.

Hypothesis 2: Socialization in children of working mothers will be more than in the children of non- working mothers.

As per the results of the thematic analysis, Children of working mothers have better social adjustment than children of non working mothers. Most working mothers reported that their children are usually comfortable in the presence of other people in the social surrounding and also stated that they do not exhibit adjustment issues and are playful in the company of other people. Non working mothers stated that their children are usually glued to them and their play activities are usually distracted in the presence of others. Children of non working mothers exhibit social adjustment concerns which are relatively higher as reported by working mothers

Therefore, the present findings support the hypothesis that Socialization in children of working mothers will be more than in the children of non- working mothers.

Hypothesis 3: Overall development of children of non-working mothers will be better than children of working mothers.

Non working mothers reported more emotional and behavioral responsiveness of the child towards the family in comparison to the working mothers. Non working mothers due to their unbiased attention given to the child, reported of better holistic development in their children. The present findings are being supported by the findings of previous hypothesis where children of non working mothers exhibit social adjustment concerns. Working mothers complained that due to scarcity of time spend & attention given to the child, their children are comparatively not very emotionally, behaviorally and cognitively responsive and such factors contribute to the hampered overall development of the child.

Therefore, the present findings support the hypothesis that overall development of children of non- working mothers will be better than children of working mothers.

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Computational comparative modeling and visualization for HIV1 and HIV2 proteins via the software SYBYL-X 2.0

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Abstract- Human immunodeficiency virus is a lentivirus (slowly replicating virus) that causes "Acquired immuno deficiency syndrome "(AIDS). HIV attached to the human CD4 receptor and leads to the infection. Protein modelling is type of structure prediction from its sequence with an accuracy that is comparable from different softwares .Computational protein modelling is a method designed for the most probable 3D structure from a sequence given its alignments with related structure .In this topic we discuss about the 3D structure of HIV1and HIV2 protein from different softwares and their variations in core value, hydrophobicity, residues and intermolecular forces

Index Terms- *protein modeling; core value; software's; HIV1; HIV2*

I. INTRODUCTION

Acquired immunodeficiency syndrome (AIDS) was first reported by the us centre of disease (CDC),a few years later it was found that's a retrovirus called human immune deficiency virus (HIV) and is causative agent in AIDS. The study of HIV protease is one of the most important approaches for the therapeutic intervention in HIV infection and their development is regarded as major success of design[1]HIV type I (HIV-1) and type 2 (HIV-2) are very closely related but differ in pathogenicity, natural history and therapy. HIV-1 is more easily transmitted and consequently accounts for the vast majority of global HIV infections. The less transmissible HIV-2 was thought to be largely confined to West Africa(where it is thought to have originated).[2-3] but has spread to parts of Europe and India.[4-5] When compared to HIV-1, HIV-2 infected individuals have a much longer asymptomatic stage, slower progression to AIDS6-8, slower decline in CD4 count[7-10] lower mortality lower rate of vertical transmission and smaller gains in CD4 count in response to antiretroviral treatment (ART)Serologic reactivity to HIV-1 and HIV-2 (HIV-1/2) has also increased in HIV-2 endemic areas over the past decade. In terms of antiretroviral drug regimens, HIV-2 is intrinsically resistant to non nucleoside reverse transcriptase inhibitors (NNRTI) such as nevirapine and efavirenz and not all the protease inhibitors (PIs) provide good viral suppression.[11-12]

B. About SYBYL-X 2.0 (software)

The SYBYL-X Suite has everything you need for drug design and other molecular discovery projects, from HTS follow-up through late Lead Optimization. Project needs may change, but you'll have all the tools available and easily be able to move from identifying potential lead candidates, to lead optimization projects, or to building a homology model for a target of interest. All of the components for life science research are included as standard with the SYBYL-X suite. [13]

C. About HIV 1 and HIV 2 proteins

HIV-1 protease is a retroviral aspartyl protease (retropepsin) that is essential for the life-cycle of HIV, the retrovirus that causes AIDS.[14-15] HIV protease cleaves newly synthesized polyproteins at the appropriate places to create the mature protein components of an infectious HIV virion. Without effective HIV protease, HIV virions remain uninfectious. The human immunodeficiency virus integrase (HIV IN) protein cleaves two nucleotides off the 3′ end of viral DNA and subsequently integrates the viral DNA into target DNA. IN exposes a specific phosphodiester bond near the viral DNA end to nucleophilic attack by water or other nucleophiles, such as glycerol or the 3′ hydroxyl group of the viral DNA molecule itself. [16-17]

II. MATERIAL AND METHODS

For this analysis we use different type on online and offline tools for suitable scientific analysis and for protein sequence of HIV1protease and HIV2 integrase retrieves from NCBI and model prediction via the online software and servers like ,GENO3D , , RaptorX ,phyre .were use to find out potential 3D structure of proteins basis on their statical values , and validate the potential models via the SAVES SERVER and the structure visualise via **Discovery studio**, ***SYBYL-X 2.0*** with analysed potential parameters for comparative modelling between two different proteins

III. RESULTS

Analysis of computational comparative modeling and visualization for HIV1and HIV2 proteins contains a two different type of protein like protease for HIV1 and integrase for HIV 2

F. ***Analysis of HIV1 protease with the help of different type of tables*****Table 1: 3D models with annotated name**

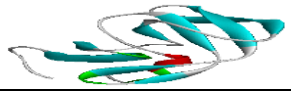
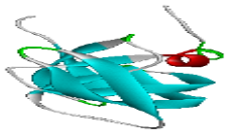
S.No	Software Used	Annotated Model Name	Structures predict via the discovery studio	Validation of models via SAVES server (Core)	(Verify 3D)	(Errat)
2.	GENO3D	>Geno3D_Pro_Model8		87.3%	75%	97.468
3.	RaptorX	>RaptorX_Protease		98.7%	98.96%	65.116
4.	Phyre 2	>Phyre_Pro_Model3		92.4%	100.00%	79.762

Table 1 explains: 3D model generated via the different type of software and validates the model via the SAVES server with avourablef statical value. Green color shows the best models with best score validation.

Table 2: Query of model with ramchandran plot and hydrophobicity plot

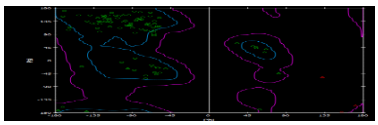
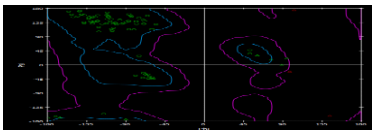
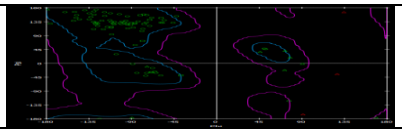
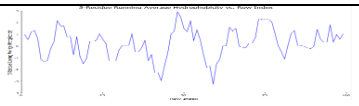
S.no.	Software Used	Annotated Model Name	Ramachandran plot via the discovery studio	Hydrophobicity plot via the discovery studio
2.	GENO3D	>Geno3D_Pro_Model8		
3.	RaptorX	>RaptorX_Protease		
4.	Phyre 2	>Phyre_Pro_Model3		

Table 2 explains: Ramchandran plot for analysis of residue and hydrophobiciy plot for hydrogen atom analysis and Ramachandran plot shows the phi and psi torision angles for all residues in structure.phi value on x-axis and psi value on y axis. the darkest area (in green colour) corresponds to the core. Hydrophobicity plot is the physical property of a molecule repelled from the mass of water.

Table 3: 3D model visualization via the *SYBYL-X 2.0*

S.No.	Software Used	Annotated Model Name	Model add with Hydrogen Molecule	Model add with Residue	Model predicted in cavity form

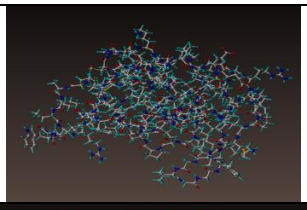
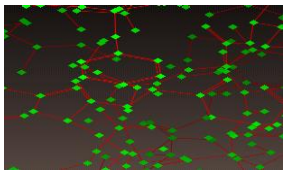
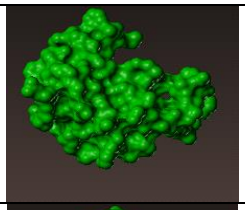
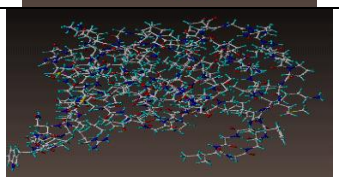
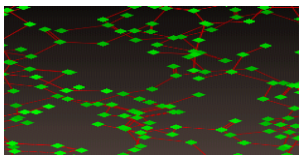
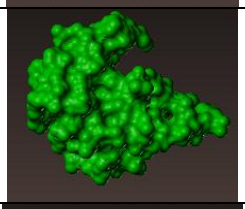
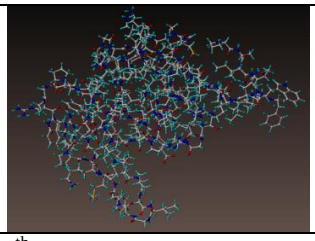
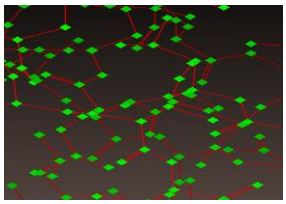
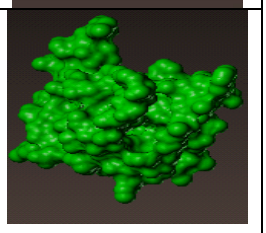
2.	GENO3D	>Geno3D_Pro_Model8			
3.	RaptorX	>RaptorX_Protease			
4.	Phyre 2	>Phyre_Pro_Model3			

Table 3 explains : In this table column no.4th figure shows Carbon (white in color) , Nitrogen (dark blue in color), Oxygen (red in color), Hydrogen(blue in color).Column no. 5th shows residues (green in color),Peptide bonds(red in color).Column no.6th shows the structure in cavity form.

Table 4: Structure with ball stick and C-C interaction

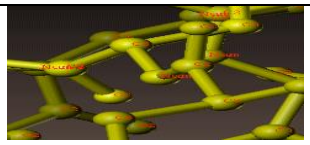
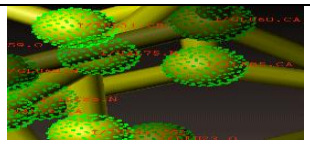
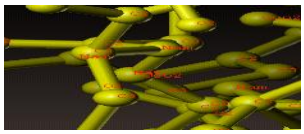
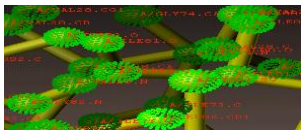
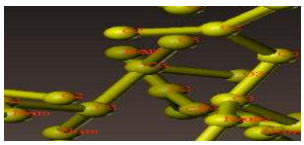
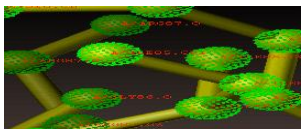
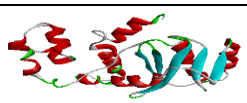
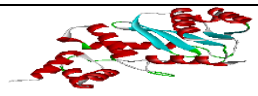
S.No.	Software Used	Annotated Model Name	Model label with tripose	Model with full name with intermolecule
2.	GENO3D	>Geno3D_Pro_Model8		
3.	RaptorX	>RaptorX_Pro		
4.	Phyre 2	>Phyre_Pro_Model3		

Table 4 explains: Binding between C-C, C-N and intramolecule analysis with green ball like structure with name of protein.

G. **Analysis of HIV2 integrase with the help of different type of tables**

Table 5: 3D models with annotated name

S.No	Software Used	Annotated Model Name	Structures predict via the discovery studio	Validation of models via SAVES server (Core)	(Verify3D)	(Errat)
1.	GENO3D	>GENO3D_IN_model3		81.2%	61.95%	93.878
2.	RaptorX	>RaptorX_IN		93.%	91.00%	82.178

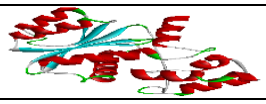
3.	Phyre 2	>Phyre2_IN_model1		93.4%	81.64%	91.667

Table 5 explains: 3D model generated via the different type of software and validate the model via the SAVES server with favorable statical value.

Table 6: Query of model with ramchandran plot and hydrophobicity plot

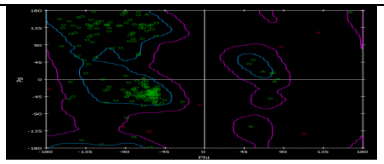
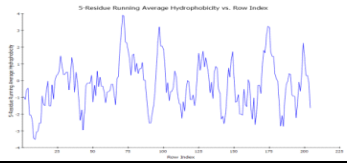
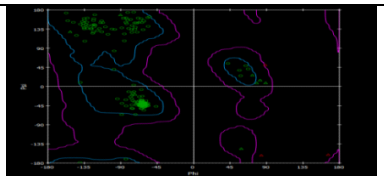
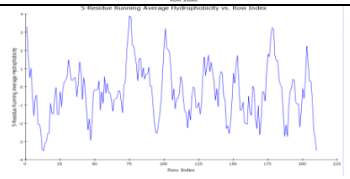
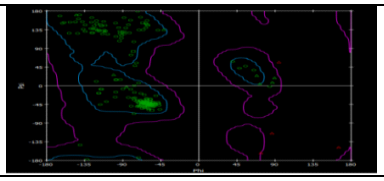
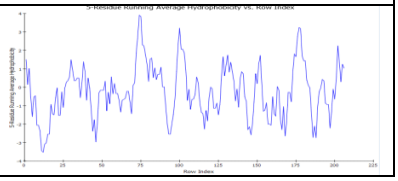
S.no.	Software Used	Annotated Model Name	Ramachandran plot via the discovery studio	Hydrophobicity plot via the discovery studio
1.	GENO3D	>GENO3D_IN_model3		
2.	RaptorX	>RaptorX_IN		
3.	Phyre 2	>Phyre2_IN_model1		

Table 6 explains: Ramchandran plot for analysis of residue and hydrophobiciy plot for hydrogen atom analysis and Ramachandran plot shows the phi and psi torision angles for all residues in structure.phi value on x-axis and psi value on y axis. the darkest area (in green colour) corresponds to the core. Hydrophobicity plot is the physical property of a molecule repelled from the mass of water.

Table: 7. 3D model visualization via the *SYBYL-X 2.0*

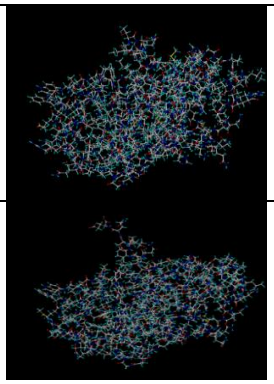
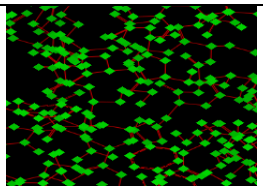
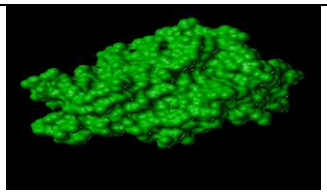
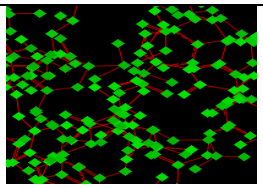
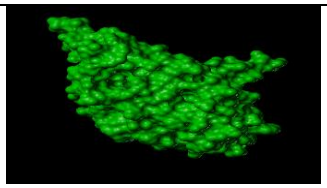
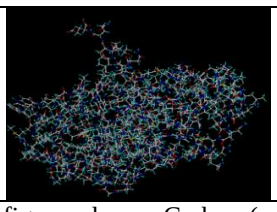
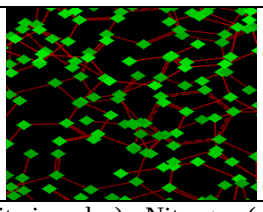
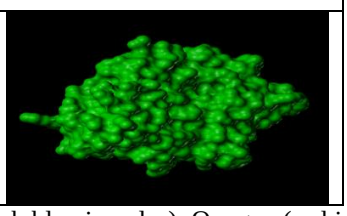
S.No.	Software Used	Annotated Model Name	Model add with Hydrogen Molecule	Model add with Residue	Model predicted in cavity form
1.	GENO3D	>GENO3D_IN_model3			
2.	RaptorX	>RaptorX_IN			
3.	Phyre 2	>Phyre2_IN_model1			

Table 7 explains : In this table column no.4th figure shows Carbon (white in color) , Nitrogen (dark blue in color), Oxygen (red in color), Hydrogen(blue in color).Column no. 5th shows residues (green in color),Peptide bonds(red in color).Column no.6th shows the structure in cavity form.

Table 8: structure with ball stick and C-C interaction

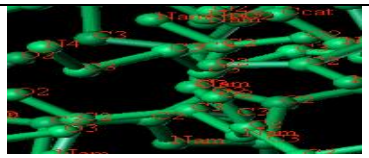
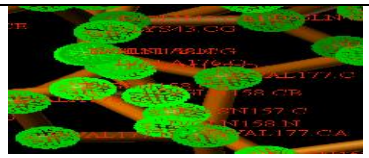
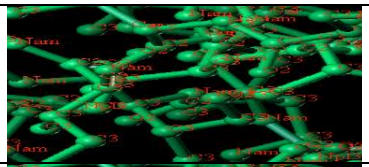
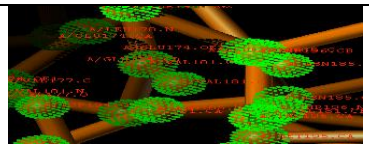
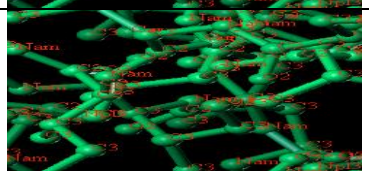
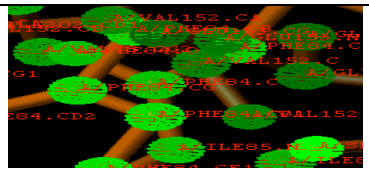
S.No.	Software Used	Annotated Model Name	Model label with tripos	Model with full name with intramolecule
1.	GENO3D	>GENO3D_IN_model3		
2.	RaptorX	>RaptorX_IN		
3.	Phyre 2	>Phyre2_IN_model1		

Table 8 explains: Binding between C-C, C-N and intramolecule analysis with green ball like structure with name of protein.

IV DISCUSSION

In this topic we discuss about comparative modeling of HIV1protease and HIV2 integrase protein for best model prediction and we analyzed very important potential parameters for this comparative prediction and such a very difference between two different structure basis on their statical values and basis on their models with different amino acid positions (residues) Comparative modeling of HIV1and HIV2 proteins of best model prediction we analyze ,the core value ,verify 3Dand errat
value of model. Errat value is the statistics of non bonding interaction ,verify 3D determines the compatibility of atomic model .for analyzing best model higher value of verfy3D will be the best model .in output section of verify 3D ,if the results come in gteen box that's mean without error and higher value it will be the best model and if results comes in an error states (>75%) then box will be red such a very major difference between two protein only in human immunodeficiency virus .

V CONCLUSION

In HIV1 protease protein modeling the best results come from phyre2 (>Phyre_Pro_Model3) because the verify 3D value is higher (100%) in comparison to GENO3D and raptorx in HIV2 integrase , protein modeling the best results come from RaptorX (>RaptorX_IN) because the verify 3D a value is higher (91%) in comparison to GENO3D and Phyre 2 so we analyzed in this topic .comparative protein modeling highest value verify 3D will be the best for given structural model

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Sculptures of Kamakhya Temple: An Aesthetic View

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Abstract- The Kamakhya temple is one of the world known religious centre. Though, the temple is regarded as the great religious *Tantric*centre but, it lays great emphasis on the sculptural art. The temple exits at the Nilachal hill of Assam. The myth, religion and art are amalgamated in the Kamakhya temple. The reconstructed temple shows the sculptural art of different times. Numerous sculptural images are very similar to the Gupta art style. The study focuses upon the characteristics of the stone images and traces the myth behind the temple. The stone images are analyzed according to the subject matter.

Index Terms- *Aesthetic, Kamakhya temple, Myth, Sculptures*

I. Section I

The Kamakhya temple is one of the main *pithas* (sacred place) among fifty one*Saktipithas* and the temple is dedicated to Mother Goddess Kamakhya. Kamakhya is another form of Goddess Parvati. The Kamakhya temple is located on the Nilachal hill in western part of Guwahati city in Assam. There is an incomplete stone staircase known as the *Mekhalaujua* path along with the Kamakhya temple. Mother Goddess Kamakhya is worshiped here in the '*Yoni'* (genitalia)form. The most celebrated festival is the Ambubachi festival. It is widely believed that during the period of festival of each summer, Devi Kamakhya goes through her menstrual cycle. The history was silent that when the temple was originally built. But, it was estimated that the temple was built around the 4^{th} -5^{th} century A D. There was a traditional belief that Kalapahar, a Muslim iconoclast from Bengal destroyed the original form of the Kamakhya temple. But, there is not found any authentic evidenceregarding this matter. Though, the temple is well known as a great sacred centre, but, the temple also plays an important role in the sculptural art of Assam and now the temple is in ruin. According to the inscription of the Kamakhya temple, Koch king Naranarayana reconstructed the temple over the ruins of the old structure in 1565 A D.The nature of the temple indicates that the original structure of the stone built temple is reconstructed many times; hence, the sculptural compositions of this temple reflect their characteristic style of different periods. Some of the stone carvings display the characteristic styles of the Gupta art as well as art of Orissa. Sculptures of Assam closely associated with the style of Bengal and Orissa. In addition, Rao mentions that the sculptures of Assam are included under the fourth school of Indian art representing the Bengal, Orissa and Assam due to the stylistic similarities [1]. The Kamakhyatemple essentially follows the *Nagara* style of architecture of the North India. The sculptures are apparent mostly on the exterior walls as well ason the interior walls of the Kamakhyatemple. A good number of sculptures are also fixed on the temple gates. Besides, some of the sculptures are lying scattered within the temple campus. But due to the religious prohibition, the sculptures of interior walls are not given permission to study.

II. Section II

Numbers of legends as well as myths are associated with the Kamakhya temple.Among them, a well known mythological story is found in the *KalikaPurana*. According to myth, once Daksha, father of Sati or Parvatiorganized a sacrificial program where all Gods and Goddesses were invited, but, Siva and Sati were not invited for the reason that Daksha disliked Siva for his appearance. But, without invitation, Sati came to the program. Daksha immediately became angry and scandalized to her husband Siva. This incident was unbearable for her and at last Sati gave up her body. Hearing the news, Siva became furious and went to his father-in-law's house where Siva destroyed the sacrificial alter. Siva carried the dead body of Sati on his shoulder roaming around the whole universe or *tribhuvana*. All the Gods and Goddesses became fearful and finally then Lord Vishnu started secretly to detach the whole body of Sati into fifty one pieces with his *Chakra* (wheel). On where every piece had fallen down, every place turned into important *pithasthana*. It was believed that the '*Yoni'* part of Sati had fallen down on the top of the Nilachala hill which was known as Kamakhya*pitha.KalikaPurana*mentioned that the '*Yoni'*part of Sati existed in the form of a stone in the Kamakhya*pitha*[2]. The*KalikaPurana* alsomentioned that the mountainNilachala represented the body of Siva himself and when*'Yoni'* of Sati had fallen on the mountain, it turned blue. There was also a mythological concept that Goddess Kamakhya came to this place secretly to fulfill the sexual enjoyment (*kama*) with Her husband Siva.It is noteworthy thatthe sanctum of the temple looks like a natural cave which is a dark and mysterious chamber. In the sanctum, there is no any image, but exits a sculptured image of stone which is like a form of '*Yoni'* and interestingly, a natural spring keeps the image moist in all times.

The walls of Kamakhya temple are richly embellished with the numerous relief sculptures where veritiesof subject matters are depicted such as religious, secular, flora and fauna and geometrical design.The divine images of the temple are included under the

religious subject matter and found abundantly. A great number of exquisite figures of the divine images which follow the iconographic rules are inscribed on the outer walls of the sanctum and they serve to evoke the religious feeling of the devotees. To carve the divine images, artists had to follow the rules and principles of the canonical texts, but, added their own creativities also. Mostly, the life size male divine figures are installed on the outer temple walls of this *Sakti* temple. An important aspect is that the images are depicted with emotionally expressive pose as well as gesture. It is noteworthy that the depictions of Siva in his various forms are found. Most of the figures of Siva show the terrific aspect which is called Bhairava. Due to the influence of *Tantricism*, the images of Gods and Goddesses show a tendency of characterize of the terrific and the destructive forms. According to *Agamas*, twenty five sporting forms (*lila-murtis*) of Siva are found in the sculptural representationsand most of them are usually illustrated in the South Indian temples [3]. According to *VishnudharmottaraPurana*, Bhairava appears with flabby belly, round yellow eyes, side-tusks and wide nostrils, and adorns a garland of skulls. He adorns snakes as ornaments with other some ornaments. The complexion of Bhairava is dark as the rain-cloud and his garment is the elephant's skin. The image carries several weapons [4].

In the Kamakhya temple, an image of Siva which performs a terrific aspect is inscribed on the outer wall of the sanctum (Figure 1). The image is given four handed where the emblems are the *trisula* (trident), *khatvanga*(clubof bone with skulls), *kati-hastamudra* (one hand is half-raised at ease and kept on the hip),*jnana-mudra* (knowledge comes from within). For beautification, the God is fully ornamented with different ornaments. A particularly interesting sculpture is found on the same wall of same attitude which is known as Bhairava (Figure 2). Here, the image's look is horrible, since, God has a terrible face with protruding teeth. His emblems are the sword, skull, *kati-hastamudra* and an indistinct object. Mythology informed that the skull which God holds was of the gate-keeper of Vishnu. A good number of Bhairava images are observed on the wall of the temple, but every figure's attributes are different from each other. Interestingly, another image of Siva expresses his terrific aspect through his dancing posture (Figure 3).Considering as a great master of dance and music, the image of Siva is carved in the form of VinadharaDakshinamurti where Siva holds a *vina* in his hands.The head of the dancing VinadharaDakshinamurti is unfortunately mutilated but,a superior craftsmanship is given in the physical form. The lower both hands hold the *vina*while upper right hand holds the *sruka* (sacrificial spoon). The back left hand carries an indistinct object. Interestingly, the God adorns a *mundamala* (garland of skull) and is standing on a dead man.These images are carved in realistic manner with the accuracy of physical details. These images can be regarded to be the best products of sculptural art of Assam. The figures are amalgamated with different characteristic features like full of charm, elegant posture, spiritual expression, simplicity etc. Besides the Bhairava figures, there are also enshrined some others divine images like Surya, Ganesa, Dakshaetc.

Along with these great numbers of the male divine figures, two females Goddesses are associated on the exterior wall of the sanctum.The females are identified as the form of *Sakti* namely Gauri and Uma. Woman is regarded as the form of Mother Goddess. Nature is the symbolic representation of woman who has creative power.According to India mythology, Gauri is the wife of Siva where Uma is another form of Gauri. Here, in the sculptural representation, Gauri is standing in graceful posture and holding a half bloomed lotus in the right hand while the other performs the *kati-hastamudra* (Figure 4). The figure reflects the characteristic feature of the Gupta art in the carving style. According to the treatise, the image of Gauri has to depict like an unmarried girl. Like Gauri, Uma is also almost similar but the figure is holding a mirror which is special emblem of Uma. Since, Uma is holding a mirror; therefore, the figure produces the *Shringar rasa* (erotic sentiment). The sculptors illustratedthe images in the temple architecture not only for divinities, but also add some human characters like subtle human moods as well assome sentiments. Artists gave more concentration to show adequate sensitivity and charming qualities in carving of the female sculptures.Therefore, the images become more lifelike on the stone surfaces. Some others mutilated stone blocks display the representations of female divine beauty (Figure 5). These sculptural pieces are also reflection of the Gupta style.The females are very sensuously carved. "*The sensuous figures that sculptors made not only commanded the admiration from the beholders but also excited their senses finally leaving an experience of ecstasy. Thus a piece of beauty turns as a source of delight and pleasure*" [5]. Proportionatelythe figures are well carvedoutwherethe physical beauty of the femalesis transferred into the spiritual beauty. A unique representation of female is shown in meditation posture (Figure 6). The treatment of the carving of the figure is like Indian terracotta style. Another image of woman is exposing openly her genital organ. This type of figure is carved on the temple wall due to the influence of *Tantricism*.

The secular themes which are the everyday life of the human societies are depicted in the temple art. In the secular theme, numbers of scenes are carved out. A recognizable sculptural composition is found on the gate of the temple where the composition is of mother and child (Figure 7). The woman is engaged in suckling her child in seated posture. Through the sculpture, a mother aspect is focused. Some other important scenes display where a female is engaged in supplying water to a male who is in thirsty. Another scene represents a robust male who is eating something. A scene which is very uncommon representation is inscribed on the temple wall. According to scene, a man is carrying a heavy load over his head. Some stone blocks are illustrated with the representations of dance posture and erotic posturewhich are found within the temple campus.

The flora and fauna are the important parts for the decoration of the temple architecture. The depictions of the flora and fauna have been always connecting to the nature with its blessings as well as rhythms. These are used in the temple building for auspiciousness as well as for the beautification of the temple. The depictions of the floral motif in the Kamakhya temple can be considered as important part for the ornamentation. Mostly, the floriated motifs are carved on the outer walls of the sanctum of the temple where the lotus is

the major flower motif. Lotus is considered as most sacred flower for all religions and signified the emblem of beauty.It is regarded as one of the auspicious motifs among the eight sacred motifs. Besides, lotus is given as pedestal to the most of the Gods and Goddesses of this temple. Different kinds of floral motifs are amalgamated with the geometrical design (Figure8). A carved stone block which is found within the temple campus shows the unique representation of creeper motif in interlacing pattern. Interestingly, a man is holding the two branches in his hands of this creeper motif which are carved in realistic manner. "*.....animals and floral patterns have throughout the history of Indian sculpture been treated with far more realism than the figures of men and Gods*" [6]. The carved creeper motif shows the characteristic style of Gupta art.

The Kamakhya temple contains the fauna motif in limited numbers where the lion is given more prominent place. For example, a broken door sill depicts a *mangalakalasa*(auspicious jar) which is flanked by two running lions in opposite direction with raised tails and their heads bent towards the *mangalakalasa*are commonly met in the sculptural art of Assam (Figure 9). *MangalaKalasa* is also one of the members among the eight auspicious symbols. Besides, a very common motif which is *gaja-simha* found on the temple wall. In this motif, a huge lion is seated vertically by his back legs on an elephant which is small in size. This type of sculptural representation is also displayed as an architectural device in the Orissa temples. Another stone block shows two lions are joined by one lion head which are fixed on the upper part of the temple. Possibly, this sculptural part is used as architectural device in the original Kamakhya temple. Some Gods are composited by the human and animal figure together such as Ganesa of elephant headed,Daksha of goat headed etcwhich are found on the temple walls.

III. Section III

Thus, it can be concluded that the temple art is the reflection of broad aspects such as myth, believes, mythology, customs and cults which are clearly as well as aesthetically reflected through the sculptural motifs found in the symbolic representations.Amalgamations of different myths as well as the sculptural parts enhanced the grandeur of the whole architectural part of the Kamakhya temple. Though, the Kamakhya temple is influenced by other parts of India but the regional variation is proper represented in some of the elements. The sculptural compositions are nicely arranged in the Kamakhya temple to create the most sophisticated ideals of aesthetic effect.Each sculptured figure is able to provide different aesthetic sentiments called *Navarasa* to the viewers.

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Figures


Figure 1(Bhairava)


Figure 2 (Bhairava)


Figure 3 (Vinadhara)


Figure 4 (Gauri)


Figure 5 (female divinity)


Figure 6 (Meditative woman)


Figure 7 (Mother & Child)


Figure 8 (Floral design)


Figure 9 (Lions with *mangalakalasa*)

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On the Number of Zeros of a Polynomial in a Given Domain

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Abstract: In this paper we obtain bounds for the number of zeros of a polynomial in a given domain when the coefficients of the polynomial or their real or imaginary parts are restricted to certain conditions. Our results generalize some known results in the theory of the distribution of zeros of polynomials.

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1. Introduction and Statement of Results

In the literature we find a large number of published research papers (e.g.[2,4,5,7,8,9,10,11,12,13,16,17,19,20]) concerning the number of zeros of a polynomial in a circle.

S. K. Singh [18] proved the following result on the number of zeros of a polynomial:

Theorem A: Let $P(z)=\sum_{j=0}^{\infty}a_j z^j$ be a polynomial o f degree n such that $\min_{0\le j\le n}|a_j|\ge 1$ and $\max_{0\le j\le n}|a_j|\le|a_n|$, then the number of zeros of P(z) in $|z|\le\frac{R}{k}$ does not exceed

$$\frac{2\log\{(n+1)|a_n|R^n\}}{\log k}$$

where

$$R=\max\{\left|\frac{a_{n-1}}{a_n}\right|,\left|\frac{a_{n-2}}{a_n}\right|,.\left|\frac{a_{n-3}}{a_n}\right|,.....\}.$$

For the class of polynomials with real coefficients, Q. G. Mohammad [14] proved the following result:

Theorem B: Let $P(z)=\sum_{j=0}^{\infty}a_j z^j$ be a polynomial o f degree n such that

$$a_n\ge a_{n-1}\ge.....\ge a_1\ge a_0>0.$$

Then the number of zeros of P(z) in $|z| \le \frac{1}{2}$ does not exceed

$$1 + \frac{1}{\log 2} \log \frac{a_n}{a_0}.$$

Bidkham an d Dewan [3] generalized Theorem B in the following way:

Theorem C: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n such that

$$a_n \le a_{n-1} \le ..... \le a_{k+1} \le a_k \ge a_{k-1} \ge ..... \ge a_1 \ge a_0 > 0,$$

for some $k, 0 \le k \le n$. Then the number of zeros of P(z) in $|z| \le \frac{1}{2}$ does not exceed

$$\frac{1}{\log 2} \log \left\{ \frac{|a_n| + |a_0| - a_n - a_0 + 2a_k}{|a_0|} \right\}.$$

Theorem D: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n with complex coefficients such that for some real α, β, $|\arg a_j - \beta| \le \alpha \le \frac{\pi}{2}, 0 \le j \le n,$ and for some $0 < t \le 1,\ 0 \le k \le n,$

$$|a_0| \le t|a_1| \le ..... \le t^k |a_k| \ge t^{k+1} |a_{k+1}| \ge ..... \ge t^n |a_n|.$$

Then the number of zeros of P(z) in $|z| \le \frac{1}{2}$ does not exceed

$$\frac{1}{\log 2} \log \left\{ \frac{2t^{k+1}|a_k| \cos\alpha + 2\sin\alpha \sum_{j=0}^{n} t^j |a_j| - t^{n+1}|a_n|(\cos\alpha + \sin\alpha - 1)}{t|a_0|} \right\}.$$

Ebadian et al [6] generalized the above results by proving the following results:

Theorem E: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n such that

$$a_n \le a_{n-1} \le ..... \le a_{k+1} \le a_k \ge a_{k-1} \ge ..... \ge a_0$$

for some k, $0 \le k \le n$ .Then the number of zeros of P(z) in $|z| \le \frac{R}{2}$,

R>0, does not exceed

$$\frac{1}{\log 2}\log\left\{\frac{|a_n|R^{n+1} + |a_0| + R^k(a_k - a_0) + R^n(a_k - a_n)}{|a_0|}\right\} \text{ for } R \ge 1$$

and

$$\frac{1}{\log 2}\log\left\{\frac{|a_n|R^{n+1} + |a_0| + R(a_k - a_0) + R^n(a_k - a_n)}{|a_0|}\right\} \text{ for } R \le 1 \text{ .}$$

Theorem F: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n with complex coefficients such that for some real α, β , $|\arg a_j - \beta| \le \alpha \le \frac{\pi}{2}, 0 \le j \le n,$ and for some $R > 0,\ 0 \le k \le n,$

$$|a_0| \le R|a_1| \le ..... \le R^k|a_k| \ge R^{k+1}|a_{k+1}| \ge ..... \ge R^n|a_n| .$$

Then the number of zeros of P(z) in $|z| \le \frac{R}{2}$ does not exceed

$$\frac{1}{\log 2}\log\left\{\frac{2R^{k+1}|a_k|\cos\alpha + 2R\sin\alpha\sum_{j=0}^{n} R^j|a_j| - R^{n+1}|a_n|(\cos\alpha + \sin\alpha - 1)}{R|a_0|}\right\}.$$

In this paper we give generalizations of Theorems E and F. More precisely we prove the following results:

Theorem 1: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n with $\text{Re}(a_j) = \alpha_j$, $\text{Im}(a_j) = \beta_j$ such that for some $k, \tau, \lambda, 0 < k \le 1, 0 < \tau \le 1,\ 0 \le \lambda \le n$,

$$k\alpha_n \le \alpha_{n-1} \le ..... \le \alpha_{\lambda+1} \le \alpha_\lambda \ge \alpha_{\lambda-1} \ge ..... \ge \tau\alpha_0 .$$

Then the number of zeros of P(z) in $|z| \le \frac{R}{c}(R > 0, c > 1)$ does not exceed

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R^{\lambda}[\alpha_{\lambda}-\tau(|\alpha_0|+\alpha_0)+|\alpha_0|+|\beta_0|+|\beta_{\lambda}|+2\sum_{j=1}^{\lambda-1}|\beta_j|] \\ +R^{n}[|\alpha_n|-k(|\alpha_n|+\alpha_n)+\alpha_{\lambda}+|\beta_{\lambda}|+|\beta_n|+2\sum_{j=\lambda+1}^{n-1}|\beta_j|]\end{array}}{|a_0|}\right\}$$

for $R \geq 1$

and

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R[\alpha_{\lambda}-\tau(|\alpha_0|+\alpha_0)+|\alpha_0|+|\beta_0|+|\beta_{\lambda}|+2\sum_{j=1}^{\lambda-1}|\beta_j|] \\ +R^{n}[|\alpha_n|-k(|\alpha_n|+\alpha_n)+\alpha_{\lambda}+|\beta_{\lambda}|+|\beta_n|+2\sum_{j=\lambda+1}^{n-1}|\beta_j|]\end{array}}{|a_0|}\right\}$$

for $R \leq 1$.

Remark 1: Taking $k=1, \tau=1$, c=2,Theorem 1 reduces to Theorem E if a_j are real i.e. $\beta_j = 0, \forall j$.

For different values of the parameters k, τ, λ etc. we get many interesting results e.g. if we take $\tau = 1$, we get the following result:

Corollary 1: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n with $\mathrm{Re}(a_j) = \alpha_j$, $\mathrm{Im}(a_j) = \beta_j$ such that for some $k, 0 < k \leq 1$,

$$k\alpha_n \leq \alpha_{n-1} \leq ..... \leq \alpha_{\lambda+1} \leq \alpha_{\lambda} \geq \alpha_{\lambda-1} \geq ..... \geq \alpha_0,$$

$0 \leq \lambda \leq n$. Then the number of zeros of P(z) in $|z| \leq \frac{R}{c} (R > 0, c > 1)$ does not exceed

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R^{\lambda}[\alpha_{\lambda}-\alpha_0+|\beta_0|+|\beta_{\lambda}|+2\sum_{j=1}^{\lambda-1}|\beta_j|] \\ +R^n[|\alpha_n|-k(|\alpha_n|+\alpha_n)+\alpha_{\lambda}+|\beta_{\lambda}|+|\beta_n|+2\sum_{j=\lambda+1}^{n-1}|\beta_j|]\end{array}}{|a_0|}\right\}$$

for $R \geq 1$

and

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R[\alpha_{\lambda}-\alpha_0+|\beta_0|+|\beta_{\lambda}|+2\sum_{j=1}^{\lambda-1}|\beta_j|] \\ +R^n[|\alpha_n|-k(|\alpha_n|+\alpha_n)+\alpha_{\lambda}+|\beta_{\lambda}|+|\beta_n|+2\sum_{j=\lambda+1}^{n-1}|\beta_j|]\end{array}}{|a_0|}\right\}$$

for $R \leq 1$.

Taking $k=1, \lambda=n$ in Theorem 1, we get the following result:

Corollary 2: Let $P(z)=\sum_{j=0}^{\infty}a_j z^j$ be a polynomial o f degree n with $\mathrm{Re}(a_j)=\alpha_j$, $\mathrm{Im}(a_j)=\beta_j$ such that for some $\tau, 0<\tau\leq 1$,

$$\alpha_n \geq \alpha_{n-1} \geq \ldots\ldots \geq \tau\alpha_0 .$$

Then the number of zeros of P(z) in $|z| \leq \frac{R}{c}(R>0, c>1)$ does not exceed

$$\frac{1}{\log c}\log\left\{\frac{|a_0|+R^{n+1}[|\alpha_n|+\alpha_n-\tau(|\alpha_0|+\alpha_0)+|\alpha_0|+|\beta_0|+2\sum_{j=1}^{n}|\beta_j|]}{|a_0|}\right\}$$

for $R \geq 1$

and

$$\frac{1}{\log c}\log\left\{\frac{|a_0| + R[|\alpha_n| + \alpha_n - \tau(|\alpha_0| + \alpha_0) + |\alpha_0| + |\beta_0| + 2\sum_{j=1}^{n}|\beta_j|]}{|a_0|}\right\}$$

for $R \leq 1$.

Taking $\tau = 1, \lambda = 0$ in Theorem 1, we get the following result:

Corollary 3: Let $P(z) = \sum_{j=0}^{\infty} a_j z^j$ be a polynomial o f degree n with $\mathrm{Re}(a_j) = \alpha_j$, $\mathrm{Im}(a_j) = \beta_j$ such that for some $k, 0 < k \leq 1$,

$$k\alpha_n \leq \alpha_{n-1} \leq .....a_1 \leq \alpha_0,$$

then the number of zeros of P(z) in $|z| \leq \frac{R}{c}(R > 0, c > 1)$ does not exceed

$$\frac{1}{\log c}\log\left\{\frac{|a_0| + R^{n+1}[2|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_0 + |\beta_0| + 2\sum_{j=1}^{n}|\beta_j|]}{|a_0|}\right\}$$

for $R \geq 1$

and

$$\frac{1}{\log c}\log\left\{\frac{|a_0| + R[2|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_0 + |\beta_0| + 2\sum_{j=1}^{n}|\beta_j|]}{|a_0|}\right\}$$

for $R \leq 1$.

Applying Theorem 1 to the polynomial –iP(z) , we get the following result:

Theorem 2: Let $P(z)=\sum_{j=0}^{\infty}a_j z^j$ be a polynomial o f degree n with $\mathrm{Re}(a_j)=\alpha_j$, $\mathrm{Im}(a_j)=\beta_j$ such that for some $k,0<k\le 1,0<\tau\le 1,$

$$k\alpha\beta_n \le \beta_{n-1} \le .....\le \beta_{\lambda+1} \le \beta_\lambda \ge \beta_{\lambda-1} \ge .....\ge \tau\beta_0,$$

$0\le\lambda\le n$, then the number of zeros of P(z) in $|z|\le\frac{R}{c}(R>0,c>1)$ does not exceed

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R^{\lambda}[\beta_\lambda-\tau(|\beta_0|+\beta_0)+|\beta_0|+|\alpha_0|+|\alpha_\lambda|+2\sum_{j=1}^{\lambda-1}|\alpha_j|]\\ +R^n[|\beta_n|-k(|\beta_n|+\beta_n)+\beta_\lambda+|\alpha_\lambda|+|\alpha_n|+2\sum_{j=\lambda+1}^{n-1}|\alpha_j|]\end{array}}{|a_0|}\right\}$$

for $R\ge 1$

and

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R[\beta_\lambda-\tau(|\beta_0|+\beta_0)+|\beta_0|+|\alpha_0|+|\alpha_\lambda|+2\sum_{j=1}^{\lambda-1}|\alpha_j|]\\ +R^n[|\beta_n|-k(|\beta_n|+\beta_n)+\beta_\lambda+|\alpha_\lambda|+|\alpha_n|+2\sum_{j=\lambda+1}^{n-1}|\alpha_j|]\end{array}}{|a_0|}\right\}$$

for $R\le 1.$

Theorem 3: Let $P(z)=\sum_{j=0}^{\infty}a_j z^j$ be a polynomial o f degree n with complex coefficients such that for some real α,β, $|\arg a_j-\beta|\le\alpha\le\frac{\pi}{2},0\le j\le n,$ and for some $R>0,\ 0\le\lambda\le n,0<k\le 1,0<\tau\le 1,$

$$\tau|a_0| \le R|a_1| \le ..... \le R^{\lambda}|a_{\lambda}| \ge R^{\lambda+1}|a_{\lambda+1}| \ge ..... \ge kR^n|a_n|.$$

Then the number of zeros of P(z) in $|z| \le \frac{R}{c}(R>0, c>1)$ does not exceed

$$\frac{1}{\log c}\log[\frac{1}{R|a_0|}\{2R^{\lambda+1}|a_{\lambda}|\cos\alpha + 2R\sin\alpha\sum_{j=1}^{n-1}R^j|a_j| - k|a_n|R^{n+1}(\cos\alpha - \sin\alpha + 1) + 2R^{n+1}|a_n|$$

$$- \tau R|a_0|(\cos\alpha - \sin\alpha + 1) + 2R|a_0|\}].$$

Remark 2: For different values of the parameters k, τ, λ etc., we get many interesting results from Theorem 3 as in case of Theorem 1. For $k=1, \tau=1$, c=2,Theorem 3 reduces to Theorem F.

2.Lemmas

For the proofs of the above results we need the following results:

Lemma 1: If f(z) is analytic in $|z| \le R$,but not identically zero, f(0) ≠ 0 and

$f(a_k) = 0, k = 1,2,....., n$, then

$$\frac{1}{2\pi}\int_0^{2\pi}\log|f(\mathrm{Re}^{i\theta}|d\theta - \log|f(0)| = \sum_{j=1}^{n}\log\frac{R}{|a_j|}.$$

Lemma 1 is the famous Jensen's theorem (see page 208 of [1]).

Lemma 2: If f(z) is analytic and $|f(z)| \le M(r)$ in $|z| \le r$, then the number of zeros of f(z) in $|z| \le \frac{r}{c}$ (r>0,c>1)does not exceed

$$\frac{1}{\log c}\log\frac{M(r)}{|f(0)|}.$$

Lemma 2 is a simple deduction from Lemma 1.

Lemma 3: Let $P(z) = \sum_{j=0}^{\infty}a_j z^j$ be a polynomial o f degree n with complex coefficients such that for some real α, β, $|\arg a_j - \beta| \le \alpha \le \frac{\pi}{2}, 0 \le j \le n,$ and

$|a_j| \geq |a_{j-1}|, 0 \leq j \leq n,$ then for any t>0,

$$|ta_j - a_{j-1}| \leq (t|a_j| - |a_{j-1}|)\cos\alpha + (t|a_j| + |a_{j-1}|)\sin\alpha .$$

Lemma 3 is due to Govil and Rahman [7].

3.Proofs of Theorems

Proof of Theorem 1: Consider the polynomial

F(z) =(1-z)P(z)

$$= (1-z)(a_n z^n + a_{n-1}z^{n-1} + ... + a_1 z + a_0)$$

$$= -a_n z^{n+1} + (a_n - a_{n-1})z^n + ... + (a_1 - a_0)z + a_0$$

$$= -a_n z^{n+1} + a_0 + [(ka_n - a_{n-1}) - (k-1)a_n]z^n + \sum_{j=\lambda+1}^{n-1}(a_j - a_{j-1})z^j$$

$$+ \sum_{j=2}^{\lambda}(a_j - a_{j-1})z^j + [(a_1 - \tau a_0) + (\tau - 1)a_0]z$$

For $|z| \leq R$, we have, by using the hypothesis

$$|F(z)| \leq |a_n|R^{n+1} + |a_0| + [(\alpha_{n-1} - k\alpha_n) + (1-k)|\alpha_n|]R^n + \sum_{j=\lambda+1}^{n-1}(\alpha_{j-1} - \alpha_j)R^j$$

$$+ \sum_{j=1}^{\lambda}(\alpha_j - \alpha_{j-1})R^j + [(\alpha_1 - \tau\alpha_0) + (1-\tau)|\alpha_0|]R + \sum_{j=1}^{n}(|\beta_j| + |\beta_{j-1}|)R^j .$$

Which gives

$$|F(z)| \leq |a_n|R^{n+1} + |a_0| + R^n[|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_\lambda + |\beta_\lambda| + |\beta_n| + 2\sum_{j=\lambda+1}^{n-1}|\beta_j|]$$

$$+ R^\lambda[\alpha_\lambda - \tau(|\alpha_0| + \alpha_0) + |\alpha_0| + |\beta_0| + |\beta_\lambda| + 2\sum_{j=1}^{\lambda-1}|\beta_j|]$$

for $R \geq 1$

and

$$|F(z)| \le |a_n|R^{n+1} + |a_0| + R^n[|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_\lambda + |\beta_\lambda| + |\beta_n| + 2\sum_{j=\lambda+1}^{n-1}|\beta_j|]$$

$$+ R[\alpha_\lambda - \tau(|\alpha_0| + \alpha_0) + |\alpha_0| + |\beta_0| + |\beta_\lambda| + 2\sum_{j=1}^{\lambda-1}|\beta_j|]$$

for $R \le 1$.

Thus

$$\frac{|F(z)|}{|F(0)|} \le \frac{1}{|a_0|}[|a_n|R^{n+1} + |a_0| + R^n\{|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_\lambda + |\beta_\lambda| + |\beta_n| + 2\sum_{j=\lambda+1}^{n-1}|\beta_j|\}$$

$$+ R^\lambda[\alpha_\lambda - \tau(|\alpha_0| + \alpha_0) + |\alpha_0| + |\beta_0| + |\beta_\lambda| + 2\sum_{j=1}^{\lambda-1}|\beta_j|]$$

for $R \ge 1$

and

$$\frac{|F(z)|}{|F(0)|} \le \frac{1}{|a_0|}[|a_n|R^{n+1} + |a_0| + R^n\{|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_\lambda + |\beta_\lambda| + |\beta_n| + 2\sum_{j=\lambda+1}^{n-1}|\beta_j|\}$$

$$+ R[\alpha_\lambda - \tau(|\alpha_0| + \alpha_0) + |\alpha_0| + |\beta_0| + |\beta_\lambda| + 2\sum_{j=1}^{\lambda-1}|\beta_j|]$$

for $R \le 1$.

Hence , by Lemma 2,it follows that the number of zeros of F(z) in $|z| \le \frac{R}{c}(R > 0, c > 1)$ does not exceed

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1} + |a_0| + R^\lambda[\alpha_\lambda - \tau(|\alpha_0| + \alpha_0) + |\alpha_0| + |\beta_0| + |\beta_\lambda| + 2\sum_{j=1}^{\lambda-1}|\beta_j|] \\ + R^n[|\alpha_n| - k(|\alpha_n| + \alpha_n) + \alpha_\lambda + |\beta_\lambda| + |\beta_n| + 2\sum_{j=\lambda+1}^{n-1}|\beta_j|]\end{array}}{|a_0|}\right\}$$

for $R \geq 1$

and

$$\frac{1}{\log c}\log\left\{\frac{\begin{array}{l}|a_n|R^{n+1}+|a_0|+R[\alpha_\lambda-\tau(|\alpha_0|+\alpha_0)+|\alpha_0|+|\beta_0|+|\beta_\lambda|+2\sum_{j=1}^{\lambda-1}|\beta_j|] \\ +R^n[|\alpha_n|-k(|\alpha_n|+\alpha_n)+\alpha_\lambda+|\beta_\lambda|+|\beta_n|+2\sum_{j=\lambda+1}^{n-1}|\beta_j|]\end{array}}{|a_0|}\right\}$$

for $R \leq 1$.

As the number of zeros of P(z) in $|z| \leq \frac{R}{c}(R>0, c>1)$ does not exceed the number of zeros of F(z) in $|z| \leq \frac{R}{c}(R>0, c>1)$, the theorem follows.

Proof of Theorem 3: Consider the polynomial

F(z) =(R-z)P(z)

$$=(R-z)(a_n z^n + a_{n-1}z^{n-1} + ... + a_1 z + a_0)$$

$$=-a_n z^{n+1} + Ra_0 + (Ra_n - a_{n-1})z^n + (Ra_{n-1} - a_{n-2})z^{n-1} + ... + (Ra_1 - a_0)z$$

$$=-a_n z^{n+1} + Ra_0 + [(kRa_n - a_{n-1}) - (kRa_n - Ra_n)]z^n + (Ra_{n-1} - a_{n-2})z^{n-1}$$

$$+ ..... + (Ra_{\lambda+1} - a_\lambda)z^{\lambda+1} + (Ra_\lambda - a_{\lambda-1})z^\lambda + ... + (Ra_2 - a_1)z^2$$
$$+ [(Ra_1 - \tau a_0) + (\tau a_0 - a_0)]z$$

For $|z| \leq R$, we have

$$|F(z)| \leq |a_n|R^{n+1} + R|a_0| + |k-1|R^{n+1}|a_n| + |kRa_n - a_{n-1}|R^n + |Ra_{n-1} - a_{n-2}|R^{n-1}$$

$$+ ..... + |Ra_{\lambda+1} - a_\lambda|R^{\lambda+1} + |Ra_\lambda - a_{\lambda-1}|R^\lambda + ... + |Ra_2 - a_1|R^2$$
$$+ |Ra_1 - \tau a_0|R + (\tau - 1)|a_0|R,$$

which gives ,by using Lemma 3and the hypothesis

$$|F(z)| \le |a_n|R^{n+1} + R|a_0| + (1-k)R^{n+1}|a_n| + [(|a_{n-1}| - kR|a_n|)\cos\alpha + (|a_{n-1}| + kR|a_n|)\sin\alpha]R^n$$

$$+ [(|a_{n-2}| - R|a_{n-1}|)\cos\alpha + (|a_{n-2}| + R|a_{n-1}|)\sin\alpha]R^{n-1} + ...$$
$$+ [(|a_\lambda| - R|a_{\lambda+1}|)\cos\alpha + (|a_\lambda| + R|a_{\lambda+1}|)\sin\alpha]R^{\lambda+1}$$
$$+ [(R|a_\lambda| - |a_{\lambda-1}|)\cos\alpha + (R|a_\lambda| + |a_{\lambda-1}|)\sin\alpha]R^{\lambda} + ...$$
$$+ [(R|a_2| - |a_1|)\cos\alpha + (R|a_2| + |a_1|)\sin\alpha]R^2 + [(R|a_1| - \tau|a_0|)\cos\alpha$$
$$+ (R|a_1| + \tau|a_0|)\sin\alpha]R + (1-\tau)|a_0|R$$

$$= 2R^{\lambda+1}|a_\lambda|\cos\alpha - k|a_n|R^{n+1}(\cos\alpha - \sin\alpha + 1) + 2R^{n+1}|a_n|$$

$$- \tau R|a_0|(\cos\alpha - \sin\alpha + 1) + 2R|a_0| + 2R\sin\alpha\sum_{j=1}^{n-1} R^j|a_j|$$

$$= 2R^{\lambda+1}|a_\lambda|\cos\alpha + 2R\sin\alpha\sum_{j=1}^{n-1} R^j|a_j| - k|a_n|R^{n+1}(\cos\alpha - \sin\alpha + 1) + 2R^{n+1}|a_n|$$

$$- \tau R|a_0|(\cos\alpha - \sin\alpha + 1) + 2R|a_0|.$$

The rest of the proof can be completed on the same lines as in the proof of Theorem 1.

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Global Accurate Domination in Graphs

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Abstract- A dominating set D of a graph $G = (V, E)$ is an *accurate dominating set*, if $V–D$ has no dominating set of cardinality $|D|$. An accurate dominating set D of a graph G is a *global accurate dominating set*, if D is also an accurate dominating set of $\overline{G}$. The *global accurate domination number* $\gamma ga(G)$ is the minimum cardinality of a global accurate dominating set. In this paper, some bounds for $\gamma ga(G)$ are obtained and exact values of $\gamma ga(G)$ for some standard graphs are found. Also a Nordhaus-Gaddum type result is established.

Index Terms- accurate dominating set, global accurate dominating set, global accurate domination number.

Mathematics Subject Classification: 05C.

I. Introduction

All graphs considered here are finite, undirected without loops and multiple edges. Any undefined term in this paper may be found in Kulli [1].

A set D of vertices in a graph $G = (V, E)$ is a *dominating set* of G if every vertex in $V – D$ is adjacent to some vertex in D. The *domination number* $\gamma (G)$ of G is the minimum cardinality of a dominating set.

A dominating set D of a graph G is an *accurate dominating set*, if $V – D$ has no dominating set of cardinality $|D|$. The *accurate domination number* $\gamma_a(G)$ of G is the minimum cardinality of an accurate dominating set. This concept was introduced by Kulli and Kattimani in [2].

A dominating set D of a graph G is a *global dominating set* if D is also a dominating set of $\overline{G}$. The *global domination number* $\gamma_g(G)$ of G is the minimum cardinality of a global dominating set, [5].

In [4], Kulli and Kattimani introduced the concept of global accurate domination as follows:

An accurate dominating set D of a graph G is a *global accurate dominating set*, if D is also an accurate dominating set of $\overline{G}$. The *global accurate domination number* $\gamma_{ga}(G)$ of G is the minimum cardinality of a global accurate dominating set.

Let $\lfloor x \rfloor$ denote the greatest integer less than or equal to x. A γ_a-set is a minimum accurate dominating set.

II. Results

We characterize accurate dominating sets which are global accurate dominating sets.

Theorem1. An accurate dominating set D of a graph G is a global accurate dominating set if and only if the following conditions hold:

(i) for each vertex $v \in V – D$, there exists a vertex $u \in D$ such that u is not adjacent to v,

(ii) there exists a vertex $w \in D$ such that w is adjacent to all vertices in $V – D$.

Theorem 2. Let G be a graph such that neither G nor $\overline{G}$ have an isolated vertex. Then

i) $$\gamma_{ga}(G) = \gamma_{ga}(\overline{G}); \quad (1)$$

ii) $$\frac{(\gamma_a(G) + \gamma_a(\overline{G}))}{2} \leq \gamma_a(G) \leq \gamma_a(G) + \gamma_a(\overline{G}). \quad (2)$$

Theorem 3. Let G be a graph such that neither G nor $\overline{G}$ have an isolated vertex. Then

$$\gamma_a(G) \leq \gamma_{ga}(G) \quad (3)$$

Proof: Every global accurate dominating set is an accurate dominating set. Thus (3) holds.

Theorem4. Let G be a graph such that neither G nor $\overline{G}$ have an isolated vertex. Then

$$\gamma_g(G) \leq \gamma_{ga}(G). \quad (4)$$

Proof: Every global accurate dominating set is a global dominating set. Thus (4) holds.

Exact values of $\gamma_{ga}(G)$ for some standard graphs are given in Theorem 5.

Theorem 5.

i) $$\gamma_{ga}(K_p) = p. \quad (5)$$

ii) $$\gamma_{ga}(C_p) = \left\lfloor \frac{p}{2} \right\rfloor + 1, \quad \text{if } p \geq 3. \quad (6)$$

iii) $\gamma_{ga}(P_p) = \left\lfloor \frac{p}{2} \right\rfloor + 1$, if $p \geq 2$. (7)

iv) $\gamma_{ga}(K_{m,n}) = m+1$, if $m \leq n$. (8)

v) $\gamma_{ga}(W_p) = \left\lfloor \frac{p}{2} \right\rfloor + 1$, if $p \geq 5$. (9)

vi) For any regular graph G,

$$\gamma_{ga}(G) = \left\lfloor \frac{p}{2} \right\rfloor + 1, \quad \text{if } p \geq 2. \quad (10)$$

Now we obtain an upper bound for $\gamma_{ga}(G)$.

Theorem 6. Let G be a graph such that neither G nor $\bar{G}$ have an isolated vertex. Then

$$\gamma_{ga}(G) \leq p - 1. \quad (11)$$

Proof: Clearly G has two nonadjacent vertices u and v such that u is adjacent to some vertex in $V - \{u\}$. This implies that $V - \{u\}$ is a global accurate dominating set of G. Thus

$$\gamma_{ga}(G) \leq |V - \{u\}|$$

or $$\gamma_{ga}(G) \leq p - 1.$$

Next we characterize graphs G that have global accurate domination number equal to the order of G.

Theorem 7. For any graph G,

$$\gamma_{ga}(G) = p \quad (12)$$

if and only if $G = K_p$ or $G = \bar{K}_p$.

Proof: Suppose (12) holds. Assume $G \neq K_p$, $\bar{K}_p$. Then G has at least three vertices u, v and w such that u and v are adjacent and w is not adjacent to one of u or v. Suppose w is not adjacent to u. Then this implies that $V - \{u\}$ is a global accurate dominating set of G. This is a contradiction. This proves necessity.

Converse is obvious.

Theorem 8. Let D be an accurate dominating set of G. If there exist two vertices $u \in V - D$ and $v \in D$ such that u is adjacent only to the vertices of D and v is adjacent only to the vertices of $V - D$. Then

$$\gamma_{ga}(G) \leq \gamma_a(G) + 1. \quad (13)$$

Proof: Let D be a γ_a-set of G. If these exists a vertex u in $V - D$ such that u is adjacent only to the vertices of D, then $D \cup \{u\}$ is a global accurate dominating set of G. Thus

$$\gamma_{ga}(G) \leq |D \cup \{u\}|$$
$$\leq |D| + 1$$

or $$\gamma_{ga}(G) \leq \gamma_a(G) + 1.$$

In a graph G, a vertex and an edge incident with it are said to *cover* each other. A set of vertices that covers all the edges of G is a *vertex cover* of G. The *vertex covering number* $\alpha_0(G)$ of G is the minimum number of vertices in a vertex cover. A set S of vertices in G is *independent* if no two vertices in S are adjacent. The *independence number* $\alpha_0(G)$ of G is the maximum cardinality of an independent set of vertices. The *clique number* $\beta_0(G)$ of G is the maximum order among the complete subgraphs of G.

Theorem 9. Let G be a graph without isolated vertices. Then

$$\gamma_{ga}(G) \leq \alpha_0(G) + 1 \quad (14)$$

Proof: Let S be a maximum independent set of vertices in G. Then for any vertex $v \in S$, $\{V - S\} \cup \{v\}\}$ is a global accurate dominating set of G. Thus

$$\gamma_{ga}(G) \leq |(V - S) \cup \{v\}|$$
$$\leq |V - S| + 1$$
$$\leq p - \beta_0(G) + 1$$

or $$\gamma_{ga}(G) \leq \alpha_0(G) + 1.$$

Now we obtain a Nordhaus-Gaddum type result.

Theorem 10. Let G be a graph such that neither G nor $\bar{G}$ have an isolated vertex. Then

$$\gamma_{ga}(G) + \gamma_{ga}(\bar{G}) \leq p + \gamma_0(G) - w(G) + 2.$$

Proof: By Theorem 9, $\gamma_{ga}(G) \leq \alpha_0(G) + 1$.

Therefore
$$\gamma_{ga}(\bar{G}) \leq \alpha_0(\bar{G}) + 1$$
$$\leq p - \beta_0(\bar{G}) + 1$$
$$\leq p - \omega(G) + 1$$

Hence $\gamma_{ga}(G) + \gamma_{ga}(\bar{G}) \leq p + \alpha_0(G) - \omega(G) + 2$

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Studies on pre-treatment of seawater using tubular ceramic MF membrane of 19-channel configuration

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Abstract: The pre-requisite for operation of a RO plant requires feed pre-treatment for removal of suspended solids, bacteria, colloidal particles, etc, which would otherwise lead to fouling of RO membrane. In recent years, the performance of polymeric membranes for seawater pre-treatment has improved significantly. This enables a more advanced SWRO system design by providing good quality feed for RO system, which results in increased reliability and lower water cost. However, use of disposable polymeric cartridge leads to higher running cost and increased plant downtime because of the need of frequent replacement.
The present study describes the pilot scale performance obtained on Arabian coastal sea water using tubular ceramic membrane (average pore diameter 0.1 µm) of 19-channel configuration as a pre-treatment system for RO. The MF pilot unit operated at fixed TMP of 1.2 bar with 40 hrs continuous run, using filtrate water of pressure sand filter (PSF) as feed. Flux obtained was around 350-370 LMH. Turbidity came down to 1.0 NTU and SDI value to less than 3. The filtrate obtained was virtually free from any suspended solids, colloids and bacteria, etc.

Index Terms: Membrane, Ceramic microfiltration, Reverse osmosis, Turbidity, Pre-treatment, Sea water.

I. INTRODUCTION

Reverse osmosis (RO) is currently one of the most prevalent methods used for seawater desalination. Research is still underway to reduce the operation costs and maintenance problems and thus improve the performance of RO systems. The most important maintenance problem associated with RO operation is membrane fouling; especially biofouling [1-3]. Hence, pre-treatment process is a significant factor for determining the success of the seawater reverse osmosis (SWRO) system. Many SWRO systems have failed because of inappropriate pre-treatment. A combination of techniques such as air flotation, flocculation-coagulation, lamella clarification, sand filtration, activated carbon treatment and filtration, followed by use of disposable polymeric cartridges to separate particles above 0.5 micron prior to reverse osmosis (RO) membrane have been widely utilized in seawater treatment plants as pre-treatment mechanism [2, 4]. Frequent replacement of the polymer cartridges after every 3 – 4 months not only involves higher recurring cost but also leads to more downtime, affecting production. However, ceramic microfiltration (MF) membrane operation based on cross-flow membrane filtration (CMF) technique is now considered an alternative pre-treatment process for sea water desalination using RO membrane. This is due to the advantageous features of ceramic MF membranes in fouling control and flux improvement [5, 6]. These special features extend the lifetime of RO membranes and enhance the economic feasibility of the desalination process [7, 8]. A study shows that MF membrane pre-treatment provides stable and predictable quality of feed water supply for RO system resulting in 40% increase in flux over traditional pre-treatment methods [9] using polypropylene membrane of 0.2 µm pore diameter in continuous mode under a pressure gradient of 100 Kpa. Energy saving in the order of 13-15% has been documented by Cardona *et al.* [10] with insertion of MF membrane pre-treatment system. Teng et. al. [11] observed that the higher permeate flux of the MF membrane pilot system was achieved at the expense of increased transmembrane pressure (TMP) in CMF mode of operation and periodic membrane washing. Silt Density Index (SDI) of the membrane filtrate was reported in the permissible limit of RO feed. Since, ceramic membranes have longer life span due to their chemical and mechanical stability, a feed pre-treatment system based on ceramic membranes may be a viable alternative to the existing pre-treatment processes. Ahmad and Mariadas [7] used tubular single channel ceramic membranes with nominal pore size of 0.2 µm and found that the insertion of helical baffle increased the permeate flux (520.8 LMH) up to 104.9% as compared to a system without baffle using feed of 1.0 g/l TiO_2 at 20 psi TMP. Clay-alumina-based low cost tubular ceramic elements of single and 19-channel configurations have been indigenously developed and characterized [12]. This has been used to demonstrate community supply of safe drinking water from iron and arsenic contaminated ground water under field condition [13] and the process has been documented [14, 15].
In this paper, a study has been presented on performance evaluation in pilot scale using indigenously developed low cost clay-alumina based tubular 19-channel ceramic MF membranes under cross-flow membrane filtration (CMF) mode fitted after PSF as a seawater pre-treatment system for RO.

II. WATER QUALITY FOR STABLE RO SYSTEM OPERATION

Feed water for RO systems should be bacteria free and maximum suspended solid load should not exceed 1.0 ppm for steady operation and longer life. This level of solid load cannot be minimized by the conventional feed pre-treatment processes such as flocculation – coagulation, lamella clarifier, pressure sand filter, polymer cartridge filter, etc. Most of the disposable polymeric cartridges required frequent replacement which results in high recurring cost.

A. Silt Density Index (SDI)

The RO industry relies on the SDI value of feed water prior to feeding it to the RO system [9]. It is observed that feed water processed by the installed indigenously developed ceramic MF membrane in pilot trial showed SDI value at always less than 3. This value is acceptable as feed for RO operation.

B. Turbidity (NTU)

Reference [9] reports that turbidity data is not a good measurement for RO, since it is not related to SDI. However, turbidity measurement has been reported (along with the SDI) by many researchers [8, 11] as supplementary evidence. There is some limitation on SDI used as indicator, as the SDI test does not give any information on the number of particles present [11].

III. PILOT AND MF MEMBRANE DESCRIPTION

Fig. 1 shows the schematic diagram of the pilot MF unit fitted after pressure sand filtration, so that total solids load, colloidal particles, turbidity, etc. could be minimized to some extent. It operates at a constant set of filtrate flow and performs time-based backwash sequences. The backwash flow is adjusted depending on the filtrate flow.

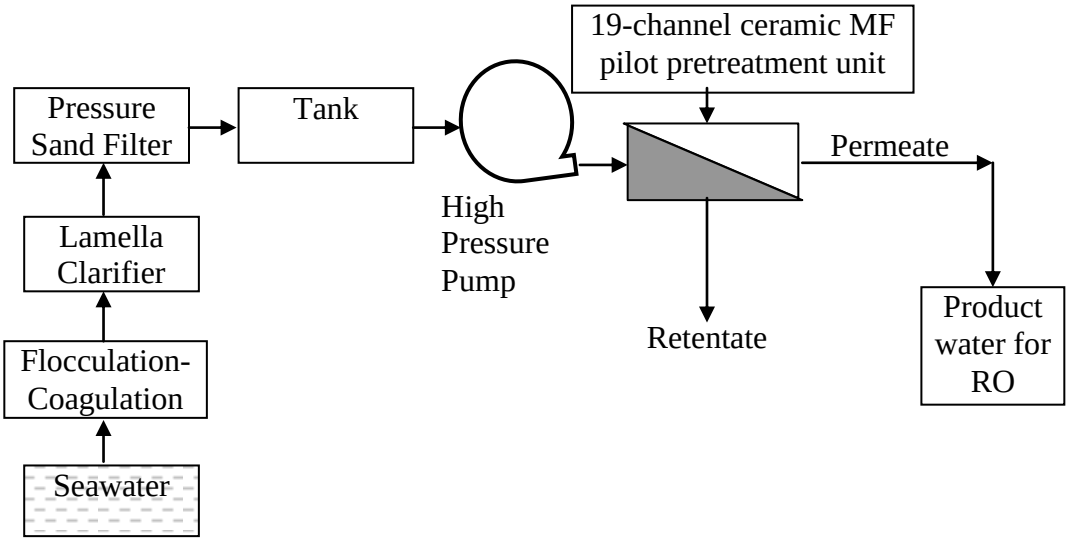

Figure 1: Schematic diagram of MF pilot pretreatment unit fitted after pressure sand filter of seawater for RO feed.

The ceramic MF pilot unit was equipped with 7-element 19-channel membrane having filtration area of 1.75 m^2. The physical properties of the indigenously developed low cost, clay-alumina based ceramic 19-channel MF membrane element are summarized in Table 1. Fig. 2 shows the configuration of the tubular 19-channel MF membrane element of 1.0 meter long. Pore size distribution of ceramic membrane has been characterized using Mercury Intrusion Porosimeter (PM60, Quantachrome, USA) and shows a unimodal 0.1 µm pore size distribution (Fig. 3). MF membrane surface feature analysis using FESEM (Leo S430i, UK) shows isotropic microporous structure as shown in the micrograph (Fig. 4).

Table 1: Physical properties of MF membrane

Properties	19 Channel Ceramic Membrane Element
Ceramic membrane O.D (m)	0.034
Channel I.D (m)	0.0042
Effective length (m)	1.0
Flow area (sq.m)	0.000263
Filtration area (sq.m)	0.25
Bulk density (kg/cu.m)	2.46
Water absorption (%)	9.6
Apparent porosity (%)	23.5

The inside – to – outside cross-flow membrane filtration (CMF) allows operation of permeate of pressure sand filter (Table 2) and facilitates backwash cleaning by clean compressed air to avoid cake layer formation leading to constant resistance to flow. As a result, TMP may remain constant with time during MF pilot run.

Figure 2: Configuration of low cost alumina based tubular 19-channel MF membrane element of 1 meter length.

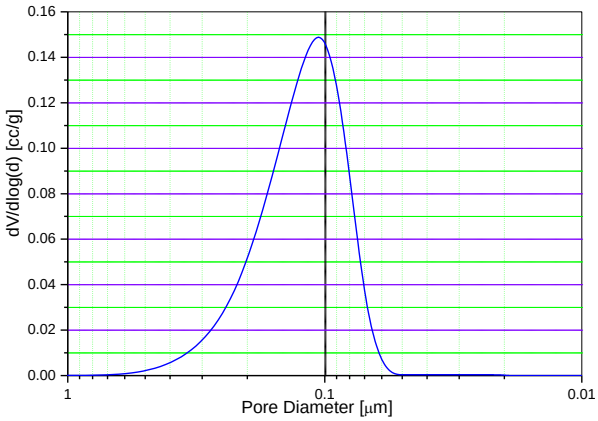

Figure 3: Pore size distribution of MF membrane.

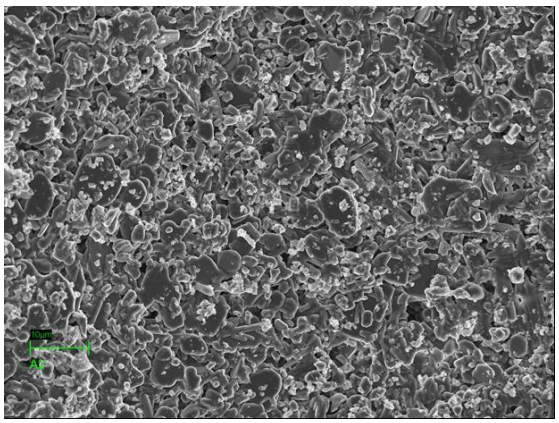

Figure 4: FESEM surface feature of MF membrane.

Table 2: Water quality at various stages of RO operation

Description	Particle size (μm)	Turbidity (NTU)	SDI	Total Coliform (cfu/100ml)
Coastal sea water	10 – 15	Up to 100	---	---
Permeate of lamella clarifier	10 – 12	40	---	---
Permeate of pressure sand filter	5 – 8	28	---	---
Permeate of 0.1 μm ceramic MF membrane filter	0.1 – 0.3	0.1 – 0.3	< 3.0	< 1

IV. RESULTS

A. SDI and Turbidity (NTU) of Filtrate

During pilot testing, MF membrane filtered water samples were tested for SDI and turbidity (NTU) every 5 hrs for a total of 40 hrs of run time. The results are shown in Fig. 5. It was observed that both the parameters fluctuated within permissible limits. SDI values remained below 3 during 40 hrs of continuous operation of the MF pilot unit with the adjusted backwash pulse at 30 minutes interval.

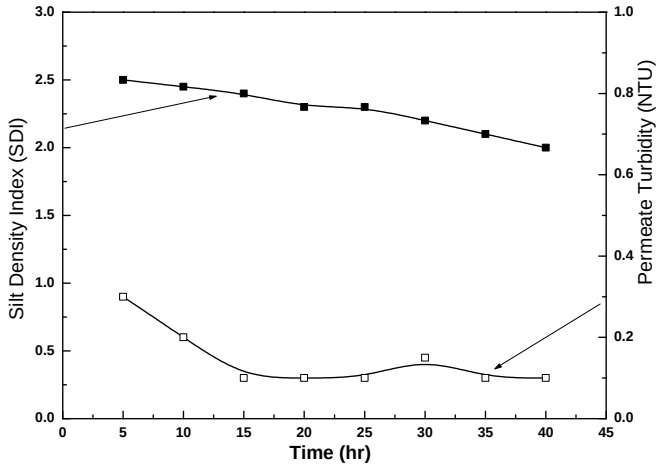

Figure 5: SDI and turbidity of MF permeate with time (hr).

B. Permeate Flux of MF Pilot Unit

Flux performance data is shown in Fig. 6 where TMP of 1.2 bar was maintained. There was minor reduction in permeate flux during continuous operation. This may be due to fluctuation of TMP and membrane fouling. But, it was regenerated by pulse backwash intermittently. Little fluctuation at TMP may result in cake layer formation. Intermittent pulse backwash led to maintain the fixed TMP at 1.2 bar and obtained steady flux of 350-370 LMH.

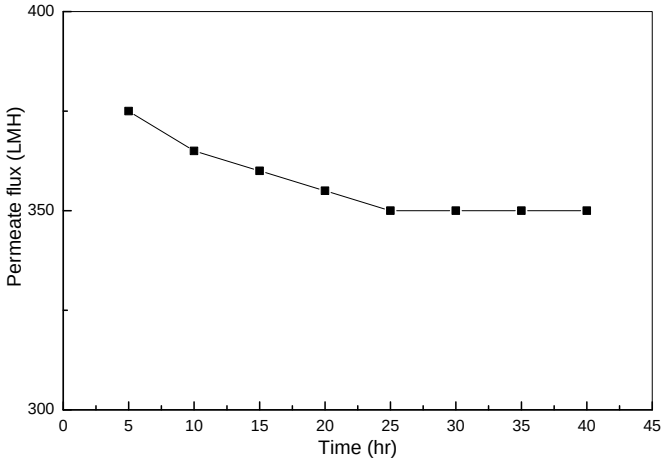

Figure 6: Permeate flux trend of the pilot unit.

V. CONCLUSION

Many RO plant trials have failed in the past because of poor pre-treatment of seawater, even with the use of disposable polymeric pre-filter cartridge and frequent replacement of the same. This study indicates that indigenously developed low cost, alumina based ceramic MF membrane of 19-channel configuration having 0.1 µm av. pore size is a suitable choice for the pre-treatment of RO plants, irrespective of foulants and suspended components such as solid loading, colloidal particles, bacteria, etc. MF membrane permeate flux obtained around 350-370 LMH having turbidity down to 1.0 NTU and SDI less than 3. The advantage of ceramic MF pre-treatment system over polymeric MF membranes are (i) membrane life is extended, (ii) can withstand extreme pH conditions, (iii) plant downtime is reduced, (iv) stable RO operation, (v) increase in flux rate and finally (vi) stable and predictable treated-water quality. Based on this study, MF pre-treatment unit of higher capacity are being installed in both Bally and Taki Municipality areas in West Bengal, India.

ACKNOWLEDGEMENT

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The Changing Role of Women in Stability Operations

Dr. Corinne Patrick, Dr. Betty Marie "Liz" Ross

Abstract- Conflict occurs globally everyday impacting lives, countries, and slowing economic productive growth and safe wellbeing. In 1945, the United Nations founded an international organization comprised of nations of the world with the purpose to promote peace, security, and economic development. Since WWII, women's roles within the U.S. and world society have transformed. This paper will examine women's roles in logistics support for peace keeping missions, the possible barriers women encounter, as well as identifying current practices that hinder and/or promote the pool of female candidates.

I. Introduction

The first documented female soldier was Deborah Sampson of Massachusetts during the Revolutionary War (N.Y. Times, 1898). Although Deborah enlisted as a man and changed her name, she was on a mission. Conflict continues to globally impacting lives, and countries. Conflicts slow economic productive growth, public safety, and wellbeing. Women make up a large portion of the population and want to help in the mission. There were approximately 35,000 American women who served during World War II. In 1945, the United Nations founded an international organization comprised of nations of the world with the purpose to promote peace, security, and economic development. The phases of peacekeeping operations include: Standby; Warning; Mounting; Deployment; Sustainment; and Redeployment. Anywhere in the six distinct phases each with their separate logistic support requirements, there is a need for both men and women. Although women have been active in many facets of field operations, the road to fully participate in the logistic support for field operations in the peace keeping missions has been a long and winding road.

II. INTEGRATING WOMEN INTO THE PLAN

Since the inception of the United Nations, there have been issues about women and about the equality between women and men in the operation. The primary task of the Charter of the United Nations is to protect the rights and freedoms of every human being regardless of race, sex, language, or religion. The Preamble to the Charter affirms the equal rights of men and women as well as faith in fundamental human rights and the dignity and worth of the human person.

During 1961-1970 this was known as the Development Decade for the United Nations. It was during this time that the status of women was not a major topic of concern (1999 UN Report). "Although the General Assembly mandated the Commission on the Status of Women in 1962 to prepare a report on women's role in development, the focus of the Commission was mainly on the humanitarian aspects of development and on women's legal rights, rather than the multifaceted aspects of women and development" (1999 UN Report, para. 11).

In the following decade (1971-1980), attention to the role of women intensified. The General Assembly included the integration of women as an objective in its International Development Strategy. Some researchers and practitioners made it a central topic of debate on development, especially after the publication of Ester Boserup's pioneering book, *Women's Role in Economic Development*. Women's roles in the stability operations literally became a field of study, advocacy, and somewhat of a practice in its own right throughout the 1970's.

At the Fourth World Conference on Women held in Beijing in 1995, the focal point became the transforming of the initiatives in order to achieve gender equality. Rather than equality in access to resources, the politics of gender relations and restructuring of institutions was the goal for program development. [Note: For a more elaborate discussion of the conceptual shifts in the women-and-development discourse, and the alternative categorization of the two approaches, see Moser (1993) and Razavi and Miller (1995).]

The 1990's brought yet another shift. There was a political rather than economic aspects of development became the focus of concern for the gender and development arena. Now women were to take the initiative as equal partners in a participatory and "bottom-up" process of development. In this approach, "Empowerment cannot be given, it must be self-generated. All that a gender-transformative policy can hope to do is to provide women with enabling resources which will allow them to take greater control of their own lives, to determine what kinds of gender relations they would want to live within, and to devise the strategies and alliances to help them get there" (Kabeer, 1995, p. 97). So the idea was that transformative change presupposes the empowerment of women (1999 U.N. General Assembly).

III. RESOLUTION 1325

The decade leading up to the adoption of Resolution 1325 saw the passing of many broad-based thematic resolutions which addressed general issues related to international peace and security. The resolutions on thematic issues of peace and security were known as 'TIPS'. TIPS included resolutions based on a role for various entities or individuals outside the UN's state-based system, such as parties involved in armed conflict, negotiators of peace agreements, etc. Resolution 1325 is a TIPS resolution that calls upon various parties, including Member States, the Secretary-General, the Council and parties to armed conflict as applicable, to

1. Gender mainstream UN peacekeeping operations;
2. Increase women's representation and participation in decision-making processes before, during, and after conflict; and
3. Consider women's specific needs in conflict and post-conflict operations, including by harmonizing national laws with international human rights standards.

The Women's International League for Peace and Freedom, part of the United Nations office was proud to announce:

On 31 October 2000, the United Nations Security Council (UNSC) unanimously adopted Resolution 1325 on women, peace and security. Resolution 1325 marks the first time the Security Council addressed the disproportionate and unique impact of armed conflict on women, recognized the under-valued and under-utilized contributions women make to conflict prevention, peacekeeping, conflict resolution and peace-building, and stressed the importance of their equal and full participation as active agents in peace and security.

Resolution 1325's adoption was a culmination of many years of efforts towards integrating women's issues into peace building and conflict studies and all dimensions of the work of the United Nations.

In the year following the endorsement of Resolution 1325, the 2001 statistics for military women serving in the armed forces of North Atlantic Treaty Organization (NATO) countries indicated an average of 5.5%. Since then, the numbers have increased; however, not at a rate that will meet the efforts that are outlined by the organization. The organization is striving for the 50/50 balance by the year 2015.

IV. CURRENT EFFORTS OF WOMEN IN STABILITY OPERATIONS

In March of 2008 a conference was held in Kigali. Discussions were focused on how to increase women's participation in peacekeeping missions, and how these missions can work to prevent and respond rapidly to sexual and gender-based violence (SGBV). The conference falls under a wider program, funded by the UK Department for International Development (DFID), to strengthen the work of the Rwanda Defense Forces (RDF) in combating SGBV, with particular focus on building the capacities of the Gender Based Violence Desk at Ministry of Defense headquarters and at decentralized levels.

Since its launch in September 2007, the program has trained 2,594 officers and cadets at the training academy, including 573 RDF officers preparing for peacekeeping missions, ex-combatants, local defense forces, and opinion leaders on the prevention and response to SGBV.

It was noted during the conference that "Women can improve the effectiveness of peacekeeping operations for the simple reason that they are not men" also according to Professor Gerard DeGroot of St. Andrew's University, Scotland, research has shown that women exhibit unique levels of self-control in violent situations that have important applications to peacekeeping.

In November 2006, 75 experts gather in New York and Washington to discuss "United Nations Reform: Improving Peace Operations by Advancing the Role of Women." This was convened by the Stanley Foundation and Women in International Security, practitioners and policymakers from various United Nations agencies, national governments and militaries, academia, and civil society groups identified barriers to women's advancement and generated concrete ways to improve the recruitment and selection of women for peace operations as heads of mission, military personnel, civilian police, and international and national staff.

It was noted that to respond appropriately to the growing need for stabilization operations, experts at the meetings recognized the need to draw upon a wide variety of personnel with diverse skills and expertise, including women, who can provide critical leadership in peace operations and post-conflict reconstruction.

In late 2006, the Department of Peacekeeping Operations (DPKO) disseminated a policy directive on Gender Equality in UN Peacekeeping Operations that reiterates the necessity of increasing women's civilian and military roles in field missions. The DPKO also released a Global Action Plan on 1325 that includes the increased participation of women in peacekeeping as a priority for the agency. At the same time, UN member states are developing national action plans for the implementation of Resolution 1325, which include increased recruitment of women for peace operations.

At the meetings experts convened in working groups to discuss the recruitment and retention of women in five categories of peacekeeping personnel: heads of mission, military personnel, civilian police, international civilian staff, and national civilian staff. Participants outlined the process for hiring personnel, the challenges and opportunities to promote women, and practical recommendations for various actors in the five categories.

V. CHALLENGES/BARRIERS FOR WOMEN

Critics have pointed out the slow and ad hoc nature of these efforts. Despite repeated mandates and policy commitments—and these initial actions just described—little progress has been made to actually increase the number of women in peace operations. Statistics illustrate the implementation gap:

- There are zero female heads of mission (out of 18 operations) and only one woman deputy (Afghanistan).
- Only 1 percent of military personnel are women (of 70,960 total troops).
- Just 4 percent of police forces are women (of 8,482 total police).
- Approximately 30 percent of international civilian staff are women (of 4,568 total)—a number that decreases to 10 percent in management positions at the D-1 level or above.
- Women make up 22 percent of nationally recruited civilian staff (of 8,657 total), but many are relegated to service and clerical posts at the lowest grades.

Other challenges to women's recruitment and appointment include:

- An opaque hiring process without a formal job description.
- Infrequent support by member states for women candidates, in part because they are required for national positions.

- A lack of political will to appoint women from existing rosters of candidates despite the mandate for gender balance in leadership.
- A variety of competing opportunities for women with such experience.
- A reluctance by some women to accept an appointment in war-torn countries with shifting time commitments as result of family concerns or obligations.

VI. CONCLUSION AND RECOMMENDATIONS

Aside from the challenges, it is clear that there is little advancement within the international peacekeeping environment to actively recruit women. It is evident, that there is a positive experience by utilizing women's participation, which can further enhance the various peacekeeping operations. In order to meet the 50-50 gender balance by 2015 strategies outlined in 2000 and each year thereafter should be followed.

"It is my hope that the Security Council, Member States, the United Nations system, the NGOs, civil society and others will take further decisive action to ensure the participation of women and girls and fully incorporate their concerns into all our efforts to promote peace and security." (S/2002/1/1154 dated 16 Oct 2002)

The following recommendations are from a presentation to the Committee on Women in NATO, presented by Colonel Leijenaar on 23 May 2000 at the NATO Headquarters in Brussels :

The Committee on Women in the NATO Forces (CWINF) is the most powerful body of women in uniform. It should make itself known to the UN DPKO decision makers and get involved in UN PKOs at top levels. Some suggestions are:

- Establish contact with Military Advisers to the respective countries'

Permanent Missions to the UN in New York.

- Identify posts and suitable women candidates for UN PK Missions.
- Participate in the development of gender training programmes. (The UN DPKO Training Unit for UN PK training in this regard will use Canada and UK's effort).
- Identify suitable female candidates to succeed the current NATO liaison officer who serves on DPKO's staff.
- Identify funds and suitable candidates for the approved senior gender analysis post at DPKO.

The UN might be the mirror image of its MS, but it also has the responsibility to set an example to the international community it serves. The UN must encourage the following:

- Political will and awareness has to be developed among top management to promote gender mainstreaming.
- Competent women have to be included at the most senior levels of peace negotiations.
- Peace Agreements and Accords shall include gender perspectives.
- UN PK Mission mandates explicitly address gender equality.
- The UN has to develop an aggressive policy to identify and recruit senior women for top appointments, especially for UN PK Missions.
- All UN PK Mission planning processes should include relevant gender issues.
- Gender mainstreaming in UN PK Missions must be institutionalised with the overall responsibility placed with the SRSG.
- The DPKO must ensure that all MS military environments have clarity regarding the UN's gender perspectives.
- The DPKO Training Unit must ensure that all training material includes gender awareness training.
- Monitor and evaluation frameworks for Missions have to include gender perspectives as an integral part.
- Accountability mechanisms have to ensure that all personnel take responsibility for gender mainstreaming as relevant to their particular work.
- Gender Units should be established in all major UN PK Missions.
- The UN should be cautious not to just "add numbers" to improve gender equality.
- Gender sensitivity training should be continued in UN Departments and PK Missions.
- Coordinate and compose gender policies with UN PK to learn from the experience of other countries in integrating women in militaries.

General recommendations:

- More research, such as currently undertaken by DPKO's Lessons Learned Unit [LLU], regarding the involvement of military women in PKOs should be initiated.
- The issue of military women and mentorship should be developed.
- Military women should create viable networks.
- Women must involve men in all their activities to promote gender equality and "buy in".

"*If we accept that in any society, gender equality is more than a goal in itself; if we believe that the empowerment of women is a vital means to meeting the challenge of sustainable development; if we argue that the participation of women is a requirement in building good governance; if we insist that the rights of women are a precondition for the effectiveness of humanitarian assistance; if we are convinced of all these things in relation to all the societies we are trying to help in this world - then how can we fail to apply this conviction to our own society in our own house?*" (Kofi Annan 1998)

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Men with Vision

Morris L. Bates

Abstract- This paper looks at a comparison be made between Eric Smith and a leader that we have had the opportunity of working with closely, explaining each man's and motivations for their respective visions. Additionally, each man's communication style is to be described, as well as, its' effectiveness with subordinates. Explain how each man's vision is purposeful, understandable, believable, and measureable. Finally, present the model of preference if asked to lead a district.

I. The Vision of Eric Smith

According to the documentary (PBS.org/makingschoolswork), Eric Smith was a Superintendent of schools in Charlotte, North Carolina in which his vision for student success was to make teachers responsible for student learning. His argument was that students were not challenged enough in the inner city (Urban) schools as their suburban counterparts. He argued that this was by design, having to do with teacher expectations of the students solely determinant upon race. Mr. Smith argued that teachers who did remain in urban schools where minorities were the majority of the student body were not up to the task of ridding themselves of their bias' to meet the challenge they signed up for, the business of teaching and would have to change in their attitudes if they were to remain employed, indicative of the *transformation leadership style.*

With the backing of the Governor, the business community, and frustrated parents, Mr. Smith, used the State of North Carolina's Supreme Court mandates and the data supplied by the state to enact change in what he calls the "business of education" and how it was conducted to correct the disparity in school performance of minority students relative to non-minority students. So, given the questions of the vision being purposeful and understandable, turning around minority student achievement to appease court mandates meets both concerns. It is understandable in that any tax paying citizen concerned about the value of services provided by their governmental bodies should be demanding that their money is being spent wisely. In the case of educating students, Mr. Smith's vision gives the taxpayer more bang for his/her buck because all involved in the spending of the taxpayer's dollar is being held accountable for results. Believability, Mr. Smith's vision is believable given that the Governor signed off on Mr. Smith's vision. Measureable, Mr. Smith's has data of prior student performance to use to compare to future student performance.

While the piece portrays Mr. Smith as being "controlling", it is evident that his confronting style with teachers was necessary in order for them to really see themselves and their issues as others do. In that regard, Mr. Smith spoke his mind without reservation stating what the data was manifesting. Egos aside, Mr. Smith's focus was that of an educator who understands the reason why teachers are employed, that is to prepare students for the next level and/or for the world of work, or college. According to the article (voices.yahoo.com/eric-smith-pedro-garcia), Mr. Smith was hired by a school district in the State of Maryland to replicate the success he had in North Carolina. This candidate would like to believe that the district Mr. Smith takes the reins of is well aware of his track record and approach and is prepared to do that which must people do not like to do; change, even when it is for their own good.

II. The Vision of Archie Blanson

Mr. Blanson is the current school board superintendent in one of the Houston, TX area school districts. This candidate was volunteered to go through the district's leadership program to get a better understanding of how a school district functions given a budget as determined by the State of Texas Legislature. Mr. Blanson's vision is to make this urban school district one of the very best in the State of Texas regarding student performance, retention to graduation, and teacher retention which is indicative of the *participative leadership style*. Unlike Mr. Smith, Mr. Blanson, and other superintendents in urban areas of the State of Texas have been at odds with the current Governor and the Republican legislature regarding funding cuts for the past five years while having to continually serve more students. Notwithstanding, Mr. Blanson's team has bought into his vision and has been a catalyst for sharing their successes with other local area urban school districts within the Houston area.

The most unique aspect of the vision is that all of the administrators within the human resources department have, at minimum, been in the classroom; most of them having been principals and assistant principals. Having viewed the district's operations from budget discussions and how best to spend the money in educating their students to how each area of operation functions given their responsibilities within Mr. Blanson's vision, Mr. Blanson has received the cooperation of community partners from local area community colleges, colleges, and universities, to businesses and non-profits.

Mr. Blanson and his team have gotten everyone on board with his vision on making his district one of the best in the state, developing a training manual for the community partners (Leadership Aldine Presentation Manual, 2012). The purpose of the manual is for every participant to walk away from the program understanding the District's mission and how they as community partners can assist the District in achieving that mission. A member of Mr. Blanson's team made the statement that "if they have their hands on a student from kindergarten to high school graduation, their students will outperform other students on the next level."

The team member posits that the University of Houston has kept data on their students for the past twenty years that verifies that statement. Mr. Blanson and his team have utilized the data

for the district's drop-out rate and created a pre-school program for four year olds (three years for those children diagnosed with a disability). The District started with four pre schools and have expanded to eight. According to Mr. Blanson's team, the reasoning for the implementation of pre-schools was to increase the probability of students remaining in school until graduation. Mr. Blanson's team posits that data shows that having a student one extra year decreases the drop-out rate by thirty percent.

The last thing that caught this candidate's attention was the allegiances the district has made with colleges and universities that are out of state such as the University of Wisconsin and the University of Minnesota, where each university participates with the districts administration via training with their secondary teachers and the offering of full scholarships to students from the district, even paying for the students to travel to their perspective universities during the winter school sessions and summer.

Is Mr. Blanson's vision purposeful and understandable? Yes, Houston area drop-out rate is one of the highest in the state. Is Mr. Blanson's vision believable and measureable? Yes, other school districts in the area have adopted many of his team's strategies.

Just like Mr. Smith, Mr. Blanson attacked issues which data had been collected to expose glaring concerns in his district. Though each man's approach was different, they were/are able to get their subordinates to look at the data and buy into their respective visions which have resulted in a turnaround in their districts.

III. My Personal Model

After reviewing the first article (Mr. Smith), and having had the opportunity of observing the results of Mr. Blanson and his team, having an approach to running a district for this candidate would be in line with the issues that district presents as shown by collected data. As with any successful administrator/leader/manager, data should always dictate the direction of your vision.

Given the opportunity to lead a district, this candidate would be more inclined to implement the model as posited by Mr. Blanson; participative leadership style. To be fair, and given the dynamics Mr. Smith was brought into and asked to correct, and the mindset of all concerned, this candidate could see the necessity for his action plan and leadership style (transactional). However, at some point, situational leadership appears to be a more cohesive, team building approach when subordinates understand the mission and that their input to the accomplishing of that mission is valued. Having had the privilege of Counseling people, as well as Managing (civilian) and leading (military) people, this candidate prefers the Situational approach to leadership. It is similar to counseling in that there is no one technique that fits all situations and circumstances. In this candidate's opinion, leadership is no different.

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Demand Forecasting For Economic Order Quantity in Inventory Management

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Abstract- With today's uncertain economy, companies are searching for alternative methods to keep ahead of their competitors. Forecasts of future demand will determine the quantities that should be purchased, produced and shipped. In this work α, two data mining methods, artificial neural network (ANN) and exponential smoothing (ES) were utilized to predict the demand of the fertilizer (Ammonium Sulphate). The training data used was the sales data of fertilizer of the previous 3 years. Demand forecasted by artificial neural network is more accurate and have less inventory costs than exponential smoothing method.

Index Terms- Artificial neural network (ANN), Economic Order Quantity (EOQ), Exponential smoothing (ES), Inventory Costs

I. INTRODUCTION

Forecasting in general is prediction of some future event. Businesses use a variety of forecasts such as forecasts of technology, economy and sales of product or service. As a result, the accuracy of demand forecasts will significantly improve the production scheduling capacity planning, material requirement planning and inventory management. Although having accurate forecasts have never been easy, it has become more difficult in recent years due to increased uncertainty, complexity of business and reduced product life cycle. Traditionally, statistical methods such as time series analysis like exponential smoothing, weighted average, weighted moving averages, holt's model, winter's model etc are used for quantitative forecasting. General problems with the time series approach include the inaccuracy of prediction and numerical instability. Most of the traditional time series methods are model based which are more difficult to develop. Recently, applications of artificial neural networks have been increasing in business. One of the important applications of ANN is in the area of sales forecasting. Several distinguishing features of artificial neural networks make them valuable and attractive for forecasting tasks, artificial neural networks are data driven self adaptive method. There are a few a priori assumptions about the models for problem under study. After learning the data presented to them (a sample) ANNs can correctly infer the unseen part of the population.

II. METHODOLGY

Two methods used in this study were Artificial neural network method and Exponential smoothing method:

A. Exponential smoothing method

It calculates the smoothed series as a damping coefficient times the actual series plus 1 minus the damping coefficient times the lagged value of the smoothed series. The extrapolated smoothed series is a constant, equal to the last value of the smoothed series during the period when actual data on the underlying series are available. While the simple Moving Average method is a special case of the ES, the ES is more parsimonious in its data usage.

$$F_{t+1} = \alpha D_t + (1 - \alpha) F_t$$

where:

- D_t is the actual value
- F_t is the forecasted value
- α is the weighting factor, which ranges from 0 to 1
- t is the current time period.

Notice that the smoothed value becomes the forecast for period t + 1.

B. ANN METHOD

Neural networks are computing models for information processing. The most popularly used neural network model in practice for retail sales is the feed forward multi-layer network. It is composed of several layers of basic processing units called neurons or nodes. Before it can be used for forecasting, the NN model must be built first. Neural network model building (training) involves determining the order of the network (the architecture)as well as the parameters (weights) of the model. NN training typically requires that the sample data be split into a training set and a validation set. The training set is used to estimate the parameters of some candidate models, among which the one that performs the best on the validation set is selected. The out-of-sample observations can be used to further test the performance of the selected model to simulate the real forecasting situations.

Advantages Of Using Artificial Neural Network
Adaptive learning, Self-Organisation, .Real Time Operation, and Fault Tolerance via Redundant Information Coding.

III. RESEARCH ELABORATIONS

Production of Ammonium sulphate include

$H_2SO_4+2NH_3 \longrightarrow (NH_3)_2SO_4$

One ton of Ammonium sulphate requires 0.6 ton of sulphur rock.

Data collection: The first and foremost step of the model is collection of data.

For implementation of exponential smoothing and Artificial neural networks for sale forecasting ,the monthly sales of fertilizer for last three year starting from March 2010 to march 2013 were collected.(Table.1)

Forecasting of demand by Exponential Smoothing:

$L_{t+1}= \alpha D_{t+1}+(1-\alpha)L_t$

$\alpha = 0.2$

Demand forecasted by Exponential smoothing is given in the table.2

Total demand of Ammonium sulphate for a period from April 2013 to March 2014=165601 tons

Raw material (sulphur rock) required = 0.6*165601=99360 tons.

EOQ of sulphur rock = 92634 tons.

No of orders per year = 3

Inventory costs of sulphur rock

Ordering costs = Rs 1320000

Holding costs = Rs8486944

Forecasting of demand by Artificial neural network:

MATLAB contains inbuilt NEURAL NETWORK tool box, which contains neural time series tool (ntstool). Time series tool helps in forecasting the demand of the fertilizer.

Demand forecasted by ANN is given in the table.3

Total demand of Ammonium sulphate for a period from April 2013 to March 2014=265217 tons

Raw material(sulphur rock) required = 0.6*265217 =99360 tons.

EOQ of sulphur rock = 33153 tons.

No of orders per year = 8

Inventory costs of sulphur rock

Ordering costs = Rs 5280000

Holding costs = Rs 2817929

IV. RESULTS

In this work demand of Ammonium sulphate is forecasted by Exponential smoothing and Artificial neural network methods.EOQ and no of orders of sulphur rock is calculated with the help of forecasted demand .Number of orders per year by Exponential smoothing is three. Number of orders per year by ANN is eight. Inventory costs, raw material holding costs and ordering costs of sulphur rock for the coming year is obtained. A comparison is made with the help of charts. By comparing two methods a savings of 17.42% is obtained in the case of ANN method.

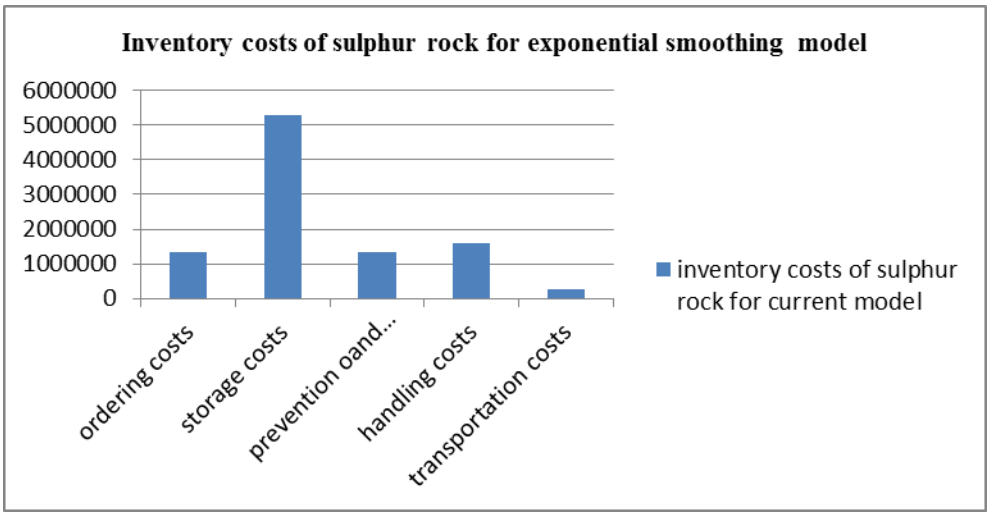

Figure 1: Inventory costs of sulphur rock for exponential smoothing.

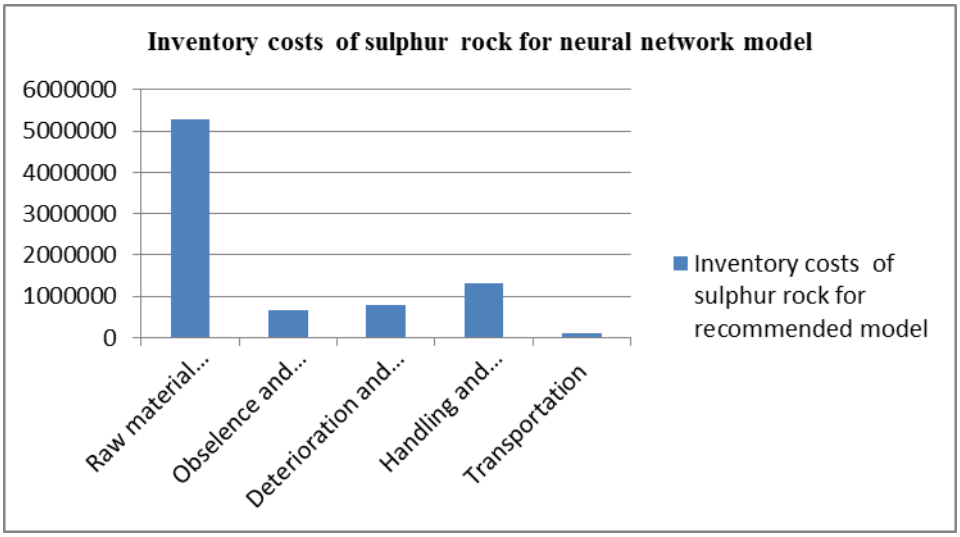

Figure 2: Inventory costs of sulphur rock for artificial neural network.

V. CONCLUSION

The current forecasting model in place at Company has brought problems due to ineffective forecasting that resulted in inaccurate inventory level. In order to help them reduce their stock outs, a forecasting model was provided along with an economic order quantity. Finally, the economic order quantity is, optimized the order quantity for each product when an order is placed, reducing the companies product stock out issue. By providing and recommending the inventory control model, the results have shown improvements in forecasting as well as in cost reduction. So, if the company follows through and implements the recommended inventory model, they would be able to reduce the total cost by approximately 20%which is a cost reduction of for top selling products. In the end, the issues the company faces would be reduced by implementing the recommended inventory model. The model will ensure the product is in stock, which would drive product sales and would allow the company to increase profit by forecasting accordingly. The recommended analysis showed that simple, yet complex techniques are the key for retail success which could give them the competitive edge.

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Table 1. Consolidated sales data of four states.

Consolidated sales of four states	
Month	AMMONIUM SULPHATE
Mar-10	10051
Apr-10	9640
May-10	8888
Jun-10	9581
Jul-10	12796
Aug-10	12752
Sep-10	26201
Oct-10	15110
Nov-10	9545
Dec-10	22433
Jan-11	25360
Feb-11	10365
Mar-11	8992
Apr-11	9191
May-11	8996
Jun-11	4573
Jul-11	12077
Aug-11	10678
Sep-11	24896
Oct-11	16942
Nov-11	14660
Dec-11	26657
Jan-12	7275
Feb-12	9024
Mar-12	9837
Apr-12	11058
May-12	9998
Jun-12	11359
Jul-12	12531
Aug-12	12307
Sep-12	23855
Oct-12	16835
Nov-12	6679
Dec-12	20547
Jan-13	7393
Feb-13	7588
Mar-13	8558

Table 2. Demand forecasted by Exponential smoothing

MONTH	AMMONIUM SULPHATE
Apr-13	12419
May-13	11712
Jun-13	11285
Jul-13	11587
Aug-13	11820
Sep-13	14696
Oct-13	14778
Nov-13	13731
Dec-13	15471
Jan-14	17448
Feb-14	16031
Mar-14	14623

Table 3. Demand forecasted by Artificial neural network.

FORECASTED DEMAND OF AMMONIUM SULPHATE FROM APRIL 2013 TO MARCH 2014	
All units are in metric tons	
MONTH	AMMONIUM SULPHATE
Apr-13	9963
May-13	9294
Jun-13	8504.333333
Jul-13	12468
Aug-13	11912.33333
Sep-13	24984
Oct-13	16295.66667
Nov-13	10294.66667
Dec-13	23212.33333
Jan-14	13342.66667

Feb-14	8992.333333
Mar-14	9129

Role of Teachers amidst Educational Reform – Passive Bystanders or Active Participants?

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Abstract- Tertiary Education has always played an important role in the overall economic and social development of any country by virtue of its contribution to the quality of education and research, which is its principle domain. A corollary to this is the training of future teachers for the effective use of ICT, and consequent transfer of these skills to successive generations. The researchers attempted to study Teacher awareness and perceptions related to their roles as 'managers of learning resources' i.e. having an in-depth understanding of learning resources and their respective potentials.

The Study concluded that, Teachers will have to address these emerging challenges if they must become active participants in the education reformation process. Keeping abreast of the latest in one's profession involves an acceptance of 'continuum of learning' and, today technology is both the raison d'être and the panacea for this.

Consequently, Teacher training programs must incorporate components, which familiarize teachers-to-be with skills related to the meaningful usage of ICT in support of student-centric methodologies.

I. Introduction

Teachers are the principal agents of socio-economic change in any country. The National Policy on Education of India (1986/1992) has given very clear directives on this issue, 'The status of teachers reflects the socio-cultural ethos of a society; it is said that no people can rise above the level of its teachers' .The Policy emphasizes that education is a continuous process and teacher education programmes must reflect the same…improvement in the status and professional competence of teachers is envisaged as the cornerstone of educational reconstruction'(NPE, 1986).

The teacher education system responsible for the training of teachers-to-be thus becomes an important vehicle to improve the quality of school education and revitalization and strengthening of this system, a powerful means for the upliftment of educational standards in the country.

Post-independent India has been witness to dramatic changes in the area of Teacher Education – the most important one being the according to Teacher Education, the stature of an independent area of specialization looking to the importance and relevance in the contemporary context. This transformation was necessitated by the conditions and context after Independence (NCTE, 1998). Education had to be responsive to the needs of the nation especially in the training of school going children who would be able to don the mantle and responsibilities of the coming future. This required better quality 'grassroot level' functionaries, teachers and administrators who would be able to recognize, understand and work towards the realization of such targets.

They had to realize the changed role of education in democracy; to represent to school children through school experience the new value orientations, emerging concerns and changes needed for a better future both for the individual and the nation (NCTE, 1998).

The Govt. of India realized the importance of teacher education in maintaining educational standards and brought in reforms to restructure, modify and make the program relevant to the times it was catering to. The first step towards realization of this goal was according accessibility to the program, countrywide. Today, India has probably one of the largest systems of Teacher Education in the world. During 1947-48, only 51 Teacher Education Institutions existed. The number had increased to 1300 Teacher Education Institutions for Elementary education and more than 700 colleges of education/University Departments preparing teachers for Secondary and higher secondary schools as per NCTE (1998) and by the year 2007, it is approximated that there would be 3429 Secondary Teacher Training Institutions in India (NCTE, 2007) with the possibility of many more being added to this number.

II. Teachers for Quality Education – The Global Scenario.

The figures given above are indicative of the quantitative expansion of the Teacher Education system in the country keeping pace with the demands of rapidly changing times. However, while quantity is necessary to ensure equity and access to wannabe teachers, the quality of the program is equally important and demands our constant attention (Education Commission, 1966).

The Parliament of India, through an Act, set up in 1995 the National Council for Teacher Education (NCTE) and gave it statutory powers for framing regulations and norms for maintaining standards of teacher education in the country.

The World Education Report (UNESCO, 1998, pp. 19-20) too confirms the central role of teachers in any education system, emphasizing that the quality of education is directly linked to how well teachers are prepared for teaching. It emphasizes that the existing traditional educational system will no longer be able to provide students with the knowledge and skills requisite for the 21st century knowledge based economy.

The new knowledge-based global society is one in which

- The world's knowledge base doubles every 2–3 years;
- 7,000 scientific and technical articles are published each day;

- Data sent from satellites orbiting the earth transmit enough data to fill 19 million volumes every two weeks;
- Graduates of secondary schools in industrialized nations have been exposed to more information than their grandparents were in a lifetime;
- There will be as much change in the next three decades as there was in the last three centuries (National School Board Association, 2002).

The challenge confronting the educational system in view of the above facts is how to transform the existing curriculum and groom students to function more effectively in this dynamic, information-rich, and continuously changing environment.

To counter these challenges, teachers need to be equipped not only with subject-specific expertise and effective teaching methodologies, but also the capacity to assist students to meet the demands of the emerging knowledge-based society. Information and Communication Technology can provide an array of powerful tools that may help in transforming the present isolated, teacher-centered and text-bound classrooms into rich, student-focused, interactive knowledge environments. Teachers therefore require familiarity with new forms of information and communication technology and need to have the ability to use that technology to enhance the quality of teaching and learning.

III. E-Learning in the Digital Era.

Teaching-learning is being revolutionized with the gradual onset of the e-learning environment. The major boost to e-learning comes from the seamless online connectivity, open source tools for organizing and delivering content, world standards to help resource discovery and more attractive components such as multimedia elements in disk and transmission efficient formats. E-learning most often means an approach to facilitate and enhance learning through the use of devices based on computer and communications technology. Such devices would include personal computers, CD-ROMs, Digital Television and Mobile Phones. Communications technology enables the use of the Internet, E-mail, discussion forums, and collaborative software. E-learning covers a wide set of applications and processes such as Web based learning, computer based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio and videotape, satellite broadcast, interactive TV, and CD-ROM (Madalli, 2006).

E-learning acquaints the learner with a scenario in which he is going to be placed in the future and for which he needs to be consequently trained in preparation for its requirements and demands. E-learning could play a vital role in the post-classroom life-long learning processes as well – namely future realities such as Distance Education, Continuing Education, Professional Enrichment, accessibility to Digital Library services and many other technology enabled utilities. Thus e-learning and e-literacy will play a crucial role in determining the nature and extent of learner participation in the digital era.

Role of Teachers amidst Educational Reform – Passive Bystanders or Active Participants?

In order to meet this challenging scenario, educational Institutions must embrace the new technologies and appropriate the new ICT tools for learning. They must move toward the goal of transforming the traditional paradigms of learning (UNESCO, 2002)

How Information and Communication Technology is used in education specifically, is largely dependent on the techno-pedagogical competencies of educators. They must be familiarized not only with the needed techno-competencies but also how to meaningfully incorporate these in the pedagogy so that the instructional processes become more effective and relevant to contemporary times.

In order to effectively harness the potential of ICT, there should be sufficient access to technology together with the understanding that its usage be pertinent to the needs of the specific learner.

A need assessment survey conducted among practicing teachers revealed that teachers although aware of the significance of inclusion of ICT, were to a very large extent ignorant of the knowledge of basic and required software, needed trouble shooting techniques for an independent usage of technology in education and the pedagogical relevance of the usage of different technology enabled facilities.

Given below is the data analysis of the responses elicited in this connection.

	Section I. Technology operations and concepts	Yes%	No%	Not Sure%
1	I can explain the difference between software and hardware.	76	15	9
2	I can operate PC fully.	27	32	41
3	I can explain terminology related to computer technology.	17	50	33
4	I can demonstrate installing content-based software.	12	61	27
5	I can use the below listed software (tick only those which you know)			
	1. M S Office (a) word (b) excel (c) PowerPoint	70	16	14
	2. Desktop Publishing	2		

	3. Multimedia	-	-	-
	4. Image processing	-	-	-
6	I can demonstrate the basic features of presentation/multimedia software (i.e. PowerPoint, Corel draw, etc).	22	50	28
7	I have the knowledge of Internet and can use it.	73	16	11
8	I know to create an email account.	63	24	13
9	I have the knowledge of below listed hardware and can use it. (Tick only those which u know)			
	1. Camera 2. Compact disk 3. Video camera 4. DVD player 5. Printer	46		
	6. Scanner 7. Digital camera 8. Computer 9. Projector 10. Net meeting	-	-	-
10	I am confident with basic troubleshooting techniques.	5	58	37

	Section II. Planning and designing learning environments and experiences	Yes%	No%	Not Sure%
11	I can design lesson plans implementing technology that are developmentally appropriate and support the needs of diverse learners.	16	52	32
12	I can apply knowledge from current instructional research on the use of technology to my future classroom.	27	28	45
13	I believe that technology- enhanced environment is important for students in their learning activities.	95	2	3
14	I can plan strategies using technology to enhance student learning.	26	40	34
15	I can identify and locate online resources dealing with learning activities and teaching strategies.	39	27	34
16	I believe that it is important for teachers to know how to utilize technology-based materials to plan for their lessons.	94	4	2
18	I can apply technology to develop students' higher order skills and creativity.	23	35	42
19	I can operate and apply content-specific software to support students' learning.	17	54	29
20	I believe that it is important for teachers to have basic knowledge of concepts and operations of computer technology for their classrooms.	82	9	9

	Section III. Assessment and Evaluation	Yes%	No%	Not Sure%
21	I can demonstrate my knowledge to evaluate content- based software.	16	46	38
22	I can demonstrate different ways to organize student performance data using technology resources.	11	43	46
23	I can apply my knowledge to determine students' appropriate use of technology resources.	28	33	39
24	I believe that it is important for teachers to apply technology to facilitate a variety of effective assessment and evaluation strategies.	91	4	5
25	I can evaluate content-based software.	12	53	35
26	I can apply technology resources in assessing students learning of subject matter knowledge.	16	53	31
27	I can apply information collected from Internet resources to improve my teaching practice.	77	15	8
28	I can evaluate the appropriateness of students' use of technology resources.	23	38	39
29	I understand educational technology as (tick on any one)			
	a) Teaching through computers	44	32	24
	b) Use of machines and other items of hardware	23	51	22
	c) Development, application and evaluation of systems, techniques and aids in the field of learning.	22	50	23
30	Do you appreciate the use of technology in education?	100	0	0
31	Techno based evaluation promotes increase in objectivity	86	5	9

IV. MAJOR FINDINGS OF THE STUDY

The data analysis revealed the following major findings:

- 94% teachers believed that it was important for all teachers to know how to utilize technology-based materials to plan for their lessons;
- 82% teachers believed that it was important for teachers to have basic knowledge of concepts and operations;
- 91% teachers believed that it was important for teachers to apply technology to facilitate a variety of effective assessment and evaluation strategies;
- 91% teachers believed that the use of productivity tools (i.e. Microsoft word, Excel, PowerPoint, Hyper studio.) would affect the quality of teaching practice and,
- 100% teachers believed that teachers should continuously be informed about new technology tools for their professional development.
- 100 % teachers appreciated the use of technology in education.
- 86 % teachers believed that Techno based evaluation promotes increase in objectivity

Despite a positive attitude towards the use of technology in Education, the Study revealed a contradictory existing reality. Only

- 16% teachers could actually design lesson plans implementing technology that were developmentally appropriate and supported the needs of diverse learners,
- 17% could operate and apply content-specific software to support students' learning,
- 22% teachers could demonstrate the basic features of presentation/multimedia software,
- 16% teachers could apply technology resources in assessing students learning of subject matter knowledge,
- 23% teachers could apply technology to develop students' higher order skills and creativity,
- 26% teachers could plan strategies using technology to enhance student learning.

V. ICT AND TEACHER TRAINING: THE PATH TO TEACHER PROFESSIONALIZATION

Tertiary Education has always played an important role in the overall economic and social development of any country by virtue of its contribution to the quality of education and research, which is its principle domain. In this context, the training of future teachers for the effective use of ICT, and consequent transfer of these skills to successive generations assumes great significance.

The data analysis established the need for a more far-sighted and thoughtful approach with regards to ICT integration in the Teacher Education program and the need to update the future teachers with necessary associate skills as well. The knowledge of one without the other would lead to partial and superficial learning - the need of the hour is not merely the knowledge of Information and Communication Technology but what it can do to address the new and emerging paradigms of learning. Thus, the need for concerted efforts and a holistic approach.

In order to make this a reality, Teacher training programs must incorporate components, which familiarize teachers-to-be with skills related to the meaningful usage of ICT with the requisite technical skills so as to facilitate the creation and designing of ICT integrated content in support of student-centric methodologies.

In order to make integration meaningful, teachers need to be sensitized to the fact that 'pedagogy is central and technology - the tool'. (Passi, 2006). Thus, the need to realize the importance of ICT as a 'curriculum enrichment tool'.

Teachers need to be trained as effective 'managers of learning resources' i.e. having an in-depth understanding of learning resources and their respective potentials. Thus, they need to be familiarized with a range of hardware and their specific applications. This is necessary for the judicious integration of technology during instructional sessions, greater access to educational resources and enabling interactive and individualized learning environments.

Teachers need to be trained to know the difference between 'presentation' and 'investigative' software so that the focus of integration is deeper, reflective and self-directed and higher order learning.

Teachers will have to address these challenges if they must become active participants in the education reformation process. Keeping abreast of the latest in one's profession involves an acceptance of 'continuum of learning' – today technology is both the raison d'être and the panacea for this.

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Socio-Economic Status and Physical Attractiveness in Mate Selection Choice

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Abstract- Selection the ideal mate is the most confusing process in the life of most people. To explore these issues to examine differences under graduates socio-economic status have on their preference of marriage partner selection in terms of their personality traits, socio-economic status and physical attractiveness. A total of 770 respondents participated in this study. The respondents were mainly college students studying in final year degree in professional and non professional courses. The result revealed that the respondents socio-economic status significantly influence preferences in marriage partners selection in terms of personality traits, socio-economic status and physical attractiveness.

I. About The Study

Mate selection criteria have long been a topic of interest for family research and social psychologists. Earlier status of socio-economic characteristics figure prominently in mate choice. In pre industrial society socio-economic status was a curial determinant of the living conditions of individuals and families. Most predominantly, socio-economic status determined the access to economic resources,' thereby reflecting group-specific differences in the standard of living in terms of nutrition, housing and vulnerability to economic hardship. This individuals and families of higher socio-economic status generally had better living conditions than those of lower socio-economic status. Socio-economic conditions had implications for demographic behaviour. It had considerable implications on differences between different socio-economic groups in terms of fertility, marriage and migration .

Socio-economic status in pre-modern society was determined by a range of different factors, socio-economic status attainment could be linked to individual achievement, through investments in education, training and network. These are the kinds of factors that we often assume to be dominant in contemporary societies. One means of accessing economic recourses, network, or social prestige in the absence of inherited assets could have been through marriage by finding a spouse from a higher socio-economic status (Dribs & Lundh, 2006).

Partner selection is potentially one of the most important factors contributing to socio-economic status and mobility besides the individual's own socio-economic origin. The real transformation of modern love is that ranking mates for material and social assets is now incorporated into unconscious structures of desire. Lilouz (1997) noticed that it was the entry of women into the labour force throughout the 20th century that shook the foundations of marriage. Basically in the 70s, economic reformation and feminism, with new possibilities for economic independences from men, more women were free to leave unsatisfying marriage, which also meant they tended to make more demands on the ones they choose to stay in.

Much of the research on mate selection or partner preferences has focused on the perceived desirability of various personality traits (e.g. intelligence, openness') or other individuals attributes (e.g, social status, physical attractiveness). In fact, several studies have found that women's emphasis on potential mete's economic resources increases rather than decreases with the elevation of women's socio-economic status. (Townsend, 1989; Wiederman & Allgcier 1992; see also, Todosijevic, Ljyubinkovic & Arancic, 2003).

II. Literature Review

A Consideration of several studies suggests that men and women will emphasize different characteristics when considering a potential partner. The mores of American culture force men and women to select mates of similar culture, religious background socio -economic status, common values, age education, ideal images and physical attractiveness. People value socio-economic status as a means to predict one's ability to provide for their young ones. The ability and willingness to provide their resources are traits, that have been correlated with high male value. Human males can and to provide a range of resources for the female before, during and after she has produced an offspring. This can include food, shelter and protection from other males. Female would have evolve preferences for males who had good financial prospects, were older than themselves, had higher social status, and who displayed hard working and industrious characters as these are clear signs of resources acquision (Mamasan,2005). Hatifield and Rapson (1996) in their study cross-cultural prospective of love and sex find that women value more than men, marriage partners who posses status, who had good financial prospects and who are ambitious and industrious. Supporting this view Khallad Jordian female college students show greater interest in positional marriage partners who exhibit economic ability and commitment. This finding further indicated that women's differentional preferences for resources and commitment related attributes were mainly determined by socio- economic status.

Gage and Hancock(2002), in their study of college students revealed that students of middle class as well as the higher class primarily choose those who are of their own socio –economic status to date or marry. Also the study revealed that those of high socio- economic status have previously preferred those of either the same or lower socio-economic status. It was also found that in their data that both males and females prefer those of a

relativity equal social class to themselves to those of lower or higher socio-economic classes. Feingold (1992) noticed that women accord more weight than men to socio-economic status, as women prefer marriage partners that will be able to take care of them financially.

South, (1991) examined, data collected from over 2000 respondents in the united states, data collected was used to examine socio-economic demographic differentials in the stated willingness of individuals to marry persons with various social, economic and demographic characteristics, it draws an exchange and marriage marked theories to develop hypotheses age, race, sex and socio-economic resources of respondents, respondents stated willingness to marry persons outside the normative age range. Who have been previously married, who already have children who are of a different religion and race, who have relatively high or low earning and education, and who are not physically attractive.

In another Study, Westman, (1999) noticed that financial success level was the most important variable sought by university students, in potential marriage partner from the data gathered from university students using a questionnaire covering background information, the self perceives mating success scale, and a materialism scale developed by Richins and Dawson and a computer survey indicating interest in a coffee date, party date, and a dinner with target individuals who varied by attractiveness level.

In fact, several studies have found that women's emphasis on potential mates economic resources increases rather than decreases with the elevation of women's Socio-economic status (Townsend, 1989; Wiederman & Allgcier, 1992; see also Todosijevic , Ljubinkovic, & Arancic. 2003). In a study by Townsend (1989) conducted , no woman preferred a spouse to have a lower Socio-economic status or income than she did, where as men seek women for their outward appearances.

In studies by Walster, Aronson, Abrahams and Rottmann, (1966) and by Sewell, Bowen and Lieberman, (1966) showed high Correlations existed between a date partner's physical appeal and linking for the other. Their studies slowed that personality as measured by the M.M.P.T. (Masculinity-femininity and social introversion scales) and I.Q, are not better predictors of mate selection preferences than physical beauty. Personality characteristics figure prominently in unstructured nominations of what people want in a mate (Langhorne & Secord, 1955).

III. Hypothesis

The purpose of this study is to examine that what influence does respondents socio-economic status have on their preferences of marriage partners in terms of personality traits, socio-economic status and physical attractiveness.

IV. Methods

Research design:

This is a survey study that made use of the descriptive survey design.

V. Participations

Participants in this study were 770 undergraduates, studying in final year degree of professional and non-professional from various degree colleges in Bagalkot city, Karnataka. The respondents consisted both male and female students within the marriageable age.

VI. Measures

Data was collected by administering the questionnaire titled "Mate selection preferences among college students in Bagalkot" designed by the researcher for the participants. Questionnaire included a list of various traits or characteristics adopted from earlier study. It was designed to obtain data on such variables as personality triats socio-economic status and physical attractiveness.

VII. Procedure

The questionnaires were administered to the participants in their respective colleges. Participants were voluntary and anonymous and each students completed his/her questionnaire at an individual desk with the help of concerned lecturers. The questionnaire was collected on the same day of administration rom each college. The data collected was appropriate statistical methods.

VIII. Results:

Table 1: Table Showing the social background of the respondent's family.

Caste/ Religion	No. of respondents	Percentage
Lingayat	217	28.18
Maratha	027	03.51
Brahman	060	07.79
Vyshya	13	01.69
Adikarnataka	025	03.25
Adidravid	034	04.42
kshatriya	019	02.47
Kurub	079	10.26
Valmiki/Nayak	030	3.90
Not mentioned	110	14.28
Others	156	20.25
Total	**770**	**100.00**

The results indicated that a majority i.e. about 28.18% belongs to lingayat community. It may be due to the fact that this area is lingayat dominant region. About 20.25% belongs to others and about 14.28% respondents have not motioned their caste/ religion they belongings. It indicate that they are emerges from various parts of the Bagalkot and outside Bagalkot for education purpose.

Table II : A table showing the respondents family occupation/ profession

Family's occupation Profession	No. of respondents	Percentage
Agriculture	280	36.36
Trade / Business	213	27.66
Artists	009	01.18
Religious services	012	01.56
Public / Private service	209	27.14
Others	47	6.10
Total	770	100.00

Table III : A table showing the economical status of the respondents family

Family Annual income from all sources	No. of respondents	Percentage
Upto Rs. 25,000/-	105	13.64
Upto Rs. 50,000/-	165	21.43
Upto Rs. 100000/-	205	26.62
Upto Rs. 200000/-	112	14.54
Upto Rs.350000/-	101	13.12
Upto Rs. 500000/-	082	10.65
Total	**770**	**100.00**

The results showed that about 280 (36.36%) respondents belongs to agricultural family. It is followed by Trade/ Business and Public/ private services in the 2nd and 3rd order respectively. If we collapse these two, we find that about 54.80% of the respondents would belongs to other than the agriculture. It is because of the fact that the research area is comprised with both rural and urban areas.

The above results showed that the respondents belongs to various income groups. Majority i.e. 205 (26.62 percent) have annual income of Rs. 1,00,000/-, which indicates their average level of economic conditions. Uncertain rainfall, low wages might have been to such economic conditions.

Table IV: A table showing the consideration of the respondents family profession and status at the time of selecting a marriage partner.

		Family status at the time of selecting mate							
Sl. No	Respondents family profession	Coming from rich family	Having a political background family	Coming from services background family	Having equal status family	Below my family status	No. special preference	Total	Percentage
1.	Agriculture	96	09	14	110	25	33	287	37.27
2.	Trade/business	85	04	10	100	08	31	238	30.91
3.	Artists	02	00	01	03	00	02	008	01.04
4.	Religious services	04	00	01	04	01	04	014	01.82
5.	Public/private service	69	03	11	87	05	14	189	24.55
6	Others	09	00	03	09	04	09	034	4.41
	Total	265	16	40	313	43	93	770	100

The results showed that on collapsing sl. No. 1, 2 and 5 columns the respondents indicated that they prefer, at the time of selecting a mate, those of relatively equal or higher social class to themselves.

Table V: A table showing the respondent's indicating their preferences in selecting marriage partner

Preferences	No. of respondents	Percentage
Education	120	15.58
Family status	215	27.92
Economic stability	184	23.90
Physical Attractiveness	141	18.31
Personality traits	91	11.82
Common interest	19	2.47
Total	770	100.00

The result showed that significant majority of the respondents have said that family status is preferred. Family still holds its importance. It is followed by economic stability, physical attractiveness, education, personality traits and common interest in that order. Family status may include position of the family in the community, character of the members, and the family's interaction with other families. Income stability is the next important factor. By it, they mean the income stability, which more or less provides them with a similar type of environment and living. Also physical attractiveness and education equally occupies in selecting a marriage partner by the respondents.

The results showed that the respondent's who are of high socio-economic status preferred to marry from that group those from medium socio-economic group also prefer to marry from that group.

IX. Conclusion

Research showed that socio-economic status significantly influences preferences in marriage partners' selection in term of personality traits and marriage partners' socio-economic status.

This implicate that the more similar people in their values background and life goals, the more likely they are to have a successful marriage. People who share common background and similar social networks are better suited as marriage partners than people who are very different in their background and network. The possibilities of marital satisfaction are greater if people marry within their own socio-economic status. Partners experience more stress in heterogamous unions. There is a tendency for couples to enter into homogenous marriages with respect to education.

It is thus concluded that our respondents do not significantly differ in preferences in marriage partners selection in terms of personality traits, socio economic status and physical attractiveness. There is substantial evidence in mate preferences predicted that men value physical attractiveness and youth to a greater degree than women whereas women ore more concerned in economic status to greater degree than men.

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Morphological variation of *Ommatobrephus lobatum* from *Varanus bengalensis* and *Tropidonotus piscator* in District Sidhi (M.P.) India

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Abstract: The aim of this paper is to increase the knowledge of the diversity of digenean parasites from *rana tigrina* collected in sidhi district madhya Pradesh, India. About 200 parasites representing *Ommatobrephus lobatum* were collected from the intestine of f *Varanus bengalensisi* and *Tropidonotus piscator* from different places of Sidhi (M.P.). They were critically analyzed for their intra specific variations. Measurements of various organs of 50 parasites were recorded for study. The body length was measured 0.910 mm. to 2.820 mm. The oral sucker range was 0.105 – 0.245 mm. X 0.176 – 0.280 mm. and ventral sucker range was 0.315 – 0.665 mm X 0.350 – 0.665 mm.

Index Terms: Digenean, *Ommatobrephus lobatum*, India

I. INTRODUCTION

The knowledge of helminths in India is very old. Helminthology is one of the most significant braches of parasitology, which constituent a large number of worms, free living as well as parasitic occurring widely, in invertebrates and vertebrates. [1] It is an established phenomenon that a parasite is always under the influence of two types of environments - viz; the internal environment in which the host lives. It is the interaction of the influence of these environments and the strategy adopted by the parasites of counter influence that develops the host specificity and host parasite relationship. Thus the establishment and survival of helminths in their hosts is controlled by the internal environment of the host as well as its external environment. [2]

Sidhi is one of the important district, head quarters of Rewa commissionary of Madhya Pradesh. It lies between longitude 81^0-15' and 82^0-49' East and latitude 24^0-42' and 24^0-42' North, almost in the East corner of the Rewa Division. [3]

In the present investigation, *Ommatobrephus lobatum* were collected from the intestine of *Varanus bengalensisi* and *Tropidonotus piscator* from different places of Sidhi (M.P.) India for examine morphological variations.

II. MATERIALS AND METHODS

The present study was done in several areas of District Sidhi. The study was conducted between the months May 2011 to December 2011. During this time period average temperature was 30.4 ^{0}C (maximum) and 15.61 ^{0}C (minimum) and rain fall 88.8 mm.

50 parasites were selected for study. Specimens were carefully collected without any contamination, and were carried to laboratory for examination. The worms thus obtained from the hosts were cleaned thoroughly by saline water or ordinary tap water, killed and fixed quickly by under pressure of the cover glass. Fixatives and preservatives were used: (1) Worm A.F.A. Solution (2) Mercuric chloride Acetic acid (3) 5% Formalin (Commercial) and Preservations 70% Ethyl alcohol.

Fixed worms brought to either water of 20% alcohol and stained in Gower's Carmine Stain for 12-35 hours. They were washed in one or two changes of water and dehydrated through series of alcohols, cleared in Methyl salicylate and Benzene then mounted whole in Canada balsam.

III. RESULTS AND DISCUSSION

Helminthology is only one of the significant branches of parasitology. Parasitism figures prominently in the Zoological curriculum at the present time. A large number of vertebrate hosts ranging from fishes, amphibia, reptiles, birds and mammals from different part of Sidhi region were collected then cut in saline water and a through examination of not only the alimentary canal but whole of the body was made for digenetic trematodes. [4]

In the present study we investigated morphological characters of *Ommatobrephus lobatum* collected from the intestine (rectal region) of *Varanus bengalensisi* and *Tropidonotus piscator* like body length, oral sucker, ventral sucker and the ratio of oral and ventral sucker. The body length range was measured 0.910 mm. to 2.820 mm. The oral and ventral sucker range were 0.105 – 0.245 mm. X 0.176 – 0.280 and 0.315 – 0.665 mm X 0.350 – 0.665 respectively. The ratio of oral and ventral sucker range was 1:1.9 - 1:2.90. (Table 1)

Pandey, 1969 has been redescribed from specimens collected from*Varanus bengalensis* and*Tropiodonotus piscator* at Gyanpur, Varanasi. The species *O. lobatum najii, O. nicolli, O. chauhani* and*O. bengalensis* is considered synonym of *O. lobatum*. [5]

Dwivedi and chauhan (1969) added one more species of the genus *Ommatobrephus*, *O. minutum* from the intestine of *Tropidonotus piscator* collected from Chindwara (M.P.).

Table- : Measurements of various organs of 50 parasites of *O. lobatum.*

S.No.	Body length	Oral sucker	Ventral sucker	Sucker ratio OS : VS
1.	0.910	0.105×0.176	0.315×0.350	1 : 2.37
2.	1.155	0.175×0.210	0.350×0.385	1 : 1.9
3.	1.260	0.175×0.245	0.455×0.385	1 : 2
4.	1.295	1.160×0.280	0.385×0.525	1 : 2.16
5.	1.330	0.175×0.210	0.350×0.455	1 : 2.09

6.	1.400	0.140×0.176	0.385×0.420	1 : 2.55
7.	1.400	0.176×0.245	0.420×0.525	1 : 2.25
8.	1.400	0.140×0.245	0.455×0.455	1 : 2.36
9.	1.540	0.175×0.245	0.420×0.560	1 : 2.33
10.	1.540	0.175×0.280	0.525×0.560	1 : 2.15
11.	1.540	0.175×0.210	0.364×0.490	1 : 2.21
12.	1.575	0.140×0.245	0.420×0.525	1 : 2.45
13.	1.610	0.175×0.245	0.490×0.525	1 : 2.41
14.	1.610	0.210×0.245	0.455×0.560	1 : 2.01
15.	1.610	0.140×0.210	0.385×0.490	1 : 2.5
16.	1.645	0.175×0.210	0.350×0.455	1 : 2.09
17.	1.680	0.175×0.245	0.490×0.490	1 : 2.33
18.	1.701	0.175×0.245	0.525×0.525	1 : 2.5
19.	1.715	0.175×0.280	0.525×0.455	1 : 2.16
20.	1.750	0.175×0.245	0.355×0.525	1 : 2.33
21.	1.750	0.175×0.210	0.490×0.385	1 : 2.27
22.	1.785	0.175×0.245	0.511×0.511	1 : 2.43
23.	1.785	0.105×0.210	0.350×0.420	1 : 2.44
24.	1.820	0.175×0.210	0.420×0.490	1 : 2.36
25.	1.820	0.175×0.245	0.420×0.490	1 : 2.16
26.	1.820	0.175×0.245	0.511×0.511	1 : 2.45
27.	1.925	0.210×0.245	0.490×0.490	1 : 2.15
28.	1.960	0.210×0.245	0.525×0.560	1 : 2.38
29.	1.995	0.210×0.245	0.525×0.525	1 : 2.30
30.	2.170	0.210×0.245	0.525×0.560	1 : 2.38
31.	2.205	0.175×0.245	0.560×0.525	1 : 2.58
32.	2.205	0.210×0.245	0.525×0.595	1 : 2.45
33.	2.240	0.105×0.245	0.350×0.560	1 : 2.6

34.	2.275	0.310×0.245	0.595×0.630	1 : 2.69
35.	2.310	0.210×0.245	0.525×0.560	1 : 2.38
36.	2.310	0.245×0.245	0.525×0.490	1 : 2.074
37.	2.345	0.245×0.245	0.525×0.560	1 : 2.21
38.	2.345	0.210×0.210	0.525×0.560	1 : 2.58
39.	2.380	0.210×0.280	0.560×0.595	1 : 2.35
40.	2.380	0.210×0.245	0.525×0.595	1 : 2.46
41.	2.415	0.175×0.245	0.525×0.525	1 : 2.5
42.	2.450	0.245×0.280	0.560×0.560	1 : 2.12
43.	2.520	0.245×0.280	0.560×0.560	1 : 2.71
44.	2.590	0.210×0.280	0.665×0.665	1 : 2.12
45.	2.590	0.210×0.280	0.560×0.560	1 : 2.28
46.	2.625	0.245×0.280	0.595×0.665	1 : 2.4
47.	2.800	0.175×0.210	0.560×0.560	1 : 2.90
48.	2.810	0.163×0.220	0.540×0.530	1 : 2.85
49.	2.810	0.172×0.210	0.580×0.520	1 : 2.01
50.	2.820	0.175×0.211	0.590×0.530	1 : 2.19

IV. CONCLUSION

In the present course of investigation, we have to explore the helminth fauna belonging to the host ranging from fishes to mammals and their ecology of Sidhi Distt. and its adjoining areas. The increasing international interest of these groups, due to their economic importance, makes it necessary in different regions, to revise the systematic status of already known taxas as well as the unknown forms.

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A Novel Design of an Efficient EMI Reduction Technique for SoC Applications

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Abstract- Electromagnetic interference (EMI), once the exclusive concern of equipment designers working with high-speed signals, is no longer limited to a narrow class of high-end applications. Continued innovation in semiconductor technology has resulted in the ready availability of cost-effective, high-performance system-on-chip (SoC) devices, microcontrollers (MCUs), processors, digital signal processors (DSPs), application-specific integrated circuits (ASICs), field-programmable gate arrays (FPGAs) and analog/digital converters (ADCs). One of the most effective and efficient approaches to controlling and reducing EMI is to use spread spectrum clock generation (SSCG) technology e.t.c for better implementation of System on Chip , The proposed technique, a novel portable and all-digital spread spectrum clock generator (ADSSCG) suitable for system-on-chip (SoC) applications with low-power consumption is presented in this paper , Provide different EMI attenuation performance for various SoC applications.

Index Terms- All digital spread spectrum clock generator (ADSSCG), digitally controlled oscillator (DOC), low power, portable, triangular modulation.

I. INTRODUCTION

As the operating frequency of electronic systems increases, the electromagnetic interference (EMI) effect becomes a serious problem especially in consumer electronics, microprocessor (µp) based systems, and data transmission circuits [1]. The radiated emissions of system should be kept below an acceptable level to ensure the functionality and performance of system and adjacent devices [1], [2]. Many approaches have been proposed to reduce EMI, such as shielding box, skew rate control, and spread spectrum clock generator (SSCG). However, the SSCG has lower hardware cost as compared with other approaches. As a result, the SSCG becomes the most popular solution among EMI reduction techniques for system-on-chip (SoC) applications [2]–[4].

Recently, different architectural solutions have been developed to implement SSCG. In [4], [5], a triangular modulation scheme which modulates the control voltage of a voltage-controlled oscillator (VCO) is proposed to provide good performance in EMI reduction. However, it requires a large loop filter capacitor to pass modulated signal in the phase-locked loop (PLL), resulting in increasing chip area or requirement for an off-chip capacitor. Modulation on PLL loop divider is another important SSCG type that utilizes a fractional-N PLL with delta-sigma modulator to spread output frequency changing the divider ratio in PLL [6], [7]. However, fractional-N type SSCG not only needs large loop capacitor to filter the quantization noise from the divider, but also induces the stability issue for the wide frequency spreading ratio applications, especially in PC related applications [7].

The proposed ADSSCG employs a novel rescheduling division triangular modulation (RDTM) to enhance the phase tracking capability and provide wide programmable spreading ratio. The proposed low-power DCO with auto-adjust algorithm saves the power consumption while keeping delay monotonic characteristic. This paper is organized as follows. Section 2 describes the proposed architecture and spread spectrum algorithm of ADSSCG. Section 3 focuses on the low-power DCO design and the auto-adjust algorithm for monotonic delay characteristic. In Section 4, the implementation and measurement results of the fabricated ADSSCG chip are presented. Finally, the conclusion is addressed in Section 5.

II. PROPOSED ADSSCG DESIGN

Fig. 1 illustrates the architecture of the proposed ADSSCG. It consists of five major functional blocks: a phase/frequency detector (PFD), an ADSSCG controller, a DCO, and two frequency dividers. The ADSSCG controller consists of a modulation controller, a loop filter, and a DCO code generator (DCG). The ADSSCG can provide the clock signal with or without spread-spectrum function based on the operation mode signal (MODE) setting. In the normal operation mode, the bang-bang PFD detects the phase and frequency difference between FIN_M and DCO_N. When the loop filter receives LEAD from the PFD, the DCG adds a current search step (S_N [15:0]) to the DCO control code, and this decreases the output frequency of the DCO. Oppositely, when the loop filter receives LAG from the PFD, the DCG subtracts the DCO control code to increase the output frequency of the DCO. When PFD output changes from LEAD to LAG or vice versa, the loop filter sends the code-loading signal (LOAD) to DCG to load the baseline code (BASELINE CODE [17:0]) which is averaged DCO control code by the loop filter. Before ADSSCG enters the spread spectrum operation mode, the baseline frequency will be stored as the centre frequency. In the spread spectrum operation mode, the modulation controller uses two spreading control signals (SEC_SEL[2:0] and STEP[2:0]) to generate the add/subtract signal (6_SS) and the spreading step (S_SS[15:0]) for the DCG, and then it modulates the DCO control code to spread out the DCO output frequency around the centre frequency evenly.

The system clock of ADSSCG controller is FIN_M whose operating frequency is limited by ADSSCG's closed-loop response time which is determined by the response time of the DCO, the delay time of the ADSSCG controller, and the frequency divider. Therefore, the period of FIN_M should not be shorter than the shortest response time to en-sure the ADSSCG functionality and performance. In addition, because the frequency of DCO_N should be the same as FIN_M after system locking, the frequency of FIN_M cannot be higher than the maximum frequency or lower than the minimum frequency of DCO_N. As a result, the frequency range of FIN_M is also limited by the DCO operating range and the divider ratio (N).

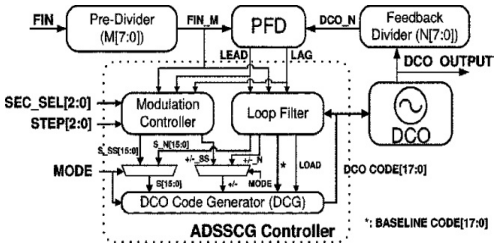

Fig. 1. Architecture of the proposed ADSSCG.

B. Spread Spectrum Algorithm

Since triangular modulation is easy to be implemented and has good performance in reduction of radiated emissions, it becomes the major modulation method for SSCG [2], [4]. In triangular modulation, the EMI attenuation depends on the frequency-spreading ratio and centre frequency, and it can be formulated as Where is the EMI attenuation, SR is the frequency spreading ratio, is the centre frequency, and are modulation parameters [3]. Based on (1), under the same centre frequency, EMI can be reduced further by increasing spreading ratio. In addition, under the same spreading ratio, the higher centre frequency has better EMI attenuation performance.

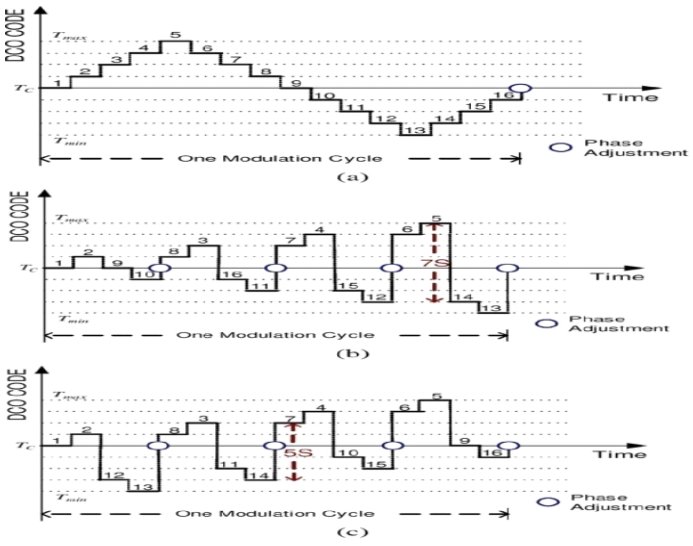

Fig. 2(a) illustrates the conventional triangular modulation with digital approach [9]. Since the output frequency can be changed by the DCO control code, the output clock frequency can be spread by tuning DCO control codes with triangular modulation within one modulation cycle. In the beginning of the conventional spread spectrum, it will start at centre frequency and take one-fourth of the modulation cycle time to reach the minimum frequency , and then takes half of the modulation cycle time to reach the maximum frequency. Finally, it will return to the centre frequency in the last one-fourth modulation cycle time. Because the upper half and lower half in the triangle have the same area, as shown in Fig. 2(a), the mean frequency of the spreading clock is equal to centre frequency and the phase drift will be zero in the end of each modulation cycle. However, in the conventional triangular modulation, the ADSSCG controller can only perform phase and frequency maintenance based on the PFD's output in the end of each modulation cycle. Hence due to the frequency error between reference clock and output clock, reference clock jitter and supply noise, the phase error will be accumulated within one modulation cycle, leading to induce the loss of lock and stability problems.

Thus, in order to enhance phase tracking ability, the division triangular modulation (DTM) is proposed as shown in Fig. 2(b). DTM divides one modulation cycle into many subsections (for example in Fig. 2(b), modulation cycle divides into 16 subsections) and updates DCO control code for phase tracking in every 4 subsections. As a result, the ADSSCG controller can perform four times phase and frequency maintenance in one modulation cycle when modulation cycle divides into 16 subsections. Because DTM can provide the frequency spreading function and keep phase tracking at the same time, it is very suitable for ADSSCG in µp-based system applications. However the disadvantage of DTM is when the frequency changes to different sub-sections; it will induce large DCO control code fluctuations (7 S) as shown in Fig. 2(b), where is the spreading step of DCO control code in spreading modulation.

In order to reduce the peak-to-peak value of DCO control code changing in DTM, the rescheduling DTM (RDTM) is proposed as shown in Fig. 2(c). By reordering the sub-sections in DTM, the peak-to-peak value of DCO control code changing can be reduced to 5 S. As a result, the peak-to-peak value of cycle-to-cycle jitter can be reduced while the period jitter is kept the same. Compared with DTM, the reduction ratio of peak-to-peak jitter by RDTM is related with number of subsection, and it can be formulated as

$$JR = \frac{((COUNT/2)-1)-((COUNT/4)+1)}{(COUNT/2-1)} \times 100$$

Where is the jitter reduction ratio, is the number of subsections. For example, if there are 16 subsections, the jitter reduction ratio is 29% ((7–5)/7), and if the number of subsection is 32, the jitter reduction ratio is 40% ((15–9)/15). Although the order of subsections of DTM is rescheduled by RDTM to reduce the peak cycle-to-cycle jitter, the average cycle-to-cycle jitter still keeps the same as DTM. Besides, because the phase drift of the opposite direction in DTM and RDTM remains the same, the equivalent phase drift is zero. As a result, it will not induce an extra phase drift while the mean frequency remains the same.

III. DIGITALLY CONTROLLED OSCILLATOR

A. The Proposed DCO Architecture

Because DCO occupies over 50% power consumption in all digital clocking circuits, the proposed ADSSCG utilizes a low-power DCO structure to reduce overall power consumption [10]. To achieve the high portability of the proposed ADSSCG, all components in this ADSSCG including DCO are implemented with standard cells. Fig. 3(a) illustrates the architecture of the proposed low-power DCO which employs cascading structure for one coarse-tuning and three fine-tuning stages to achieve a fine frequency resolution and wide operation range. As the number of delay cell in the coarse-tuning stage increases, leading to have a longer propagation delay, the operating frequency of DCO becomes lower.

The shortest delay path that consists of one NAND gate, one path MUX of coarse-tuning stage at the minimum delay determines the highest operation frequency of DCO. There are 2^C different delay paths in the coarse-tuning stage and only one path is selected by the 2^C-to-1 path selector MUX which controlled by C-bit DCO control code. The coarse-tuning delay cell utilizes a two-input AND gate which can be disabled when the DCO operates at high frequency to save power. In order to increase the frequency resolution of DCO, the three fine-tuning stages which are controlled by F-bit DCO control code are added into the the DCO design. The first fine-tuning stage is composed of X hysteresis delay cells (HDC), and each of which contains one inverter and one tri-state inverter as shown in Fig. 3(b). When the tri-state inverter in HDC is enabled, the output signal of enabled tri-state inverter has the hysteresis phenomenon to increase delay [11]. Different digitally controlled varactors (DCVs) are exploited in the second and third fine-tuning stages to further improve the overall resolution of DCO as shown in Fig. 3(b).The operation concept of DCV is to control the gate capacitance of logic gate with enable signal state to adjust the delay time. The second and third fine-tuning stages employ Y long-delay DCV cells and Z short-delay DCV cells, respectively. Since the HDC can replace many DCV cells to obtain wider operation range, the number of delay cells connected with each driving buffer and loading capacitance can be reduced, leading to save power consumption and gate count as well.

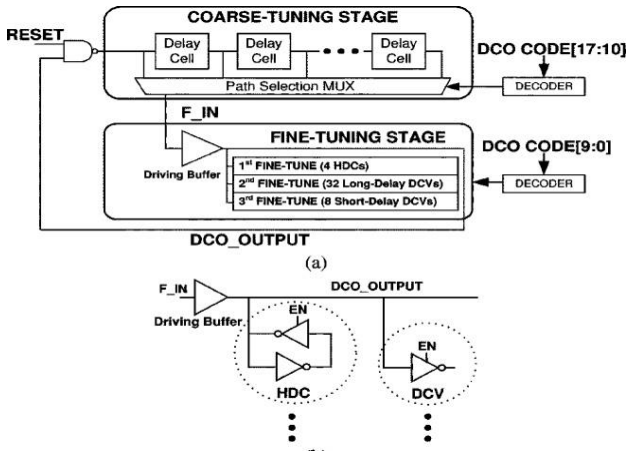

Fig. 3. Architecture of the proposed DCO

Based on an in-house μP-based system for liquid crystal display (LCD) controller applications [12], the requested operating frequency is from 27 to 54MHz. Thus the design parameters of the proposed DCO are determined as follows: *C=8,F=10,X=4,Y=32*, and *Z=8*. Table II shows controllable delay range and the finest delay step of di fferent tuning stages in the proposed DCO under typical case (typical corner, 1.8V,25^0 C). It should be noted that the controllable delay range of each stage is larger than the finest delay step of the previous stage. As a result, the cascading DCO structure does not have any dead zone later than the LSB resolution of DCO.Since the finest delay step of the third fine-tuning stage determines the overall resolution, the proposed DCO can achieve high resolution of 1.1 ps.

IV. SOFTWARE RESULTS

By using the Xilinx 13.1 and modelsim 6.5b interference estimated and, The following figures shows the result of Interference reduction technique, The following Fig 4 shows the estimating phase error of the applied clock signal and on chip clock signal

Fig 4. Estimating phase error

The following Fig 5 shows the phase error of the applied clock signal and on chip clock signal and different modes of operation

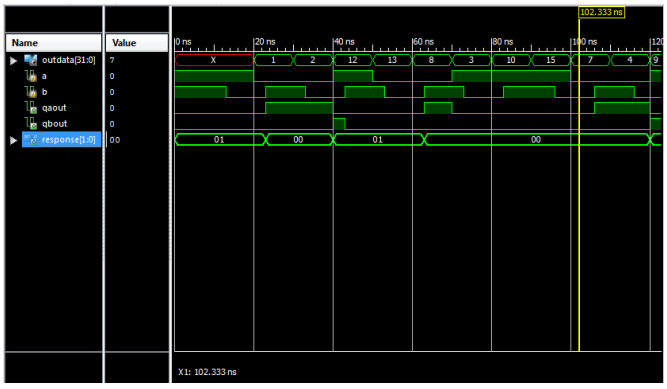

Fig 5. Estimating phase error with different modes

The following Fig 6 shows the phase error correction of the applied clock signal and on chip clock signal and different modes of operation

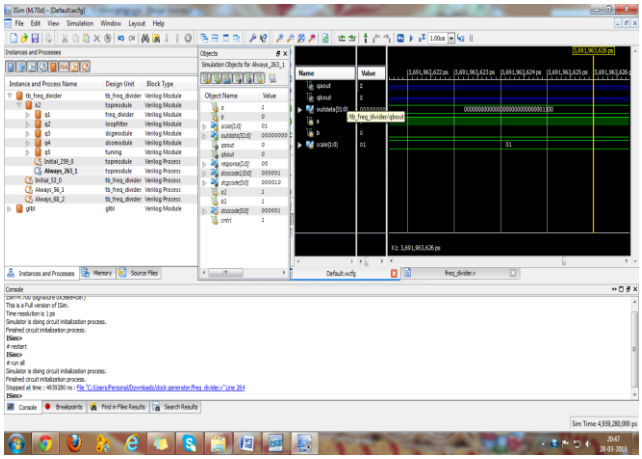

Fig 6. The phase error correction

The following figure Fig 7 shows the power estimation of low power interference technique.

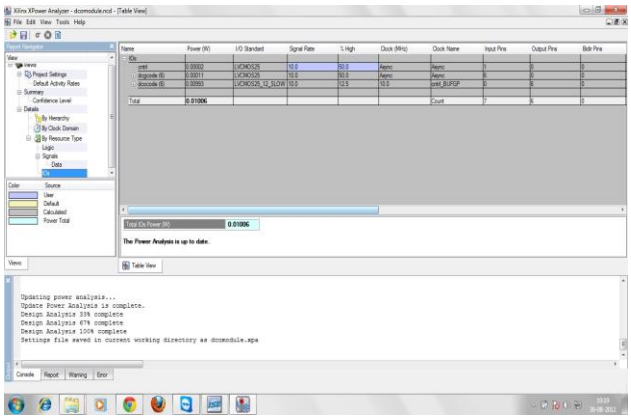

Fig 7. The power estimation of low power interference technique

The following Fig.8 shows the layout of the DCO which is used for the, To minimize the noise coupling from the digital blocks to the DCO core, they have some physical distance as shown in Fig. 10. In addition, putting guard rings and substrate contacts is done carefully.

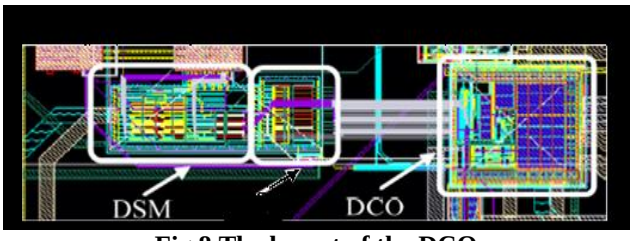

Fig.8 The layout of the DCO

The following Fig.9 shows the various comparison results

Performance Parameter	Proposed	[10]	[2]	[8]	[6]	[9]
Process	0.13μm CMOS	0.13μm CMOS	0.35μm CMOS	0.35μm CMOS	0.18μm CMOS	0.18μm CMOS
Operation range (MHz)	98 ~ 599	150	152 ~ 366	18 ~ 214	413 ~ 485	140 ~ 1030
LSB resolution (ps)	0.93	40	10 ~ 150	1.55	2	22
Power consumption	110μW (@200MHz)	1mW (@150MHz)	NA	18mW (@200MHz)	170 ~ 340 μW (Static only)	NA
Portability	Yes	No	Yes	Yes	No	Yes

Fig.9. Comparison of various methods

V. CONCLUSION

In this paper, we proposed a portable, low power, and area-efficient ADSSCG with programmable spreading ratio for SoC applications. Based on the proposed RDTM, the spreading ratio can be specified flexibly by application demands while keeping the phase tracking capability. With the proposed low-power DCO, the overall power consumption can be saved. The proposed auto-adjust algorithm can maintain the monotonic characteristic of DCO. Measurement results show the proposed ADSSCG can achieve 9.5 dB EMI reductions with 1% frequency-spreading ratio and 1.2 mW frequency of 54 MHz As a result, our proposal achieves less power consumption and area with competitive EMI reduction. Moreover, because the proposed ADSSCG has a good portability as a soft intellectual property (IP), it is very suitable for SoC applications as well as system-level integration.

VI. FUTURE SCOPE

The proposed ADSSCG employs a novel rescheduling division triangular modulation (RDTM) to enhance the phase tracking capability and provide wide programmable spreading ratio. The proposed low-power DCO with auto-adjust algorithm saves the power consumption while keeping delay monotonic characteristic. So in future all the analog spread spectrum clock generators may be replaced by digital clock generators by using ADSSCG. So in future the EMI reduction is almost achieved thoroughly and this can be further improved by still lowering the power of the digital circuits.

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An Update on the Available Diabetic Monitoring Tests

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Abstract- Diabetes mellitus is a common disorder affecting individuals of all ages. It is not a pathogenic entity but a group of aetiologically different metabolic defects. By the year 2025, there is predicted to be a 35 % increase in the world-wide prevalence of diabetes. The rising number of people with diabetes will occur mainly in populations of developing countries, leading to more than 300 million people with diabetes globally by 2025. Presently as many as 50 % of people with diabetes are undiagnosed.

Monitoring biomarkers associated with Diabetic Mellitus plays a key role in the assessment of glycemic control. Several studies have clearly shown that improved glycemic control is strongly associated with a decreased development and/or progression of diabetic complications. The basic laboratory test include detection of sugar in urine, fasting and post prandial glucose levels, Glucose Tolerance and Glucose Challenging Tests by giving 75 gms of glucose. Once diabetes is confirmed and treatment initiated, several laboratory tests are available to assess the diabetic control. While tests like fructosamine and Glycohemoglobin are used to assess short and long time diabetic control, there are some other special tests like microalbumin to assess progress to renal problem, C-peptide to assess Impaired glucose tolerance and proinsulin and Insulin to assess the degree of resistance in type 2 daibeties mellitus, insulin like growth factor-1 to assess insulin resistance, glycemic control and development of microvascular complications. Glucagon and Epinephrine measurement helps glucose recovery during times of hypoglycemia, cortisol to assess type 1 diabetes mellitus and Body Mass Index to link type 2 daibetes mellitus. This review paper presents an update on all available diagnostic tests, its merits and demerits.

Index Terms- DM , GTT, IGT, GCT, HbA1c, GDM, NIDDM

I. Introduction

Fructosamine

Fructosamine test measures glycemic control for a short period for 2-3 weeks. Fructosamine level was found to correlate well with HbA1c ($r = 0.82$, $p < 0.001$) and both HbA1c and fructosamine correlates well with the mean daily blood glucose value during the preceding week ($r = 0.45$, $p < 0.01$ and $r = 0.58$, $p < 0.01$) respectively. These data suggest that serum fructosamine is as effective as the HbA1C in correlating to mean blood glucose control in Insulin Dependent Diabetes Mellllitus (IDDM) patients. [(1)]

A study shows that a weak correlation between fructosamine and mean blood glucose suggesting that it is not a reliable marker of the short-term integrated glycemia. Therefore, frequent monitoring of fructosamine levels does not add to the management of the adolescent population. [(2)] In a study involving 30 diabetic and 61 non diabetic children, fructosamine level showed a significant correlation to HbA1c suggesting that fructosamine could be used instead of HbA1c to monitor short time Diabetic control [(3)]

Fructosamine correlated moderately well with HbA1c, (affinity; $r = 0.8$) and placed 71% of IDDM and 72% of Non Insulin Dependent Diabetes Mellitus (NIDDM) patients in the same clinical category of good, moderate, or poor control. Differences can probably be partly attributed to the different periods over which HbA1c, and fructosamine reflect average glycemia and partly to imprecision. [(4)]

In a study involving obese diabetic and non-diabetic subjects, fructosamine was markedly lower than for lean diabetic and non-diabetic subjects with similar glycaemic control. Stepwise multiple-regression analysis showed that fructosamine was associated with glycaemic control (as indicated by fasting plasma glucose and HbA1c) suggesting that serum fructosamine concentrations will decrease in obese diabetic and non-diabetic subjects with body mass index ≥ 30 kg m^{-2} giving rise to the underestimation of glycaemic control as indicated by fructosamine measurement. A change in the glycation reaction itself may be partly responsible for such decrease. [(5)]

Fructosamine appears to be as effective as HbA1c in its ability to correlate with mean blood glucose in a cross-sectional study in both type I and type II diabetic patients. However, due to the increased sensitivity of the fructosamine in detecting glycemic changes, caution must be taken in interpreting glycemic control from infrequent use of this assay, because it may not provide a reliable overview of glycemic control over a period such as 2-3 months as has been firmly established with HbA1c. [(6)]

The value of fructosamine measurement in the detection of diabetes in pregnancy was further tested in a group of high-risk patients for developing carbohydrate intolerance. It is concluded that fructosamine has limited value as a screening test for gestational diabetes mellitus (GDM), particularly for the mild form of glucose intolerance.[(7)] A second generation fructosamine test, corrected for total protein as a practical alternative to

glucose screening for GDM achieved 79.4% sensitivity and 77.3% specificity for the diagnosis of GDM confirmed by a glucose tolerance test using Carpenter's modified criteria. [8] Fructosamine concentration in serum of diabetics and healthy individuals generated a reference interval of 1.9 to 2.9mmol/L and correlated with HbA1c ($r=0.65$, $p<0.001$).[9]

Fructosamine was found to correlate only with post load glucose values in excess of 180 mg/dL at 2 hour ($r = 0.87$; $p = 0.01$), i.e. with the highest overall glucose values, but not with fasting glucose or milder postprandial hyperglycemia of under 180 mg/dL suggesting that quantification of fructosamine detects only the rather severe cases of gestational hyperglycemia, but is too insensitive to uncover mild asymptomatic GDM, and therefore fructosamine could not be considered as useful parameter for the diagnosis of this condition.[10]

Serum fructosamine levels did not differ significantly if measured at fasting or 2 h after ingestion of 75 g of glucose. [11]

II. Glycosylated Hemoglobin

The current recommended goal for glycosylated hemoglobin (HbA1c) in patients with diabetes is <7.0%, which is considered good glycemic control, although some guidelines are stricter (<6.5%). People with diabetes who have HbA1c levels within this range have a significantly lower incidence of complications from diabetes, including retinopathy and diabetic nephropathy.[12] The characteristics of several screening tests for NIDDM showed that Fasting Plasma Glucose (FPG) has the best screening properties, HbA1c and quantitative urine glucose also provide high specificity and approximately 80% sensitivity in detecting NIDDM. The choice of a particular method could depend on cost, convenience, and availability.[13] Determination of HbA1c or fasting plasma glucose concentrations alone may be acceptable alternatives to measuring glucose concentration 2 hrs after challenge with 75 g glucose for the diagnosis of diabetes.[14] The prevalence of diabetic retinopathy was much higher in the subgroup with elevated HbA1c levels and increased with increasing HbA1c level, and so no advantage over fasting or post challenge glucose levels in the diagnosis of diabetes.[15]

A significant correlation was observed between HbA1c values and fasting blood glucose ($r = 0.68$, $p < 0.01$) suggesting that HbA1c levels are influenced by slightly reduced carbohydrate tolerance. [16] A raised HbA1c is useful for confirming the diagnosis of diabetes mellitus in patients with long-standing hyperglycaemia but is within the reference range in many patients with newly developed diabetes or other minor abnormalities of glucose tolerance. The glucose tolerance test must remain the test of choice in these patients. [17]

Patients with risk factors for diabetes and FPG levels ≥99 mg/dLand in particular in patients with FPG 110 mg/dL but below the current diagnostic threshold—the HbA_{1c} level appears helpful in identifying those with early diabetes. Individuals with elevated HbA_{1c} values but nondiagnostic FPG levels are overwhelmingly likely to have diabetes and patients with a single FPG between 124 and 144 mg/dL, maintaining HbA1c within normal appears to be of greater value than repeat FPG testing in confirming the diagnosis of diabetes.[18]

GDM is a risk factor for delivering a large-for-gestational-age (LGA) babies. HbA1C for GDM diagnosis may not be linearly associated with LGA or macrosomia, possibly because of the mediating effect of strict glycaemic control in this clinical setting. [19]

Women with GDM not maintaining HbA1c within the normal range before delivery had a three-fold increased risk of having an LGA infant and a six-fold increased risk of neonatal hypoglycaemia.[20]

A study involving nonpregnant, early pregnant and late pregnant women has demonstrated a decline of the upper normal level of HbA_{1c} from 6.3 to 5.7% in early pregnancy and to 5.6% in the third trimester of pregnancy, indicating a reduction of HbA_{1c} during normal pregnancy that is of clinical importance when defining the goal for HbA_{1c} during pregnancy complicated with diabetes.[21]

III. Insulin and C – peptide

C-peptide is more reliable than insulin as a measure of endogenous insulin secretion, and is usually measured in insulin-treated patients. Fasting or stimulated serum or plasma C-peptide measurement is used as an index of endogenous insulin reserve in people with diabetes. Both C-peptide and insulin secretions reflects the metabolic needs of the body. C-peptide secretion by a healthy pancreas thus reflects the insulin requirement of the body .An insulin-insensitive individual will thus develop NIDDM despite increased insulin production ('high output failure'), whereas IDDM is associated with near-normal insulin sensitivity and 'low-output failure. This difference will be reflected in the levels of C-peptide at diagnosis.

Both plasma immunoreactive insulin and C-peptide concentrations from 0800-1600 h were higher ($P < 0.002$-0.001) in patients with either Imparied Glucose Tolerance (IGT) or NIDDM than in the group with normal glucose tolerance. [22]
As the clinical diagnosis is not always straightforward, a random C-peptide taken at diagnosis may help to classify diabetes. There is an obvious use for C-peptide determinations to evaluate beta-cell function in children with diabetes.[23]

C-peptide measurement has a key role in the correct diagnosis of the type of diabetes in adults. and in children and majority of patients become severely insulin deficient within 5 years of diagnosis (2–3 years in children), whereas in Maternity Onset Diabetes of the Young (MODY) and NIDDM, C-peptide persists. C-peptide testing is most useful beyond 2–3 years of diabetes and can not discriminate MODY from type 2 diabetes.[24]

C-peptide levels are lower in children compared with adults, and the speed of C-peptide decline is more rapid (particularly in children aged <5 years). Increasing use of sensitive C-peptide assays have demonstrated that IDDM patients may continue to secrete C-peptide at low levels, often for decades after diagnosis. [25]

It is therefore becoming increasingly clear that C-peptide has major functions in supporting insulin action with a multitude of beneficial effects on diabetic polyneuropathy and primary diabetic encephalopathy in IDDM.[26] Available data demonstrate that even relatively modest treatment effects on C-peptide will result in clinically meaningful benefits. The development of therapies for addressing this important unmet clinical need will be facilitated by trials that are carefully designed with β-cell

function as determined by C-peptide measurement as the primary efficacy outcome.[27]

The association between chronic complications and residual C-peptide levels was also analyzed. It is possible that this residual beta cell secretion is associated with a lower insulin requirement, a lower frequency of chronic complications and a higher frequency of other autoimmune diseases.[28]
Diabetic patients with high C-peptide levels (> 0.16 nmol/L) resemble type II diabetes. The small proportion of diabetic patients with basal serum C-peptide in the range of 0.17-0.32 nmol/L have indeterminate status.[29]

Cord blood samples showed parallel rises in blood glucose and plasma C-peptides in the newborns of women with GDM.[30] There was a significant difference in the levels of C – peptide and insulin as well as insulin resistance between the suspected latent autoimmune diabetes (LADA) group and classic NIDDM patients, which was maintained on and followed up. C-peptide could be used as an important screening tool for autoimmunity.[31] Cord levels of C peptide in infants of diabetic mothers were elevated at the earliest gestational age studied (<34 weeks) and were directly related to the severity of maternal diabetes, as assessed by the White classification.[32]

IV. Microalbumin

Microalbuminuria is an important clinical marker in patients with diabetes because of its well-established association with progressive renal disease.Around 10% to 42% of IDDM & NIDDM patients develop microalbuminuria, which is largely related to disease duration.[33] Microalbuminuria predicts early mortality in patients with diabetes and is an important cardiovascular risk factor. In IDDM patients with microalbuminuria, the relative risk of cardiovascular death is 1.2 times that of normoalbuminuric IDDM patients and in macroalbuminuria the risk is increased 10-fold. The risk of premature death from cardiovascular event in NIDDM patients with microalbuminuria is about 4 times that of patients with normoalbuminuria. This increased risk seems to start at relatively low levels of albuminuria.[34]

Microalbuminuria often progressed to proteinuria (6.3/100 person/year) in those who were treated. Poor glycemic control and elevated serum cholesterol were the major determinants/predictors of this progression. Although treatment with Acetyl Choline Esterase -1 increased during the past decade, it was not completely effective, because microalbuminuria progressed to proteinuria in many treated patients. [35]
Physicians should routinely measure urinary albumin excretion in patients with NIDDM and hypertension and be aggressive in treating this modifiable risk factor as they do blood pressure, cholesterol, or blood glucose.[36] Microalbuminuria is an early predictor of diabetic nephropathy and premature cardiovasculardisease. The higher rate of fatal cardiovascular events with olmesartan among patients with preexisting coronary heart disease is of concern.[37] High prevalence of microalbuminuria in diabetic patients and its positive association with blood pressure and altered lipid profile suggests that screening for microalbuminuria is essential.[38]

V. Proinsulin

GDM is not independently associated with hyperproinsulinemia as measured by the proinsulin–to–C-peptide ratio. Instead, in pregnant women, increased insulin resistance is associated with decreased proinsulin–to–C-peptide ratio, independently of glucose tolerance status. These data suggest that relative proinsulin secretion in late pregnancy is primarily related to insulin resistance and does not necessarily reflect β-cell function.[39] In adults with IGT and obesity (OB), an elevated proinsulin (PI) is predictive of NIDDM. [40]

PI, the precursor molecule of insulin, undergoes intra-cellular processing within beta-cells to form equimolar concentrations of insulin and C-peptide. In the healthy state, nearly all PI synthesized is processed to insulin and C-peptide, but this is not the case in diabetic patients where inefficiencies in PI processing are evident.[41]

The association between PI and Intima Media wall Thickness (IMT) appears to be stronger than that of insulin. The biological significance of the association between PI and IMT is unknown, and thus it is possible that the relation between PI and atherosclerosis may be an epiphenomenon. Further work on the biological basis of this association is necessary.[42]

VI. Insulin like Growth Factor I

Insuline Like Growth Factor – 1 (IGF-1) and its receptors share considerable homology with insulin and insulin receptors, and their respective signaling pathways interact at the post receptor level. While the growth hormone (GH)-IGF-1 axis principally regulates tissue growth and differentiation, insulin exerts its primary effects on fuel metabolism. However, these two endocrine systems interact at multiple levels and in diabetes mellitus the GH-IGF-1 axis is grossly disturbed, with increased secretion of GH, reduced plasma levels of IGF-1, and complex tissue-specific changes in IGF binding proteins (IGFBPs). These observations have given rise to the view that GH-IGF-1 axis dysfunction, particularly low plasma levels of circulating IGF-1, probably play a significant role in several aspects of the pathophysiology of diabetes mellitus, including insulin resistance and poor glycemic control, and may also influence the development of microvascular complications.[43]

Patients with NIDDM have a 2 to 3 fold increased risk for Alzheimer's disease (AD), the most common form of dementia. Vascular complications might explain partially the increased incidence of neurodegeneration in patients with NIDDM. Neuronal resistance for IGF- 1 might represent a molecular link between NIDDM and AD, characterizing AD as "brain-type diabetes".[44]

IDDM is a disease of insulin deficiency, resulting from the autoimmune-mediated destruction of pancreatic beta cells. However, as a likely consequence of intraportal insulin deficiency, patients with IDDM also exhibit abnormalities of the GH-IGF binding protein (IGFBP) axis, including GH hypersecretion, reduced circulating levels of IGF-I and IGFBP-3, and elevated levels of IGFBP-1. These abnormalities not only exacerbate hyperglycemia in patients with IDDM, but may contribute to the pathogenesis of diabetes-specific complications, including diabetic neuropathy, nephropathy, and retinopathy.[45]

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VII. Glucagon

The development of severe diabetic hyperglycemia requires the presence of glucagon, whether secreted by pancreatic or newly identified gastrointestinal A cells, as well as a lack of insulin. Glucagon suppression could improve therapeutic glucoregulation in diabetes.[47] The secretion of glucagon by pancreatic α-cells plays a critical role in the regulation of glycaemia. A better understanding of the α-cell physiology is necessary for an integral comprehension of the regulation of glucose homeostasis and the development of diabetes.[48] As a counter regulatory hormone for insulin, glucagon plays a critical role in maintaining glucose homeostasis in vivo in both animals and humans. Glucagon and glucagon receptor have been pursued extensively in recent years as potential targets for the therapeutic treatment of diabetes.[49]

VIII. Epinephrine

Epinephrine compensates largely for deficient glucagon secretion. Glucose recovery from hypoglycemia fails to occur only in the absence of both glucagon and epinephrine. The efficacy of glucose counter regulation in a given patient may determine the degree to which euglycemia can be achieved with aggressive insulin therapy in that patient.[50]

Children with IDDM showed a greater rise in plasma norepinephrine than did adults with IDDM ($P < 0.001$), and both diabetic groups failed to mount a glucagon response. GH and cortisol responses were unaffected by either childhood or diabetes. Enhanced secretion of epinephrine, induced by mild reduction in plasma glucose, may contribute to the management difficulties characteristically observed in young patients with diabetes.[51]

Despite equivalent epinephrine, insulin and glucose levels, changes in glucose flux, glucagon, and cardiovascular responses were greater in healthy subjects compared with NIDDM. However, NIDDM patients had greater lipolytic responses and there is a spectrum of significant in vivo physiological differences of epinephrine action on the liver, muscle, adipose tissue, pancreas and cardiovascular system between NIDDM and healthy subjects.[52]

Enhanced glycemic responsiveness of patients with IDDM to epinephrine is not the result of increased sensitivity of adrenergic receptor-effector mechanisms per se nor of their increased glucagon secretory response; rather, it is the result of their inability to augment insulin secretion. Augmented insulin secretion, albeit restrained, normally limits the glycemic response, but not the lipolytic or ketogenic responses to epinephrine in humans.[53]

Elevations of plasma epinephrine comparable to those observed in physiologic stress, cause a sustained 20--35 mg/dL elevation of plasma glucose in normal humans. In diabetes, the hyperglycemic effect of epinephrine is markedly accentuated. [54]

IX. Cortisol

In NIDDM subjects, hypothalmic-pituitary-adrenal activity is enhanced in patients with diabetes complications and the degree of cortisol secretion is related to the presence and number of diabetes complications.[55] Plasma HbA1c levels of NIDDM patients with elevated cortisol levels were found to be significantly higher than NIDDM patients with normal cortisol levels.[56]The consistent presence of normal cortisol secretion rate in diabetic children without acidosis argues against the contention that increased cortisol secretion is a factor in the pathogenesis of juvenile diabetes mellitus.[57] The degree of severity of several clinical measures of NIDDM correlates with cortisol concentrations. Moreover, the results provide evidence for a positive relationship between metabolic disturbances and cortisol concentrations that are within the accepted normal range.[58]

Altered cortisol action occurs not only in obesity and hypertension but also in glucose intolerance, and could therefore contribute to the link between these multiple cardiovascular risk factors.[59]In NIDDM subjects, Hypothalamic-Pituitary-Adrenal (HPA) activity is enhanced only in patients with chronic complications and the degree of cortisol secretion is directly associated with the presence and the number of diabetes complications.[60]An increase in basal cortisol level in the blood plasma or the adrenal cortex reaction to insulin hypoglycemia was seen in patients in the early periods of diabetes mellitus (latent, initial manifest type).[61]

X. Body Mass Index (BMI)

Obesity contributes to the development of NIDDM, and weight control efforts are an important component of the clinical management of diabetes. Although epidemiological studies have examined weight change as a predictor of diabetes and intervention studies have shown that weight loss produces short-term improvements in glycemic control in people with NIDDM and few data exist on how body weight changes longitudinally in relation to the development of diabetes.[62]

Weight gain after age 18 was a major determinant of risk. For an increase of 20–35 Kg, the relative risk was 11.3, and for an increase of more than 35 Kg, the relative risk was 17.3.[63]Waist circumference may be a better indicator than Weight to Height Ratio (WHR) to establish the of the relationship between abdominal adiposity and risk of diabetes. Although early obesity, absolute weight gain throughout adulthood, and waist circumference were good predictors of diabetes, attained BMI was the dominant risk factor for NIDDM; even men of average relative weight had significantly elevated Relative Risk.[64]

Obesity and increases in body weight in adults are considered to be among the most important risk factors for NIDDM.[65]Weight maintenance and prevention of weight gain during adulthood are necessary to decrease the risk of NIDDM.[66]

Increases in obesity and diabetes among US adults continue in both sexes, all ages, all races, all educational levels, and in all smoking levels. Obesity is strongly associated with several major health risk factors.[67]Subclinical hypercortisolism (SH) may play a role in several metabolic disorders, including diabetes.[68]

XI. Conclusion

This review aritcel has brought together the various laboratory tests available to screen and monitor diabetic control and the following are the conclusions arrived.

Traditional screening tests like urine sugar, FPG, 2hr Post glucose load PG, GGT, GCT are all still being used in all clinical laboratories as all the tests are cost effective and serve as first line of Diabetes detection. Contraversy is still prevalent about the use of Frustosamine to monitor short time diabetic control during the preceeding 2-3 weeks. The Gold standard to monitor long term diabetic control during the preceeding 2-3 months is HbA1c and the test could also be used to screen for diabetes.C-peptide is considered as a better marker than pro insulin and isnulin to monitor diabetic control in IDDM patients, particularly in children as it is a major regulator of Insulin action. The hyperglycemic hormones viz GH, glucagon, epinephrine and cortisol also play a major role in maintaing plasma glucose during times of hypoglycemia. Microalbuminuria tests is very useful to monitor complications arising out of uncontrolled DM and is a very useful marker to assess the development of neuropathy, retinopathy and nephropathy in diabetic patients. IGF-1 test is of research interest and available data suggests that its measurement may be useful to elucidate the molecular link between DM an AD while tests like urine sugar, FPG, 2hr PG, Fructosamine and HbA1c could be routinely done in any clinical laboratory, as all these tests are cost effective, other tests like insulin, C-peptide, IGF-1 and hyperglycemic hormones are recommended only under extreme special situations.

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Nasal Colonization of Methicillin and Inducible Clindamycin Resistant Staphylococci and Cd4 Correlation in HIV Seropositives

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***Abstract*- Background:** HIV- infected patients are at high risk of colonization and infection with methicillin resistant *Staphylococci* over the past decade. Increasing non-β-lactam antimicrobial resistance among methicillin resistant *Staphylococcal* clones, particularly to clindamycin, may complicate the efforts to manage infections in the community.

Methodology: Nasal swabs from 200 HIV patients were cultured. *Staphylococcal* isolates were tested for methicillin resistance by Cefoxitin disk diffusion test & inducible clindamycin resistance by 'D test' as per CLSI guidelines. CD4 counts of the patients were determined and analyzed.

Results: Among the screened HIV patients prevalence rate of *S. aureus* was 45.5% (91/200) out of which 27% (54/200) was MRSA, CoNS was 25.5% (51/200) with 13% (26/200) being MRCoNS. Inducible clindamycin resistance was detected in 16.66% MRSA, 18.91% MSSA, 19.23% MRCoNS and 16% MSCoNS. The CD4 counts ranged from 22 to 1235 cells/mm3. Statistical significance was not observed between CD4 values and nasal *Staphylococcal* colonization.

Conclusion: In HIV patients, we should have a high level of suspicion regarding methicillin resistant *Staphylococci*, irrespective of patients' CD4+ T lymphocyte counts.

***Index Terms*-** Methicillin Resistant *Staphylococci*; Inducible Clindamycin Resistant *Staphylococci*; nasal colonization; HIV; CD4 count

I. Introduction

Staphylococcus aureus (S. aureus) is the most commonly isolated human bacterial pathogen [1] and is the leading cause of gram positive bacterial infections [2]. *Staphylococcal* infections have clinical range from minor skin infections to severe life-threatening infections [3]. The primary reservoir of *S. aureus* is the anterior nares [4]. The relationship between colonization with *S. aureus* and human immunodeficiency virus (HIV) infection is of particular interest due to the associated morbidity and mortality [5].

Antimicrobial drug resistance in *S. aureus* arose early after the development of antimicrobial agents and continues to evolve and this limits the choice of potentially efficacious agents [6].

The emerging Methicillin resistant *Staphylococcus aureus* (MRSA) is a problematic pathogen in the world [7]. Life-threatening sepsis, endocarditis, and osteomyelitis caused by MRSA have been reported [8]. Carriage of MRSA precedes endogenous MRSA infections [9]. Since resistance to multiple antibiotics among MRSA isolates is very common, there is a possibility of extensive outbreaks, which may be difficult to control [8].

This has led to renewed interest in the usage of clindamycin which belongs to Macrolide-Lincosamide-Streptogramin B (MLSB) antibiotics to treat *S. aureus* infections. However, widespread use of these antibiotics has led to an increase in the number of *Staphylococcal* strains acquiring resistance to this group of antibiotics [10]. Concern over the possibility of emergence of clindamycin-resistance during therapy which may cause treatment failure has discouraged some clinicians from prescribing this agent. However simple laboratory testing (e.g. the erythromycin- clindamycin 'D-zone' test) can separate strains that have the genetic potential (i.e. the presence of *erm* genes) to become resistant during therapy, from strains that are susceptible to clindamycin [11].

MRSA infections in HIV patients are reported to be 6 to 18 fold higher than in the general population [12]. There is a particular concern about life-threatening invasive MRSA infections, increased risk for persistent nasal colonization and recurrent infections at low CD4+ cell counts [13, 14].

As the role of nasal colonization with methicillin resistant & inducible clindamycin resistant *Staphylococci* is not well established, we decided to undertake a prospective study in HIV seropositive individuals.

Our objectives were to determine the prevalence of nasal *Staphylococcal* colonization, and determine methicillin resistance & inducible clindamycin resistance of nasal *Staphylococcal* isolates and to co-relate with the CD4 count of these patients.

II. Materials and Methods

The population for this study was drawn from the HIV seropositive patients who visited the ART centre, Krishna Rajendra Hospital, attached to Mysore Medical College and Research Institute (MMC & RI), Mysore, South India for a routine clinic visit and who were willing to participate in the study. Study was conducted in the Department of Microbiology, MMC&RI and was approved by the institutional ethical committee.

200 patients were enrolled in the study. Informed consent was taken from the patients. Patient details with relevant history was recorded in the pro forma.

Nasal samples were collected from both the anterior nares using separate sterile culture swabs. Swabs were inoculated on 5% sheep blood agar and incubated at 370C for 24 hrs. Bacterial

growth was identified as *Staphylococci* by standard procedures [15].

Methicillin resistance was detected by Cefoxitin disk diffusion test. A suspension of each isolate was prepared with the turbidity equal to 0.5 McFarland standard and lawn cultured onto Mueller Hinton agar plate. A 30 µg cefoxitin disc was placed and incubated at 37°C for 24 hrs. The zone of inhibition was measured. Results were interpreted according to the criteria of Clinical and Laboratory Standards Institute (CLSI) [16]. The zone of inhibition of *S. aureus* 21 mm and Coagulase negative *Staphylococci* (CoNS) 24 mm were considered as methicillin resistant.

Inducible clindamycin resistance (ICR) was tested by ' D test' as per C LSI guidelines [16]. Mueller Hinton agar plate was inoculated with 0.5 McFarland standard bacterial suspension. Erythromycin (15µ g) and clindamycin (2µg) discs were placed at a distance of 15 mm (edge to edge). Following overnight incubation at 37°C, ICR was detected by flattening of zone (D-shaped) around clindamycin in the area between the two discs.

All the *Staphylococcal* isolates were tested for Linezolid (30µg) susceptibility by K irby Bauer disk diffusion method.

CD4 counts of these patients were determined by flow cytometry (FACS caliber) and analyzed.

III. Statistical Methods

Summary statistics was done by measuring proportions with 95% confidence Interval (CI), mean and Standard Deviation. Inferential statistics was done using chi-square test/fisher exact test for identifying difference in proportions. Odds Ratio with 95% CI is calculated. Independent *t* test is used for identifying difference in means between colonized and non-colonized patients. All the analysis was done by using SPSS version 13.

IV. Results

Two hundred patients were enrolled in the study: median age 34.19 ± 9.216 years (range 3 – 60). There were 74 males and 126 females.

Staphylococci was isolated from 142 (71% CI 70.9-71.0) patients. MRSA and MRCoNS were detected in 54 (59.34% CI 59.3-59.4) and 26 (50.98% CI 50.9-51.0) patients respectively [Table 1].

The prevalence rate of *S. aureus* among HIV patients screened was 45.5% (91 out of 200) with 27% (54 out of 200) being MRS A and CoNS 25.5%(51 out
of 200) with 13% (26 out of 200) MRCoNS.

ICR was detected in 16.66% of MRSA, 18.91% of MSS A, 19.23% of MRCoNS & 16% of MSCoNS isolates [Table 2].

All the *Staphylococcal* isolates were sensitive to Linezolid.

MRSA colonization was found more in patients >45 years of age, MRCoNS in 31-45 years, ICR in <30 years [Table 3].

The CD4 counts of patients ranged from 22 to 1235 cells/ mm3. The odds ratio for MRSA, MSSA, MRCoNS, MSCoNS, ICR colonization were 0.7, 0.7, 0.4, 0.9, 0.9 respectively when CD4 >200 compared to lower CD4 counts [Table 4]. However none of these was significant, indicating no role of CD4 count in the colonization of MRSA, MSSA, MRCoNS, MSCoNS and ICR *Staphylococci* in the study sample.

V. Discussion

Nasal colonization with *S. aureus* is a significant risk factor for serious infections [17]. Patients colonized with MRSA when compared with those with MSSA are more prone to subsequent infections [18]. So colonized *S. aureus* elimination may reduce the rate of subsequent invasive infections [17].

The prevalence of *S. aureus* nasal colonization in HIV-infected patients is between 0% and 17% [4]. The present study prevalence rate is 45.5% which is higher compared to 33.6% & 23% in the previous studies [19, 20]. MRSA colonization was observed to be 27% in our study. Other study reports of colonization are 3%, 10.3%, 8.4% [20, 4, 21]. The reason for the higher colonization rates observed are unclear, but could include factors such as frequent contact with health care settings and frequent exposure to antibiotics, leading to colonization with resistant strains [12].

In immunocompromised hosts, CoNS have become increasingly recognized as agents of clinically-significant nosocomial blood stream infections [22]. Previous study showed that 58% of bacterial blood stream infections in HIV- infected adults were due to CoNS [23]. In the current study the prevalence rate of CoNS was 25.5% and MRCoNS was 13%. Nasal carriage of MRCoNS is also highly prevalent, but its dynamics has been less investigated [24].

The *Staphylococcal* colonization was not statistically significant in different age groups. MRS A colonization was found to be statistically significant in male and female distribution (p value 0.02).

In the current study the association between *Staphylococcal* nasal colonization and CD4 count was evaluated. It was found that there was no statistically significant association between them. This is consistent with a previous study which reported that MRSA colonization was independent of CD4+T lymphocyte counts [21]. However in one study *S. aureus* colonization rate among HIV positive individuals increased as the CD4 count decreased [19]. Mean CD4 count of our study was 408 cells/µL. Previous study showed median CD4 cell count of 252 cells/µL and it was not associated with *S. aureus* colonization [25].

Staphylococcal colonization in patients on highly active antiretroviral therapy (HAART), antibiotics, hospitalization and skin infections was not found to be statistically significant [Table 4]. A previous study also reported that MRSA colonization was independent of antiretroviral treatment status, prior history of MRSA infection and chronic skin conditions. Previous antibiotic use was the only statistically significant risk factor for MRSA carriage [21]. Another study reported that MRSA colonization was associated with lower CD4 cell count, not receiving current or recent antibiotics, history of prior MRS A or MSSA infection [4].

In the present study MRSA colonization was observed in 62.5% of patients with tuberculosis and 25.52% of patients without tuberculosis and it was found to be statistically significant (p value 0.04).

Due to the emergence of resistance to antimicrobial agents accurate drug susceptibility data of the microbe is an essential factor in making appropriate therapeutic decisions [26]. Increasing non-β-lactam antimicrobial resistance among MRSA clones, particularly to clindamycin, may complicate efforts to manage infections in the community [1]. Clindamycin can be administered in patients with clindamycin-susceptible strains if IC R is excluded [17]

In this study ICR was detected in 16.66% of MRSA, 18.91% of MSSA, 19.23% of MRCoNS & 16% of MSCoNS isolates. Earlier study has reported lower susceptibility of MRSA isolates to commonly used antibiotics such as clindamycin, erythromycin, and ciprofloxacin. 42.9% of all MRSA isolates were resistant to clindamycin [21]. We could not get many ICR studies from nasal colonizers. Previous studies reported 19% incidence of clindamycin resistance in MRSA isolates from other *Staphylococcal* infections in children and young adults with HIV infection [27]. Another study reported 63% resistance in MRSA isolates from skin and soft tissue infections (SSTIs) in men who have sex with men [28]. Given the possible increasing rate of resistance of MRSA isolates, clindamycin should be used with caution if local antibiograms suggest high-grade resistance of MRSA isolates [12]. Compared to these studies our rate of ICR is low, probably because other studies are in isolates from infections.

Duration of MRSA carriage and risk of invasive infections in the study-group could not be determined as we did not follow up these patients. We could not confirm these strains by genotypic methods. The two important resistance strains we come across during treatment of *Staphylococcal* infection has been detected by simple methods which can be easily adopted by any laboratory as it is not technically demanding. It is economical, with good reproducibility. Detection of these strains in HIV sero-positives will help to take preventive measures to avoid invasive infections in this high risk group.

In several studies, the elimination of nasal carriage reduced the incidence of *S. aureus* infections [29]. Although optimal regimens for decolonization have not yet been established by clinical trials, most clinicians use topical agents including intranasal topical mupirocin administered b.i.d along with chlorhexidine body wash daily for 5- 7 days [30]. The results of a previous study suggested that a five-day course of mupirocin applied on a monthly basis can suppress *S. aureus* colonization over an extended period of time in high-risk individuals like HIV patients [31]. Although mupirocin resistance is described, the rate of resistance appears low. Other agents for decolonization include a variety of oral antibiotics such as rifampin combined with trimethoprim-sulfamethoxazole, minocycline or doxycycline [30].

VI. Conclusion

Universal surveillance regimens are being introduced in hospitals to control MRSA infections. Our findings suggest that targeted monitoring of HIV infected individuals for *Staphylococcal* carriage status of resistant strains may be an important clinical and public health approach. In HIV patients, we should have a high level of suspicion regarding MRSA, irrespective of patients' CD4+T lymphocyte counts. As these patients are ambulatory there may be a risk of transmission of these resistant strains in the community. Future studies are needed to address the role of nasal colonization on subsequent infections and the utility of decolonization in this high risk group.

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Enabling for Cost-Effective Privacy Preserving of Intermediate Data Sets in Cloud

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Abstract- In this paper, we propose a upper-bound privacy leakage constraint based approach to identify which intermediate datasets need to be encrypted and which do not, so that privacy preserving cost can be saved while the privacy requirements of data holders can still be satisfied. To identify and encrypt all functionally encrypt able data, sensitive data that can be encrypted without limiting the functionality of the application on the cloud. However, Preserving the privacy of intermediate datasets becomes a challenging problem because adversaries may recover privacy-sensitive information by analyzing multiple intermediate datasets. Encrypting all datasets in cloud is widely adopted in existing approaches to address this challenge. But we argue that encrypting all intermediate datasets are neither efficient nor cost-effective because it is very time consuming and costly for data-intensive applications to encrypt/decrypt datasets frequently while performing any operation on them. In order to preserve privacy, the clients will encrypt their data when they out- source it to the cloud. However, the encrypted form of data greatly impedes the utilization due to its randomness. Such data would be stored on the cloud only in an encrypted form, accessible only to users with the correct keys, thus protecting its confidentiality against unintentional errors and attacks.

Index Terms- Data Storage Privacy ,Encryption and Decryption, Privacy Preserving, Intermediate Dataset, Privacy Upper Bound, Economics of scale.

I. INTRODUCTION

Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the datacenters that provide those services. Existing technical approaches for preserving the privacy of datasets stored in cloud mainly include encryption and anonymization. On one hand, encrypting all datasets, a straightforward and effective approach, is widely adopted in current research. However, processing on encrypted datasets efficiently is quite a challenging task , because most existing applications only run on unencrypted datasets. Although recent progress has been made in homomorphic encryption which theoretically allows performing computation on encrypted datasets, applying current algorithms are rather expensive due to their inefficiency. On the other hand, partial information of datasets, e.g., aggregate information, is required to expose to data users in most cloud applications like data mining and analytics. In such cases, datasets are anonymized rather than encrypted to ensure both data utility and privacy preserving. Current privacy-preserving techniques like generalization can withstand most privacy attacks on one single dataset, while preserving privacy for multiple datasets is still a challenging problem. Thus, for preserving privacy of multiple datasets, it is promising to anonymize all datasets first and then encrypt them before storing or sharing them in cloud. Usually, the volume of intermediate datasets is huge .Hence, we argue that encrypting all intermediate datasets will lead to high overhead and low efficiency when they are frequently accessed or processed. As such, we propose to encrypt part of intermediate datasets rather than all for reducing privacy-preserving cost. In this paper, we propose a novel approach to identify which intermediate datasets need to be encrypted while others do not, in order to satisfy privacy requirements given by data holders. A tree structure is modeled from generation relationships of intermediate datasets to analyze privacy propagation of datasets. As quantifying joint privacy leakage of multiple datasets efficiently is challenging, we exploit an upper-bound constraint to confine privacy disclosure. Based on such a constraint, we model the problem of saving privacy-preserving cost as a constrained optimization problem. This problem is then divided into a series of sub-problems by decomposing privacy leakage constraints. Finally, we design a practical heuristic algorithm accordingly to identify the datasets that need to be encrypted. Experimental results on realworld and extensive datasets demonstrate that privacy preserving cost of intermediate datasets can be significantly reduced with our approach over existing ones where all datasets are encrypted.

II. RELATED WORK

We briefly review the research on privacy protection and consider the economical aspect of privacy preserving, adhering to the pay-as-you-go feature of cloud computing. Once we identify the data to be encrypted, we must choose how many keys to use for encryption, and the granularity of encryption. In the simplest case, we can encrypt all such data using a single key, and share the key with all users of the service. Unfortunately, this has the problem that a malicious or compromised cloud could obtain access to the encryption key, e.g. by posing as a legitimate user, or by compromising or coluding with an existing user. In these cases, confidentiality of the entire dataset would be compromised. In the other extreme, we could encrypt each data object with a different key. This increases robustness to key compromise, but drastically increases key management complexity. Our goal is to automatically infer the right granularity for data encryption that provides the best tradeoff between robustness and management complexity. To this end, we

partition the data into subsets, where each data subset is accessed by the same group of users. We then encrypt each data subset using a different key, and distribute keys to groups of users that should have access (based on the desired access control policies).Thus, a malicious or buggy cloud that compromises a key can only access the data that is encrypted by that key, minimizing its negative impact. We introduce a dynamic access analysis technique that identifies user groups who can access different objects in data set. To provide data robustness is to replicate a message such that each Storage server stores a copy of the message. It is very robust because the message can be retrieved as long as one storage server survives. The privacy concerns caused by retaining intermediate datasets in cloud are important but they are paid little attention. Storage and computation services in cloud are equivalent from an economical perspective because they are charged in proportion to their usage. Tight integration of encoding, encryption, and forwarding makes the storage system efficiently meet the requirements of data robustness, data confidentiality, and data forwarding. Thus, cloud users can store valuable intermediate datasets selectively when processing original datasets in data-intensive applications like medical diagnosis, in order to curtail the overall expenses by avoiding frequent re-computation to obtain these datasets. Such scenarios are quite common because data users often reanalyze results, conduct new analysis on intermediate datasets, or share some intermediate results with others for collaboration in cloud that deals with privacy preserving protection for data storage and usage. Although encryption works well for data privacy in these approaches, it is necessary to encrypt and decrypt datasets frequently in many applications. Encryption is usually integrated with other methods to achieve cost reduction, high data usability and privacy protection. Royet al. investigated the data privacy problem caused by Map Reduce and presented a system named Airavat which incorporates mandatory access

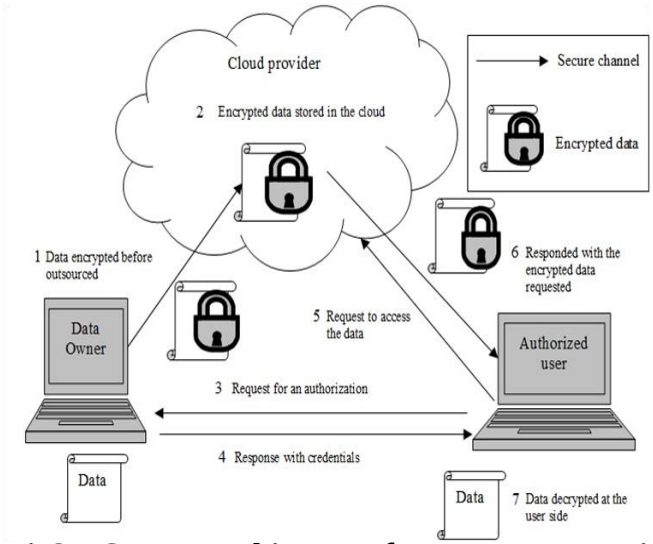

Fig2.1:System architecture for secure transaction using the cloud

control with differential privacy. Puttaswamy et al described a set of tools called Silverline that identifies all functionally encryptable data and then encrypts them to protect privacy. Zhang et al. proposed a system named Sedic which partitions Map Reduce computing jobs in terms of the security labels of data they work on and then assigns the computation without sensitive data to a public cloud. The sensitivity of data is required to be labeled in advance to make the above approaches available. Ciriani et al. proposed an approach that combines encryption and data fragmentation to achieve privacy protection for distributed data storage with encrypting only part of datasets. We follow this line, but integrate data anonymization and encryption together to fulfill cost-effective privacy preserving. The importance of retaining intermediate datasets in cloud has been widely recognized , but the research on privacy issues incurred by such datasets just commences. Davidson et al. studied the privacy issues in workflow provenance, and proposed to achieve module privacy preserving and high utility of provenance information via carefully hiding a subset of intermediate data. This general idea is similar to ours, yet our research mainly focuses on data privacy preserving from an economical cost perspective while theirs concentrates majorly on functionality privacy of workflow modules rather than data privacy. Our research also differs from theirs in several aspects such as data hiding techniques, privacy quantification and cost models. But our approach can be complementarily used for selection of hidden dataitems in their research if economical cost is considered. The PPDP research community has investigated extensively on privacy-preserving issues and made fruitful progress with a variety of privacy models and preserving methods . Privacy principles such as k-anonymity and l-diversity are put forth to model and quantify privacy, yet most of them are only applied to one single dataset. Privacy principles for multiple datasets are also proposed, but they aim at specific scenarios such as continuous data publishing or sequential data releasing. The research in exploits information theory to quantify the privacy via utilizing the maximum entropy principle. The privacy quantification herein is based on the work . Many anonymization techniques like generalization have been proposed to preserve privacy, but these methods alone fail to solve the problem of preserving privacy for multiple datasets. Our approach integrates anonymization with encryption to achieve privacy preserving of multiple datasets.

III. APPROACHES

Our approach works by automatically identifying subsets of an application's data that are not directly used in computation, and exposing them to the cloud only in encrypted form.

• We present a technique to partition encrypted data into parts that are accessed by different sets of users (groups). Intelligent key assignment limits the damage possible from a given key compromise, and strikes a good tradeoff between robustness and key management complexity.

• We present a technique that enables clients to store and use their keys safely while preventing cloud-based service from stealing the keys. Our solution works today on unmodified web browsers.

IV. Motivating Example

A motivating scenario is illustrated in where an online health service provider, e.g., Microsoft HealthVaule , has moved data storage into cloud for economical benefits. Original datasets are encrypted for confidentiality. Data users like governments or research centres access or process part of original datasets after anonymization. Intermediate datasets generated during data access or process are retained for data reuse and cost saving in cloud database. Two independently generated intermediate datasets in Fig.1 are anonymized to satisfy 2-diversity, i.e., at least two individuals own the same quasi-identifier and each quasi-identifier corresponds to at least two sensitive values. Knowing that a lady aged 25 living in 21400 (corresponding quasi-identifier is ⟨214 ∗, female, young⟩) is in both datasets, an adversary can infer that this individual suffers from HIV with high confidence if (a) and (b) are collected together. Hiding (a) or (b) by encryption

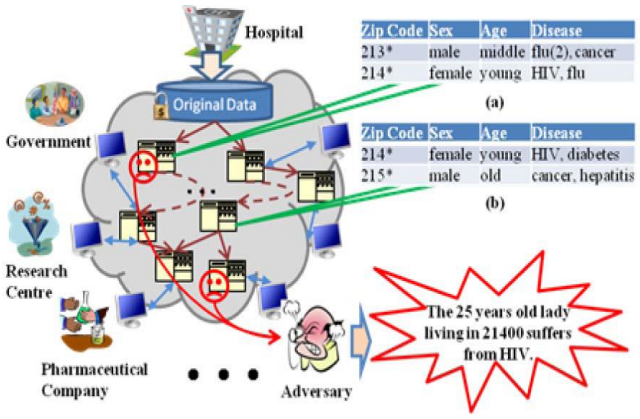

Fig. 4.1. A scenario showing privacy threats due to intermediate datasets.

is a promising way to prevent such a privacy breach. Assume (a) and (b) are of the same size, the frequency of accessing(a) is 10 and that of (b) is 100. We hide (a) to preserve privacy because this can incur less expense than hiding (b). In most real-world applications, a large number of intermediate datasets are involved. Hence, it is challenging to identify which datasets should be encrypted to ensure that privacy leakage requirements are satisfied while keeping the hiding expenses as low as possible.

V. Problem Analysis

5.1Datacentric security and privacy:

Data in the cloud typically resides in a shared environment, but the data owner should have full control over who has the right to use the data and what they are allowed to do with it once they gain access.To provide this data control in the cloud, a standard based heterogeneous data-centric security approach is an essential element that shifts data protection from systems and applications. In this approach, documents must be self-describing and defending regardless of their environments. Cryptographic approaches and usage policy rules must be considered. When someone wants to access data, the system should check its policy rules and reveal it only if the policies are satisfied. Existing cryptographic techniques can be utilized for data security,but privacy protection and outsourced computation need significant attention—both are relatively new research directions.

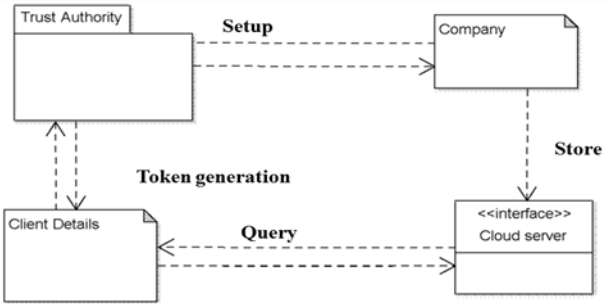

Fig5.1.1:An architecture for privacy and

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Data provenance issues have just begun to be addressed in the literature. In some cases,information related to a particular hardware component (storage, processing, or communication) must be associated with a piece of data.

5.2 Privacy-Preserving Cost Problem

Privacy-preserving cost of intermediate datasets from frequent en/decryption with charged cloud services.Cloud service venders have set up various pricing models to support the pay-as-you-go model, e.g., Amazon Web Services pricing model.Practically, en/decryption needs computation power, data storage and other cloud services. To avoid pricing details and focus on the discussion of our core ideas, we combine the prices of various services required by en/decryption into one. This combined price is denoted as $PPRR$. $PPRR$ indicates the overhead of en/decryption on per GB data per execution.Datasets in DD can be divided into two sets. One is for encrypted datasets, denoted as . The other is for unencrypted datasets, denoted as Then, the equations $DD\ eenncc \cup DD\ uunnee = DD$ and $DD\ eenncc \cap DD\ uunnee = \emptyset$ hold. We define the pair $\langle\ , DD\ uunnee \rangle$ as a global privacy-preserving solution. The privacy-preserving cost incurred by a solution $\langle\ , DD\ uunnee \rangle$ is denoted as $CCpppp\ (\langle DD\ eenncc\ , DD\ uunnee \rangle)$. With the notations framed above, the cost $CCpppp\ (\langle\ , DD\ uunnee \rangle)$ in a given period [$TT0$, T], can be deduced by the following formula:

$$CCpppp\ (\langle DD\ eenn\ cc\ , DD\ uunnee \rangle) = \int_{tt=TT0}^{TT} (\sum_{dd\ ii \in DD\ eenncc\ SSii} \cdot PPRR \cdot ffii \cdot tt\ ) \cdot ddtt. \quad (1)$$

The privacy-preserving cost rate for $CCpppp\ (\langle\ , DD\ uunnee \rangle)$,denoted as $CCRRpppp$, is defined as follows.

$$CCRRpppp \triangleq \sum_{dd\ ii \in DD\ eenncc\ SSii} \cdot PPRR \cdot \quad (2)$$

In the real world, $SSii$ and $ffii$ possibly vary over time, but we assume herein that they are static so that we can concisely present the core ideas of our approach. The dynamic case will be explored in our future work. With this assumption, $CCRRpppp$

determines $CCpppp$ (⟨ , $DD\ uunnee$ ⟩ in a given period. Thus, we blur their meanings subsequently. The problem of how to make privacy-preserving cost as low as possible given a SIT can be modeled as an optimization problem on :

Minimize $CCRRpppp = \sum dd\ ii \in DD\ eenncc\ SSii \cdot PPRR \cdot ffii, \subseteq DD.$ (3)

Meanwhile, the privacy leakage caused by unencrypted datasets in $DD\ uunnee$ must be under a given threshold.

Definition :(Privacy Leakage Constraint)

Let $\varepsilon\varepsilon$ be the privacy leakage threshold allowed by a data holder, then a privacy requirement can be represented as $PPPPmm(\ ) \leq$,

$DD\ uunnee \subseteq DD$. This privacy requirement is defined as a Privacy Leakage Constraint, denoted as PLC.With a PLC, the problem defined in (3) becomes a constrained optimization problem. So, we can save privacy-preserving cost by minimizing it. As it is challenging to obtain the exact value of $PPPPmm(\ )$, which is formulated our approach is to address the problem via substituting the PLC with one of its sufficient conditions.

5.3 Privacy leakage upper-bound constraint based approach for privacy preserving:

We propose an upper-bound constraint based approach to select the necessary subset of intermediate datasets that needs to be encrypted for minimizing privacy-preserving cost. we specify relevant basic notations and elaborate two useful properties on a SIT. The privacy leakage upper-bound constraint is decomposed layer by layer . A constrained optimization problem with the PLC is then transformed into a recursive form.and, a heuristic algorithm is de-signed for our approach. We extend our approach to a SIG .

5.4 Recursive Privacy Leakage Constraint Decomposition

To satisfy the PLC, we decompose the PLC recursively into different layers in a SIT. Then, the problem stated can be addressed via tackling a series of small-scale optimization problems. Let the privacy leakage threshold required in the layer $PPii$ be , $1 \leq ii \leq HH$. The privacy leakage incurred by $UUDDii$ in the solution $\pi\pi ii$ can never be larger than , i.e., $PPPPmm(UUDDii\ ) \leq \varepsilon\varepsilon ii$. The threshold $\varepsilon\varepsilon ii$ can be regarded as the privacy leakage threshold of the remainder part of a SIT after the layer $PPii-1$. In terms of the basic idea of our approach, the privacy leakage constraint $PPPPmm(\ ) \leq \varepsilon\varepsilon ii$ is substituted by one of its sufficient conditions.

5.5 Privacy-Preserving Cost Reducing Heuristic Algorithm

In this section, we design a heuristic algorithm to reduce privacy-preserving cost. In the state-search space for a SIT, a state node $SSNNii$ in the layer herein refers to a vector of partial local solutions,

i.e., $SSNNii$ corresponds to⟨$\pi\pi 1rr\ 1$, … , $\pi\pi iirr\ ii$ ⟩, where $\pi\pi kkrr\ kk \in \Lambda\Lambda kk$, $1 \leq kk \leq ii$.

Note that the state-search tree generated according to a SIT is different from the SIT itself, but the height is the same. Appropriate heuristic information is quite vital to guide the search path to the goal state. The goal state in our algorithm is to find a near-optimal solution in a limited search space Heuristic values are obtained via heuristic functions. A heuristic function, denoted as ( ), is defined to compute the heuristic value of SSN . Generally, ( ) consists of two parts of heuristic information, i.e., $ffSSNNii\ ) = FFSSNNii\ ) + hSSNNii\ )$, where the information $FFSSNNii\ )$ is gained from the start state to the current state node $SSNNii$ and the information $hSSNNii\ )$ is estimated from the current state node to the goal state, respectively.

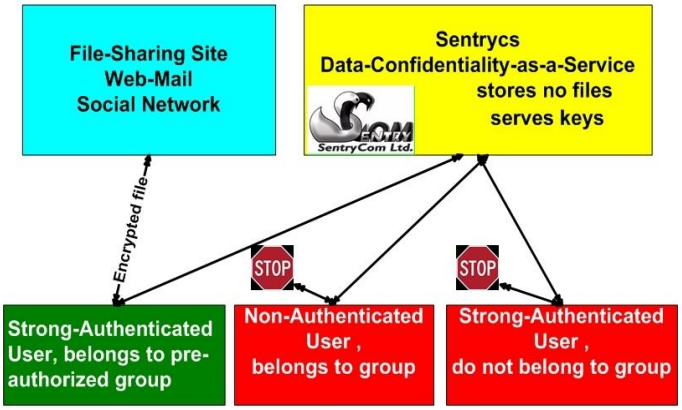

Fig 5.5.1:A scenario in implementation for privacy production

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Intuitively, the heuristic function is expected to guide the algorithm to select the datasets with small cost but high privacy leakage to encrypt. Based on this, $FFSSNNii\ )$ is defined as $FFSSNNii\ ) \triangleq CCccuurr\ /(\varepsilon\varepsilon - \varepsilon\varepsilon ii + 1\ )$, where $CCccuurr$ is the privacy-preserving cost that has been incurred so far, $\varepsilon\varepsilon$ is the initial privacy leakage threshold and $\varepsilon\varepsilon ii+1$ is the privacy leakage threshold for the layers after $PPii$. Specifically, $CCccuurr$ is calculated by $CCccuurr = \sum dd\ rr \in \cup ii\ EEDDkk\ (SSrr \cdot PPRR)$.The smaller total privacy-preserving cost will be. Larger ($\varepsilon\varepsilon - \varepsilon\varepsilon ii+1\ )$ means more datasets before $PPii+1$ remain unencrypted in terms of the

RPC property, i.e., more privacy-preserving expense can saved.

VI. Experiment Results and Analysis

The experimental result on real-world datasets is depicted , from which we can see that $CCHHEEUU$ is much lower than $CCSSPPPP$ with different privacy leakage degree.Even the smallest cost saving of $CCHHEEUU$ over $CCSSPPPP$ at the left side of is more than 40%.Further, we can see that the difference $CCSSSSVV$ between $CCSSPPPP$ and $CCHHEEUU$ increases when the privacy leakage degree increases. This is because looser privacy leakage constraints imply more datasets can remain unencrypted. we reason about the difference between $CCHHEEUU$ and $CCSSPPPP$ with different privacy leakage degree, Fig.6 illustrates how the difference changes with different numbers of extensive datasets while $\varepsilon\varepsilon dd$ is certain. In most real-world cases, data owners would like the data privacy leakage to be much low. The selection of these specific values is rather random and does not affect our analysis because what we want to see is the trend of $CCHHEEUU$ against. At the same

time, we woud like to informatively conduct the experiments. Hence, we select four values. Interested readers can try 3, 5 or other number of values. The conclusions will be similar. we can see that both $CCSSPPPP$ and $CCHHEEUU$ go up when the number of intermediate datasets is getting larger. That is, the larger the number of intermediate datasets is, the more privacy-preserving cost will be incurred. Most importantly, we can see from that the difference $CCSSSSVV$ between $CCSSPPPP$ and $CCHHEEUU$ becomes bigger and bigger when the number of intermediate datasets increases. That is, more expense can be reduced when the of datasets becomes larger. This trend is the result of the dramatic rise in $CCSSPPPP$ and relatively slower increase in $CCHHEEUU$ when the number

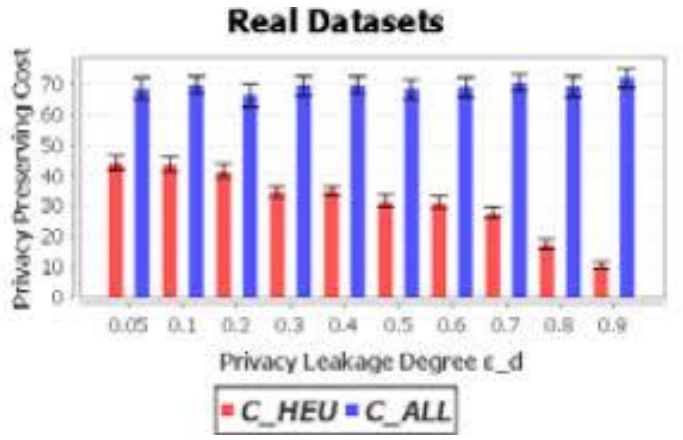

Fig.6.1. Experiment results about real-world datasets: Change in privacy-preserving cost in relation to privacy leakage degree.

of datasets is getting larger. In the context of Big Data, the number and sizes of datasets and their intermediate datasets are quite large in cloud. Thus, this trend means our approach can reduce the privacy preserving cost significantly in real world scenarios. As a conclusion , both the experimental results demonstrate that privacy-preserving cost intermediate datasets can be saved significantly through our approach over existing ones where all datasets are encrypted.

VII. Conclusions and Future Work

In this paper, we propose a novel approach to identify which intermediate datasets need to be encrypted while others do not, in order to satisfy privacy requirements given by data holders. A tree structure is modeled from generation relationships of intermediate datasets to analyze privacy propagation of datasets. Based on such a constraint, we model the problem of saving privacy-preserving cost as a constrained optimization problem. This problem is then divided into a series of sub-problems by decomposing privacy leakage constraints. Finally, we design a practical heuristic algorithm accordingly to identify the datasets that need to be encrypted. Experimental results on real-world and extensive datasets demonstrate that privacy preserving cost of intermediate datasets can be signifi-cantly reduced with our approach over existing ones where all datasets are encrypted.

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Application of GIS in Solid Waste Management for Coimbatore City

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Abstract- Solid waste management is the one of the major problem faced by today's world. There is an increase in commercial, residential and infrastructure development due to the population growth and it leads to negative impact on the environment. Urban solid waste management is considered as one of the most tedious environmental problems facing by municipal authorities in developing countries. Rapid urbanization coupled with increasing industrial, commercial and economic development, have given rise to an increased generation of various types of waste. The amount of waste generation rates is coupled with socio-economic development, degree of industrialisation and climate. Generally, the greater the economic growth and higher the percentage of urban population, the greater amount of solid waste is produced. In recent years, the management of solid waste continues to be one of the major issues facing municipal planners due to increased population levels. Planners are thus forced to consider alternate and available means of disposal, especially by minimizing damage to the ecosystem and human population. GIS has proved to be a boon to such planners by visualizing the real solid waste situations and facilitating route analysis through mapping. Based on the above focus, the present study focuses mapping the waste generation of Coimbatore urban area and on suggesting convenient and administratively transparent solutions to the waste disposal problem.

Coimbatore urban is located in the extreme west of Tamil Nadu. The area covers 105.6 Sq. km with a population of 1026219. The total waste generated from the study area is 749 tonnes. Solid waste generation data and population data were collected from each ward (total number of wards are 72) and linked to the Coimbatore urban map through GIS. Analysis through maps was performed to identify the areas with increased solid waste generation on comparison with the local population.

Index Terms- Solid Waste Management, GIS, Thematic mapping, Population distribution, Waste generation.

I. INTRODUCTION

The rapid growth of population and urbanization decreases the non renewable resources and disposal of effluent and toxic waste indiscriminately, are the major environmental issues posing threats to the existence of human being (Allen et al; 1997). The most common problems associated with improper management of solid waste include diseases transmission, fire hazards, odor nuisance, atmospheric and water pollution, aesthetic nuisance and economic losses (Jilani et al). There has been a significant increase in solid waste generation in India over the years from 100 gm per person per day in small towns to 500 grams per persons per day in large towns. Presently most of the municipal solid waste in India is being disposed unscientifically (Akolkar, A.B; 2005). Generally municipal solid waste is collected and deposited in sanitary landfill, such unscientific disposal attract birds, rodents and fleas to the waste dumping site and create unhygienic conditions (Suchitra, et al). The degradation of the solid waste results in the emission of carbon dioxide (CO2), methane (CH4) and other trace gases.

Municipal solid waste management is one of the major problems that city planners face all over the world. The problem is especially severe in most developing country cities where increased urbanization, poor planning and lack of adequate resources contribute to the poor state of municipal solid waste management (Obirih-Opareh & Post, 2002; Mato, 1999; Doan, 1998; Mwanthi et al., 1997). There is a considerable amount of disposal of waste without proper segregation, leading to both economic and environment loss. There is a tremendous amount of loss in terms of environmental degradation, health hazards and economic descend due to direct disposal of waste. It is better to segregate the waste at the initial stages of generation rather than going for a later option, which is inconvenient and expensive. There has to be appropriate planning for proper waste management by means of analysis of the waste situation of the area.

The environment is heading towards a potential risk due to unsustainable waste disposal. It is a sensitive issue, which concerns about serious environmental problems in today's world. The present situation of direct dumping of the waste without proper inspection and separation leaves a serious impact of environmental pollution causing a tremendous growth in health related problems. Domestic, industrial and other wastes, whether they are low or medium level wastes, they are causing environmental pollution and have become perennial problems for mankind.

Most urban areas in the country are plagued by acute problems related to solid waste management. It is estimated that about 100000 metric tones (MT) of solid waste is generated everyday in the country. Per capita waste generation in major cities ranges from 0.12 kg to 0.6 kg as per the data from National Environmental Engineering Research Institute (NEERI). The collection efficiency ranges from 50 to 90% only, leaving the balance unattended. It is estimated that the urban local bodies spend about Rs. 500 to Rs. 1500 per tone on solid waste for collection, transportation, treatment and disposal. About 60 to 70% of this amount is spent on collection, 20 to 30% on transportation and less than 5% on final disposal of waste.

Therefore waste collection must be regarded as an important issue in order to increase the efficiency of waste management.
The population of urban India was 285 million as per 2001 census, which accounts for 27 per percent of the total population. The TATA Energy Research Institute has estimated that the waste generation will exceed 260 million tons by 2047 which speaks volumes of the problems that urban areas are going to face in coming decades in managing their waste.

Corporation carries out detailed study of the existing situation of solid waste management in Coimbatore. Municipal Corporation does not do any treatment or scientific disposal of waste. Private sector has come forward and set up a very small plant, which takes care of only 3% of city's waste. Thus 97% of the waste is not treated at all and disposed of unscientifically at the landfill. The situation of landfill is pathetic. The entire waste, which is over 700 MTs a day, is disposed of haphazardly at the landfill. The waste is neither spread nor covered. It is allowed to decay on site. Over 500000 MTs of waste is disposed of at Vellalore landfill unscientifically during many years. This project used to identify the waste generation pattern for Coimbatore corporation limit.

II. GIS

A Geographic Information System (GIS) is a computer tool for capturing, storing, querying, analyzing and displaying spatial data from the real world for a particular set of purposes. This technique is used to generate optimal route for collecting solid waste. GIS is a tool that not only reduces time and cost of the site selection, but also provide a digital data bank for future monitoring program of the site. Therefore, objective of the present study are to estimate the ward wise per capita solid waste generation and to prepare a distribution map of waste generation in the urban limit of Coimbatore.

III. STUDY AREA

Coimbatore known as 'The Manchester of South India' is the district head quarters of Coimbatore district. It is the second largest city in Tamil Nadu and houses numerous textile mills and small scale engineering units. In the year 1866, Coimbatore was constituted as a Municipal Town with an area of 10.88 sq. kms. The Coimbatore Corporation was upgraded from special grade Municipality to corporation in the year 1981 and spreads over an area of 105.60 sq. kms.

A. Population density

The density of population is increasing from year to year and the area has remained unchanged. The collected average population data have been used to calculate the population density of the area, based on population/total area (sq. km). Using the above, a population distribution map is prepared thematically to identify areas based on population. Natural break classifier is used to classify the population into six classes.

IV. METHODOLOGY

An inventory questionnaire seeking available data on solid waste generation, collection, treatment and disposal was prepared and used to collect information from officials of Coimbatore Corporation. The data thus obtained were compiled and processed to assess the adequacy of data for strategic planning of solid waste management.

A. Data Entry

The spatial data and attribute data is entered into a data base to create maps and analysis by Arc view GIS 3.2a software. This includes photos, ward boundaries, quantity of waste, etc.

B. Mapping Technique

The Coimbatore Corporation map was obtained from the District Town Planning office. The details were identified using the geographical coordinates. The map was scanned using the HP Precision scan jet 5200c at 600dpi and the scanned images were stored as JPEG files, which were edited wherever necessary, using MS Photo Editor. Scanning results in the conversion of the image into an array of pixels, thereby producing an image in the raster format. A raster file is an image in a series of dots called pixels or picture element that are arranged in rows and columns in a matrix format.

The raster images were opened in Arc view GIS 3.2a as a raster layer using JPEG interchange format. Later this image was projected using projection of geographic latitude and longitude. Registration and Transformation was done to convert the image to real world coordinates. There are two types of transformation techniques, where the first one involves the X and Y co-ordinates recorded in Notepad or dbase being opened in Arc View. The option "Add Table" presents in Arc View adds the X, Y coordinates in the Notepad or dbase to the map, out of which the points were created. The created points were coordinated to that of the raster layer.

Similar features to that of the points were identified in the raster layer and a source point was selected in the raster map. Using that, the destination point was given to the text / dbf map. The raster later was thus assigned the real world coordinated or the ground control points of the study area. On completion of the transformation with the above method, over the raster layer, a new layer is digitized with special points. The digitized layer is transformed using the method similar to the first method.

Once the map is transformed, the line tool was used to digitize the map. Digitizing is a method to convert raster layer to vector. A specific tool like point, line or polygon was selected and digitized over the map. Automatically, an Attribute table with records for each polygon was created by the platform. Each line was given an ID and additional fields were added to enter records such as average waste generation per day, method of collection etc., the entire layer was saved as a shape file.

C. Thematic Mapping

Thematic maps show the distribution pattern of a particular theme objective. Thematic mapping involves data classification methods, which is known as the most common method for manipulation. Generally, six data classification methods are available: equal interval, equal area, standard deviation, means, natural break and user defined. Equal interval uses a constant

class interval in classification. Equal frequency also called as quantile, divides the total number of data values by the number of classes and ensures that each class contains the same number of data values. Equal area divides the map area by the number of classes and ensures that each class contains the equal proportions of area. Mean and standard deviation sets the class breaks at the units of standard deviation above and below the mean. The method of natural breaks uses a computing algorithm to minimize the difference between data values in the same class and to maximize difference between classes. For the present study, natural break classification techniques was used to classify the waste generation for thematic mapping.

V. RESULTS

The city is decentralized into four administrative zones, namely North, South, East and West. Each zone is headed by an assistant commissioner who is delegated with adequate powers to discharge his functions effectively. Each zone consists of 18 wards. The ward administration is being supervised by junior engineers and sanitary inspectors who are also delegated with some powers to discharge his functions at the ward level. The distribution of wards in Coimbatore urban is shown in Map 1. The ward number of Coimbatore Corporation is shown in the map.

A Thematic map of population density was prepared for the ward wise population density for Coimbatore Corporation as shown in Map 2. To arrive at the population density values, the formula was adopted

Population Density = No of persons / Area of ward (sq.km)

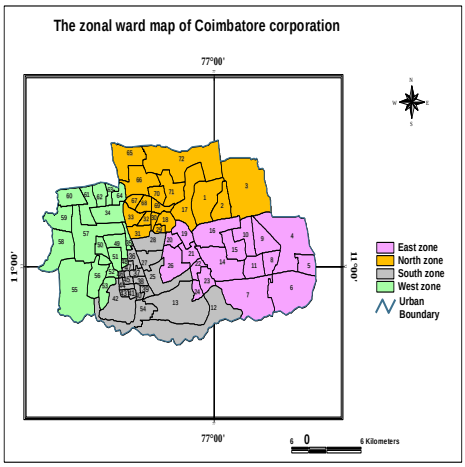
The Arc view calculator was used to obtain the population density value, which was attributed in the existing table. The population density values were further used for thematic mapping.

More than 50% of the wards (41 wards) are identified with density between 9934 -28727 persons per sq.km. These wards are identified are the potential wards for development and high growth rate is attributed to these wards. About 20 wards are observed with densities ranging upto 9933 Persons/sq.km. Low densities wards are attributed to location along the corporation periphery, presence of water bodies, hillocks, Industrial units or educational institutes

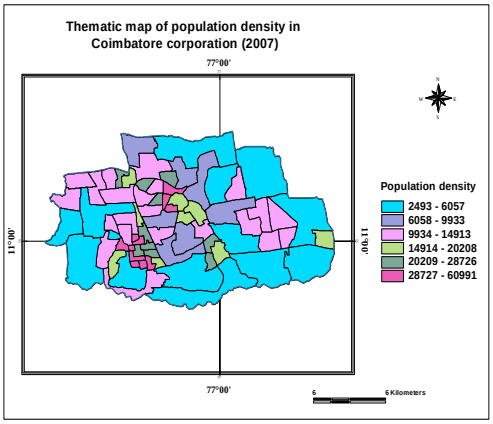
Based on population of each ward and the waste generation of each ward using this per capita waste generation map were prepared. Per capita waste generation is calculated using Per capita solid waste generation = (Total weight of solid waste generated per day) / (Population served)

For each ward area, this method was used to prepare a thematic map of per capita waste generation in Coimbatore urban. Natural breaks classification method was used to classify the area based on high per capita waste generation wards. From the result of thematic mapping, it is observed that out of 72 wards in Coimbatore urban only 4 wards namely 48,49,50,51 are highly waste generated areas in the range of 1.37 to 2.28 kg/person/day as shown in Map 3.

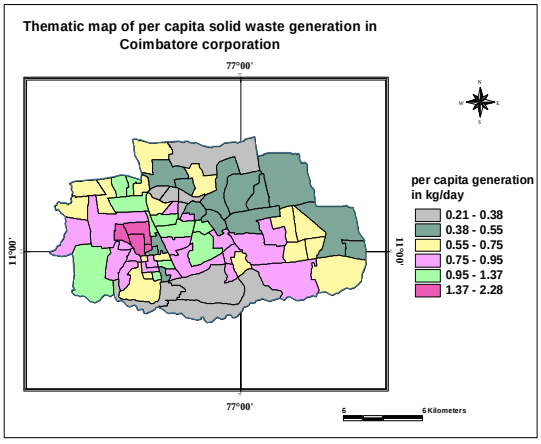
The details of the sanitary workers of the wards was obtained from the zonal offices and attributed into the existing ward map. Based on this, the distribution of the ward workers was prepared using natural break classification into six classes. A relationship was identified between the waste generation and workers. Workers distribution is high in the wards where the waste generation is more as shown in Map 4.



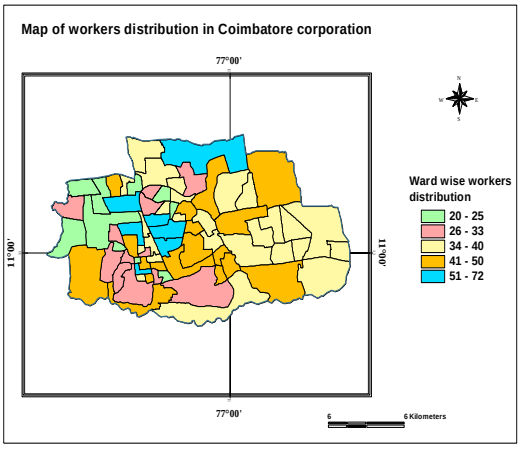
Map. 1



Map. 2



Map. 3



Map. 4

VI. CONCLUSION

The municipal officer involved in the solid waste management should be clear about the function and their role in terms of managing the cities effectively with the help of GIS system. These Thematic maps will help officers to identify and monitoring the more waste generated wards.

Promoting waste markets and recycling would also create awareness to reduce the total volume of waste at the landfill. There is a need to improve the data system of solid waste for the monitoring and management to support environmental reports has been improved

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The Optimization of Surface Roughnessof Al 6061 using Taguchi Method in Ball Burnishing Process

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Abstract- Burnishing is a cold-working process in which plasticdeformation occurs by applying a pressure through a very hard and smooth ball or roller on a metallic surface. Improvements in surface finish, surface hardness, wear resistance, fatigue resistance, yield and tensile strength and corrosion resistance can be achieved by the application of this process.

The experimental studies were conducted under varying Burnishing forces, speeds, feeds, and lubricants. The settings of burnishing parameters were determined by using the Taguchi's experimental design method. The optimum burnishing parameter combination was obtained by using the analysis of signal-to-noise (S/N) ratio. The confirmation tests indicated that it is possible to increase surface hardness and decrease surface roughness significantly by using the Taguchi method. The experimental results confirmed the validity of the used Taguchi method for enhancing the ball burnishing performance and optimizing the process parameters.

Index Terms- Ball burnishing; Surface roughness; Hardness; Taguchi method; Optimization.

I. INTRODUCTION

Toensure reliable performance and prolonged service life of modern machinery, its components require to be manufactured not only with high dimensional and geometrical accuracy but also with high surface finish. The surface roughness of engineering parts is a significantdesign specification that is known to have considerableinfluence on properties such as wear resistance and fatigue strength. Perfectly flat surface can never be generated. Surfaces have always irregularities in the form of peaks and valleys. Processes by which surfaces are finished differ in its capabilities concerning finishing action, mechanical and thermal damage, residual stresses and materialsThese processes are divided according to runningin mechanisms into two types: one involves material losssuch as grinding and the other depends on plastic squeezingof the surface where by a redistribution on material is performedwith no material loss (M.H. El-Axir, 2008).

The latter is seenin finishing process such as burnishing which can be achievedby applying a highly polished and hard ball onto metallic surfaceunder pressure as shown in Fig.1.1. This will cause the peaks of the metallicsurface to spread out permanently, when the applied burnishing pressure exceeds the yield strength of the metallicmaterial to fill the valleys and some form of smoothing takesplace. Besides producing a good surface quality, the burnishingprocess has additional advantages over machining processes, such as securing increased hardness, corrosion resistance and fatigue life as result of the produced compressive residual stress on the surfaces (Hassan and Al-Bsharat, 1996).A literature survey shows that work on burnishing has been conducted by many researches.

Optimization of process parameters is the key step in the Taguchi method to achieving high quality without increasing cost. This is because optimization of process parameters can improve quality and the optimal process parameters obtained from the Taguchi method are insensitive to the variation of environmental conditions and other noise factors. Basically, classical process parameter design is complex and not easy to use.

An advantage of the Taguchi method is that it emphasizes a mean performance characteristic value close to the target value rather than a value within certain specification limits, thus improving the product quality. Additionally, Taguchi's method for experimental design is straightforward and easy to apply to many engineering situations, making it a powerful yet simple tool. It can be used to quickly narrow the scope of a research project or to identify problems in a manufacturing process from data already in existence (Ugur Esme, 2009).

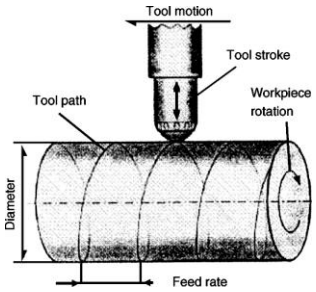

Fig.1.1.Scheme of ball burnishing [9]

II. EXPERIMENTAL WORK

A. Workpiece Material and Specimen Preparation:

In this work aluminium (Al 6061) was used as workpiece material with 68 HRB. The chemical composition of the material is as shown in table 8.1.1. This material was selected because of its importance in industry and its susceptibility to degradation when burnished,through surface and subsurface damage. Aluminium alloys are particularly well suited for parts and structures requiring high strength-to-weight ratio and are the probably the best known materials used extensively in aircraft and truck wheels [16].

Table 2.1. Chemical Composition of Al 6061

% Fe	% Si	% Cu	% Cr	% Mg	% Mn	% Zn	% Ti	% Al
0.678	0.504	0.104	0.023	1.20	0.194	0.086	0.010	97.6

The material was received in the form of solid bars with diameter 24 and was then cut onto power hack saw with length 120 and was then machined with a finished cut to diameter 23 and length 110.

B. Burnishing Conditions :

The Burnishing process was carried out on Kirloskar Turn master T-40 Lathe. Only four ball burnishing parameters namely Burnishing force, Speed, Feed and Lubricant were investigated in the study. The forces are applied by manual feed to cause spring deflection and were measured through multiplying the spring deflection by spring stiffness ($F= k\chi$). The applied force range was from 17.1 kgf to 42.75 kgf by causing deflections from 2 to 5 mm. The speed ranges were from 280-630 rpm and feed from 0.056-0.125 mm/rev. The burnishing conditions were lubricated using kerosene, SAE 20W 40 oils and with the addition of graphite powder in SAE 20W 40.

The selected burnishing process parameters along with their levels are given in Table 2.2. Each parameter had three levels and interactions between the parameters were not considered in the present study. The experimental set up for the same is shown below. At each set of experimental runs the burnishing tool is pressed against the turned aluminium bar and thus a burnishing operation is carried out at 20mm distance.

Table 2.2. Process parameters and their levels

Symbol	Parameter	Unit	Level 1	Level 2	Level 3
A	Burnishing Force	Kgf	17.1	34.2	42.75
B	Speed	Rpm	280	400	630
C	Feed	mm/rev	0.056	0.1	0.125
D	Lubricant	-	Kerosene	SAE 20W 40	SAE 20W 40 with graphite

C. Selection of orthogonal array (OA) :

The selection of an appropriate orthogonal array (OA) depends on the total degrees of freedom of process parameters. Degrees of freedom are defined as the number of comparisons between process parameters that need to be made to determine which level is better and specifically how much better it is. In this study, since each parameter has three levels therefore, the total degrees of freedom (DOF) for the parameters are equal to 8. Basically, the degrees of freedom for the OA should be greater than or at least equal to those for the process parameters. The standard L9 orthogonal array has four 3 level columns with 8 DOF. Therefore, an L9 orthogonal array with four columns and nine rows was appropriate and used in this study. The experimental layout for the injection moulding parameters using the L9 OA is shown in Table 2.3. Each row of this table represents an experiment with different combination of parameters and their levels, obtained by using Minitab 16 software.

Fig 2.1. Experimental Set-up

III. RESULTS AND DISCUSSIONS

The results, in terms of Surface Roughness were obtained after conducting the burnishing test for all nine specimens. Each test specimen, indeed, represented one experiment in the orthogonal array (Table 2.3). The experimental results for burnishing test under the application of four parameters are summarized in Table 3.1. In the latter, the results were analysed by employing main effects, and the signal-to-noise ratio (S/N) analyses. Finally, a confirmation test was carried out to compare the experimental results with the estimated results.

Table 2.3. Experimental plan using L9 orthogonal array

	Parameter/Level			
Experiment Number	**A**	**B**	**C**	**D**
1	1	1	1	1
2	1	2	2	2
3	1	3	3	3
4	2	1	2	3
5	2	2	3	1
6	2	3	1	2
7	3	1	3	2
8	3	2	1	3
9	3	3	2	1

Table 3.1. Experimental results for Ball Burnishing

Experiment No.	Burnishing Force (kgf)	Speed (rpm)	Feed (mm/rev)	Lubricant	Surface Roughness (µm)
1	17.1	280	0.056	Kerosene	0.287
2	17.1	400	0.1	SAE 20W40	0.287
3	17.1	630	0.125	SAE 20W40 with graphite	0.326
4	34.2	280	0.1	SAE 20W40 with graphite	0.292
5	34.2	400	0.125	Kerosene	0.327
6	34.2	630	0.056	SAE 20W40	0.24
7	42.75	280	0.125	SAE 20W40	0.337
8	42.75	400	0.056	SAE 20W40 with graphite	0.299
9	42.75	630	0.1	Kerosene	0.364

A. Main Effects :

Used in conjunction with an analysis of variance and design of experiments to examine differences among level means for one or more factors. A main effect is present when different levels of a factor affect the response differently.A main effects plot graphs the response mean for each factor level connected by a line. General patterns to look for:

- When the line is horizontal (parallel to the x-axis), then there is no main effect present. Each level of the factor affects the response in the same way, and the response mean is the same across all factor levels.
- When the line is not horizontal, then there is a main effect present. Different levels of the factor affect the response differently. The steeper the slope of the line, the greater the magnitude of the main effect.

The values of surface roughness for each factor i.e. A, B, C and D at each level i.e. level 1, level 2 and level 3 were obtained from Minitab 16 and the results are summarized in Tables 3.2.

Table 3.2. Levels average for Surface Roughness main effects

Symbol	Parameters/Factors	Average Surface Roughness (µm)		
		Level 1	Level 2	Level 3
A	Burnishing Force	0.3000	0.2863	0.3333
B	Speed	0.3053	0.3043	0.3100
C	Feed	0.2753	0.3143	0.3300
D	Lubricant	0.3260	0.2880	0.3057

Figure 3.1 presents the main effect graph for surface roughness characteristics. This graph is based on the surface roughness being formed through Minitab 16. The quality characteristics investigated in this study was "the-smaller-the-better" owing to the fact that smaller surface roughness value represents higher surface finish. It can be seen from Figure 3.1 that the combination of parameters and their levels $A_2B_2C_1D_2$ yield the optimum quality characteristic for surface roughness.

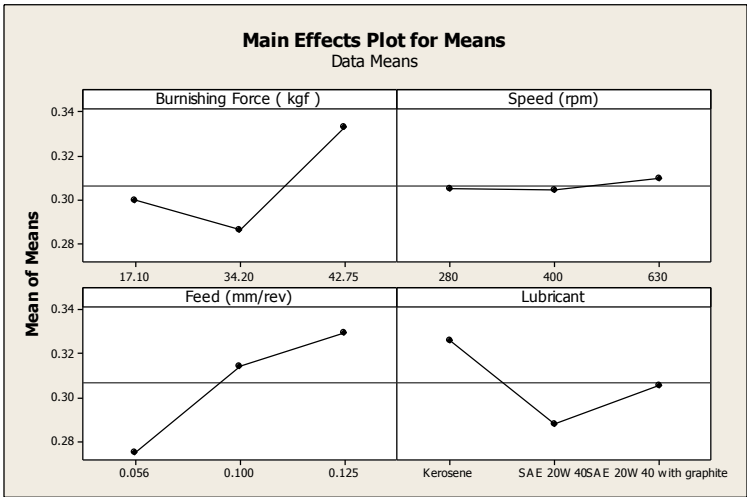

Fig.10.1.1. Main effects graph for Surface Roughness

B. Signal to Noise Ratio (S/N) :

Taguchi experiments often use a 2-step optimization process. In step 1 use the S/N ratio to identify those control factors that reduce variability. In step 2, identify control factors that bring the mean to target and have little or no effect on the S/N ratio.The

signal-to-noise (S/N) ratio measures how the response varies relative to the nominal or target value under different noise conditions. You can choose from different S/N ratios, depending on the goal of your experiment.

As mentioned earlier the quality characteristic used in this study was "the-smaller-the-better" and "the-larger-the-better", i.e. the smaller surface roughness and the higher hardness of the test specimen results in better finish and consequently better performance. In order to perform S/N ratio analysis, mean square deviation (MSD) for quality characteristics and S/N ratio were calculated from the following equations,

Characteristic smaller the better:

$$MSD = 1/n \sum y_i^2$$

$$S / N = -Log (MSD)$$

Where,

y_i =is the surface roughness of i^{th} experiment.

Using the above two formulae the S/N ratios for the nine experiments were calculated and the results are presented in Table 3.3. It can be seen from this table that for surface roughness experiment number 6 yields the largest S/N ratio and for this experiment the combination of parameters and their levels is $A_2B_3C_1D_2$ as indicated in Table 2.3.

This result is different from those obtained from main effect analysis and does not represent optimum combination of parameters and their levels. However, it shows that in the present case study the combination of parameters and their levels $A_2B_3C_1D_2$ for surface roughness yield optimum quality characteristic with minimum variance around the target value.

Table 3.3. S/N ratio responses for surface roughness

Experiment No.	Surface Roughness (µm)	MSD	S/N ratio
1	0.287	0.0824	10.8424
2	0.287	0.0824	10.8424
3	0.326	0.1063	9.7356
4	0.292	0.0853	10.6923
5	0.327	0.1069	9.7090
6	0.24	0.0576	12.3958
7	0.337	0.1136	9.4474
8	0.299	0.0894	10.4866
9	0.364	0.1325	8.7780

C. Confirmation Test :

The confirmation experiment is the final step in the first iteration of the design of the experiment process. The purpose of the confirmation experiment is to validate the conclusions drawn during the analysis phase. The confirmation experiment is performed by conducting a test with a specific combination of the factors and levels previously evaluated.

Once the optimal combination of process parameters and their levels was obtained, the final step was to verify the estimated result against experimental value. It may be noted that if the optimal combination of parameters and their levels coincidently match with one of the experiments in the OA, then no confirmation test is required. Estimated value of the bending deflection at optimum condition was calculated by adding the average performance to the contribution of each parameter at the optimum level using the following equations,

$$y_{opt} = m + (m_{Aopt}-m) + (m_{Bopt}-m) + (m_{Copt}-m) + (m_{Dopt}-m)$$

and $$m = \frac{T}{N}$$

Where,
m: average performance
T: grand total of response for each experiment
N: total number of experiments
mAopt : response for parameter A at its optimum level
mBopt : response for parameter B at its optimum level
mCopt : response for parameter C at its optimum level
mDopt : response for parameter D at its optimum level.

Confirmation test was required in the present case study because the optimum combination of parameters and their levels i.e. $A_2B_2C_1D_2$ and $A_3B_2C_3D_2$ did not correspond to any experiment ofthe orthogonal array.

Table 3.4. Results of confirmation test for Surface Roughness

	Optimal Condition			
	Estimation	Experiment	Difference	Difference (%)
Level	$A_2B_2C_1D_2$	$A_2B_3C_1D_2$	-	-
Surface Roughness Achieved (µm)	0.2341	0.24	0.0059	0.59
S/N Value	-	12.3958		

The values of surface roughness and hardness obtained from the experiment were then compared with the estimated value as shown in Table 3.4.It can be seen that the difference between experimental result and the estimated result is only 0.0059 µm. This indicates that the experimental value of Surface Roughness is very close to the estimated value. This verifies that the experimental result is strongly correlated with the estimated result, as the error is only 0.59%.

III. CONCLUSIONS

Results obtained from the present case study following can be concluded:

1. Favourable and optimum conditions could be predicted for different requirements of finish, hardness and economy of process. Database developed from the experimental analysis could be very useful for the selection of best possible process parameters and conditions for finishing various machine components, economically.
2. Surface roughness up to 0.24 µm could be achieved by this process.
3. An optimum parameter combination for the minimum surface finish and maximum surface hardness was obtained by using the analysis of signal-to-noise (S/N) ratio. The combination of parameters and their levels for optimum surface roughness is $A_2B_3C_1D_2$ (i.e. Burnishing force- 34.2 kgf, speed- 630 rpm, feed-0.056 mm/rev, lubricant- SAE 20W 40).
4. The experimental results confirmed the validity of the used Taguchi method for enhancing the burnishing performance and optimizing the ball burnishing parameters.

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A STUDY ON IMPACT OF WORK STRESS AMONG TILE FACTORY WORKERS IN TRICHUR DISTRICT IN KERALA

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Abstract: Stress is a part of everyday life; we experience it to one degree or another. Although it's an unavoidable part of our activities at work and at home, stress becomes harmful when it reaches an intensity that impairs daily activities. Stress is really the body's reaction to what are called stressors. Under stress the body 'gears up' and response to situations to protect itself. Once the cause is removed the body returns to its normal situation. The focus of this study is to find out and compare the impact of work stress among tile factory workers, at gender level in Trichur district in Kerala. The research design undertaken for the study was descriptive research and convenience sampling method is used. The data were collected from 100 workers, 50 male workers and 50 female workers selected from 5 tile factories in Trichur District. Henry Garrett ranking method and Mann – Whitney test was used to analyze the data collected and the results of the study.

Index Terms: Stress, stressors, impact and consequences

I. INTRODUCTION

Stress is an emotional and physical reaction to change. Day to day life is full of stress – both on the personal and professional fronts. Stress is associated with constraints and demands. The former prevents an individual from doing what he or she desires. The latter refers to the loss of something desired. Both constraints and demands can lead to potential stress. Potential stress becomes actual stress, if it is coupled with uncertainty of the outcome and importance of the outcome. Stress is highly individualistic in nature. Some people have high tolerance for stress and thrive well in face of several stressors in the environment. On the other hand, some have very low level of tolerance for stress and they become paralyzed when exposed to stressors. Stress becomes a problem when body is constantly under pressure, and does not return, to normal. At this stage, the brain and its coordinating assistance are overwhelmed and worn out. As a result of that the stressed people are constantly in what scientists call a state of arousal or alertness. This can lead to long term physical, psychological or behavioral problems like anger, anxiety, alcoholism, asthma, depression, headaches, stomach problems, sleep disturbances, skin rashes, teeth grinding etc.

STATEMENT OF THE PROBLEM

Stress in the workplace has been a topical problem among blue collar workers, say factory workers, construction workers, maintenance workers, manufacturing workers and the like. Tile factory workers are blue collar workers and are privately employed and mainly unorganized. Majority of them belong to the lower strata of socio-economic groups and are highly stressed. Stress may be personal or organizational such as unsafe and or uncomfortable work environments, lack of employ participation in organizational policies. Workplace stress is very costly. It contributes to low productivity, occupational illness, injury, absenteeism, poor employee morale and high health care costs.

LITERATURE REVIEW

Johnson et.al, (2005) have carried out the study on the experience of work-related stress across occupations. They have discussed three stress related variables like psychological well-being, physical health and job satisfaction and these variables are compared between 26 different occupations. The occupations like ambulance workers, teachers, social services, customer services - call centers, prison officers and police. The study reveals the high emotional labour associated with the high stress jobs is discussed as a potential causal factor. Bhattacharya and Guha (2006) conducted a study on stress and coping. A group of 34 lady criminal lawyers were selected for the study. The significant factors found to generate stress were busy schedule of work, odd duty hours, poor interaction, leading tendency of superiors and poor interpersonal relationship among the colleagues in the work environment. According to Pawar et.al. (2007) measured occupational stress and life satisfaction in 413 naval personnel serving afloat and ashore. The result shows that naval personnel serving on board submarine and ship had lower levels of occupational stress as compared to those serving on shore establishments. Occupational stress scores were higher among junior sailors (36.7%) as compared to officers and senior sailors (20%). Life satisfaction scores were lower in junior sailors. Greater occupational stress was linked to lower life satisfaction. The finding of high occupational stress in junior sailors needs to be investigated further with a larger sample. Judith (2008) in her research on workplace bullying found that 75% of participants reported witnessing mistreatment of co-workers throughout their careers, 47% had been bullied during their career and 27% admitted that they were being bullied for the last 12 months. Kayoko Urakawa and Kazuhito Yokoyam 11 in their journal “Sense of Coherence (SOC) may Reduce the Effects of Occupational Stress on Mental Health Status among Japanese Factory Workers” (2009) has resulted the adverse effects on mental health due to the job demand and job stress was positively associated with SOC (sense of coherence), the mental health status of males in managerial work was adversely negative, where as it was positive among the female co-workers. Thus, SOC is an important factor determining the coping ability over the job stress for both the genders. Chiang *et al.* (2010) found in his study on work stress of hotel and catering industry employees that job demands, job control and work-life balance significantly affected job stress in such a way that high job demands when

combined with low job control and minimal work-balance practices contributed to higher level of work stress. Kumar (2011) studies found that job stress is the major cause for job dissatisfaction, wchich creates disturbances in quality of life, so it results unhappiness. Ramezan Jahanian, Seyyed Mohammad Tabatabaei and Behnaz Behdad (2012) observed that stress is a fact in our daily life. When a person needs help, it means the person feels physically and emotionally disabled. Most people believe that their capacity and capabilities are so little to encounter high level of stress. Today, with progress in all respects, human is facing new challenges in many different fields as if progress in turn creates new problems. Over a century, the nature of working has changed widely, and still these changes are in progress. Following these changes, number of illnesses has increased, morality and human aspects have faded and new problems occur every day. CFO daily news June 26 (2013) reports that according to the recent study by financial finesse 83% of employees are under financial stress. The detailed breakdown of the type of stress workers are under: 67% of workers reported “some” financial stress, 13% said that they have “high” financial stress and 3% said their financial stress was “overwhelming”.

Impact / consequences of work stress

The impact / consequences of stress have been found to be fairly widespread, implicating changes in behavior, mood, capacity to perform mental tasks and neuropsychological functioning. Psychological stimuli operate on persons each of whom is equipped with an individual psychological programme for relating to any type of internal or external stimuli. These programmes are propensities conditioned by a vast array of genetic and earlier environmental influences. When the environment fails to meet personal demands or be its wake a host of pathogenic mechanisms which may be cognitive, emotional behavioral, and / or physiological.

The following are some of the consequences of work stress experienced by tile factory workers.

A: Physical consequences: Headache, Tightness in neck, backache, Facial or jaw pain, Stomach disorder, swollen joints, High blood pressure, Skin disorder.

B: Psychological Consequences: Irritability, Moodiness, Anxiety, Anger, Withdrawal from other people, Feelings of insecurity, Loneliness, Helplessness.

C: Behavioral / Emotional Consequences: Increased smoking, Gnashing or grinding teeth, Nail biting, Hair pulling, wrinkling forehead, Carelessness, Increased alcohol / drug consumption, Sudden changes in social habits.

II. OBJECTIVES OF THE STUDY

1. To find out and compare the impact of work stress among tile factory workers at gender level.
2. To suggest better strategies to overcome work stress.

RESEARCH METHODOLOY

Research methodology is a way to systematically solve the research problems. It may be understood as a science of studying how research is done scientifically. It includes the overall research design, the sampling procedure, data collection method and analysis procedure. In this study, Descriptive research was adopted. Descriptive research study includes surveys and fact-findings enquiries of different kinds, which help the researchers to describe the present situation.

SAMPLING DESIGN

Sampling design is to clearly define a set of objects, technically called the universe to be studied. A sampling design is a definite plan for obtaining a sample from the given population.

SAMPLE SIZE & SAMPLING METHOD

The sample size consists of 100 respondents, 50 male workers and 50 female workers selected from 5 tile factories in Trichur District. Convenience sampling method under Non-Probability sampling was employed in selecting the sample. In order to ensure greater clarity and validity pre-testing was done with limited number of respondents and necessary modifications were made in the interview schedule. With the objectives in mind the researcher collected first hand information about the universe through pilot study. The pilot study helped the researcher to narrow down the scope of the study and facilitated the selection of samples.

DATA COLLECTION METHODS

The present study covers both primary as well as secondary data.

A) PRIMARY DATA

For the study, both primary as well as secondary information were collected. Interview schedule method was used to collect the primary data. To collect information in deepest level, observation and guidance methods also were employed.

B) SECONDARY DATA

Secondary data were collected from organizations' records, documents,' website', company's annual reports, muster roll, brochure, Journals etc

STATISTICAL TOOLS USED FOR ANALYSIS

Data collected through Research Schedule were presented in a master table. From the master table sub tables were prepared. In order to do analysis and interpretation of the data simple statistical tools like Henry Garrett Ranking method and Mann – Whitney test are used. Analysis was done using PAST 2.17

software of University of Oslo. The following formula can be used for calculating the Henry Garrett Ranking Method.

$$\text{Henry Garrett Ranking Method} = \frac{100(Rij-0.5)}{Nj}$$

Where, Rij is Rank given for ith item jth individual

Nj is Number of items ranked by jth individual

Table 1 : Impact of Work Stress Among Tile Factory workers in Trichur District in Kerala – Sample size -Male – 50															
	Ranks Scale		**I 81**	**II 70**	**III 63**	**IV 57**	**V 52**	**VI 47**	**VII 42**	**VIII 36**	**IX 29**	**X 18**	**Total**	**Total Score**	**Mean Score**	**Rank**
	Factors															
1	Difficulty in thinking logically	f	3	2	5	4	3	6	3	7	8	9	50	2136	42.72	10
		fx	243	140	315	228	156	282	126	252	232	162				
2	Experience Headache, Increased Blood pressure	f	7	5	4	6	7	3	8	3	4	3	50	2630	52.6	1
		fx	567	350	252	342	364	141	336	108	116	54				
3	Increased Absenteeism	f	4	6	2	3	5	3	7	5	8	7	50	2274	45.48	9
		fx	324	420	126	171	260	141	294	180	232	126				
4	Unable to relax, sleep and concentrate	f	8	4	5	7	2	6	5	3	6	4	50	2592	51.84	3
		fx	648	280	315	399	104	282	210	108	174	72				
5	Increasingly distressed and irritable	f	9	4	6	3	4	2	8	7	2	5	50	2596	51.92	2
		fx	729	280	378	171	208	94	336	252	58	90				
6	Experience low back pain, Joint & neck pain	f	5	8	3	5	4	7	4	6	3	5	50	2537	50.74	5
		fx	405	560	189	285	208	329	168	216	87	90				
7	Moodiness / withdrawal from other people	f	2	5	7	6	8	4	3	7	2	6	50	2443	48.86	8
		fx	162	350	441	342	416	188	126	252	58	108				
8	Feel tired, depressed and anxious	f	3	6	4	8	7	6	5	4	5	2	50	2552	51.04	4
		fx	243	420	252	456	364	282	210	144	145	36				
9	Decreased commitment to Work	f	5	3	8	4	5	6	4	3	8	4	50	2469	49.38	7
		fx	405	210	504	228	260	282	168	108	232	72				
10	Increased smoking / Alcohol consumption	f	4	7	6	4	5	7	3	5	4	5	50	2521	50.42	6
		fx	324	490	378	228	260	329	126	180	116	90				
	Total	Σf	50	50	50	50	50	50	50	50	50	50				

Note: x = Scale value, f = number of respondents, fx = score

Table 2 : Impact of Work Stress Among Tile Factory workers in Trichur District in Kerala – Sample size -Female – 50															
	Ranks Scale / **Factors**		**I 81**	**II 70**	**III 63**	**IV 57**	**V 52**	**VI 47**	**VII 42**	**VIII 36**	**IX 29**	**X 18**	**Total**	**Total Score**	**Mean Score**	**Rank**
1	Difficulty in thinking logically	f	3	6	4	6	7	5	2	4	8	5	50	2381	47.62	8
		fx	243	420	252	342	364	210	84	144	232	90				
2	Experience Headache, Increased Blood pressure	f	11	4	6	5	3	7	4	3	5	2	50	2776	55.52	1
		fx	891	280	378	285	156	329	168	108	145	36				
3	Increased Absenteeism	f	1	3	8	6	4	2	7	9	4	6	50	2281	45.62	9
		fx	81	210	504	342	208	94	294	324	116	108				
4	Unable to relax, sleep and concentrate	f	4	5	6	4	5	9	4	3	6	4	50	2635	52.7	4
		fx	324	350	378	342	260	423	168	108	174	108				
5	Increasingly distressed and irritable	f	10	6	3	5	2	6	5	4	6	3	50	2672	53.44	3
		fx	810	420	189	285	104	282	210	144	174	54				
6	Experience low back pain, Joint & neck pain	f	8	6	5	4	3	5	4	7	5	3	50	2710	54.2	2
		fx	648	420	315	342	156	210	168	252	145	54				
7	Moodiness / withdrawal from other people	f	3	5	4	6	7	4	8	3	2	8	50	2385	47.7	7
		fx	243	350	252	342	364	188	336	108	58	144				
8	Feel tired, depressed and anxious	f	7	3	5	7	3	7	2	8	3	5	50	2525	50.5	5
		fx	567	210	315	399	156	329	84	288	87	90				
9	Decreased commitment to Work	f	2	7	6	3	9	3	6	5	4	5	50	2448	48.96	6
		fx	162	490	378	171	468	141	252	180	116	90				
10	Increased smoking / Alcohol consumption	f	1	5	3	4	7	2	8	4	7	9	50	2265	45.3	10
		fx	81	350	189	342	364	94	336	144	203	162				
	Total	Σf	50	50	50	50	50	50	50	50	50	50				

Note: x = Scale value, f = number of respondents, fx = score

HENRY GARETT RANKING METHOD

MANN WHITNEY U TEST		
Factor	**Ranking Male**	**Ranking Female**
1	10	8
2	1	1
3	9	9
4	3	4
5	2	3
6	5	2
7	8	7
8	4	5
9	7	6
10	6	10
Males: N = 10 Mean Rank = 5.25		Females: N = 10 Mean Rank = 5.25

Impact of Work Stress Among Tile Factory workers in Trichur District in Kerala

Sl. No.	**Factors**	**MALE**			**FEMALE**		
		Total Score	**Mean Score**	**Rank**	**Total Score**	**Mean Score**	**Rank**
1	Difficulty in thinking logically	2136	42.72	10	2381	47.62	8
2	Experience Headache, Increased Blood pressure	2630	52.6	1	2776	55.52	1
3	Increased Absenteeism	2274	45.48	9	2281	45.62	9
4	Unable to relax, sleep and concentrate	2592	51.84	3	2635	52.7	4
5	Increasingly distressed and irritable	2596	51.92	2	2672	53.44	3
6	Experience low back pain, Joint & neck pain	2537	50.74	5	2710	54.2	2
7	Moodiness / withdrawal from other people	2443	48.86	8	2385	47.7	7
8	Feel tired, depressed and anxious	2552	51.04	4	2525	50.5	5
9	Decreased commitment to Work	2469	49.38	7	2448	48.96	6
10	Increased smoking / Alcohol consumption	2521	50.42	6	2265	45.3	10

H0: There is no significant difference between the rankings of male and females tile factory workers for the impact of work stress.

H1: There is significant difference between the rankings of male and female tile factory workers for the impact of work stress.

U= 50 and p value at 5% level of significance was found to be 0.9697

As p value is greater than 0.05 at 5% level of significance, we accept the H0.

FINDINGS OF THE STUDY

A descriptive study was conducted to assess the impact of work stress among tile factory workers in Trichur district in Kerala. Out of the 100 samples 50 male workers and 50 female workers were selected from 5 tile factories in Trichur district. In the pilot study, factors like

difficulty in thinking logically, experience headache, increased blood pressure, increased absenteeism, unable to relax, sleep and concentrate, increasingly distressed and irritable, experience low back pain, joint and neck pain, moodiness / withdrawal from other people, feel tired, depressed and anxious, decreased commitment to work, increased smoking / alcohol consumption etc. have been given in the Interview schedule.

On the basis of the outcome of the pilot study, only factors like difficulty in thinking logically, experience headache, increased blood pressure, increased absenteeism, unable to relax, sleep and concentrate, become increasingly distressed and irritable, experience low back pain, joint and neck pain, moodiness / withdrawal from other people, feel tired, depressed and anxious, decreased commitment to work, increased smoking / alcohol consumption have been used in the final Interview schedule. Male and female respondents were instructed to indicate the importance of the impact of work stress factor by giving rank 1 to the most important factor, rank 2 the second important factor and so on. Based on the ranks assigned by the order of importance is identified. To find the most significant factor Henry Garrett Ranking Technique is employed. It is calculated as percentage score and the scale value is obtained by employing the scale conversion Table given by Henry Garrett.

The Percentage Score is calculated as

$$\text{Percentage Score} = \frac{100(Rij-0.5)}{Nj}$$

Where, Rij is Rank given for ith item jth individual

Nj is Number of items ranked by jth individual

The percentage score for each rank from 1 to 10 are calculated. The percentage score thus obtained for all the ten ranks are converted into scale values using Scale Conversion Table given by Henry Garrett. The scale values for first rank to tenth rank is 81, 70, 63, 57, 52, 47, 42, 36, 29 and 18 respectively. The score value (fx) is calculated for each factor by multiplying the number of respondents (f) with respective scale values (x). The total scores are found by adding the score values (fx) of each rank for every factor. The mean score is then calculated to know the order of preference given by the respondents for the factors. Based on the mean score, the overall ranks are assigned for each. The ranking analysis of the factors impact of work stress among workers in tile factories in Trichur district in Kerala Henry Garrett's ranking shown in Table 1 & 2.

Table 1 (Male workers): It is clear that male workers have given more importance to the factor that Experience headache, increased blood pressure (52.6) followed by become increasingly distressed and irritable (51.92), unable to relax, sleep and concentrate (51.84), feel tired, depressed and anxious (51.04), experience low back pain, joint and neck pain (50.74), increased smoking / alcohol consumption (50.42), decreased commitment to work (49.38), moodiness / withdrawal from other people (48.86), increased absenteeism (45.48),
difficulty in thinking logically (42.72).

Table 2 (Female workers): It is clear that female workers have given more importance to the factor experience headache, increased blood pressure (55.52), experience low back pain, joint and neck pain (54.2), become increasingly distressed and irritable (53.44), unable to relax, sleep and concentrate (52.7), feel tired, depressed and anxious (50.5), decreased commitment to work (48.96), moodiness / withdrawal from other people (47.7), difficulty in thinking logically (47.62), increased absenteeism (45.62), increased smoking / alcohol consumption (45.3).

Ranking Male and female Mann – Whitney Test (Past 2.17 – (University olso) used.
Male - N = 10, Mean Rank = 5.25, u = 50, p = 0.9697 and Female N = 10 Mean Rank = 5.25 Accept Null hypothesis. As per the 'p' value > 0.05 at 5 % level of significance Null hypothesis is accepted.

SUGGESTIONS

The present study is an endeavor to understand the impact and consequences of work stress among tile factory workers in Trichur District in Kerala. A few coping strategies at individual and organizational level are suggested to manage stress in day to day life and to resolve the state of stress by making use of stress management strategies, consciously at appropriate time.

Measures to be taken by the workers to prevent stress.

- Start your day early so that you have fewer people to distract you from your task and you may find that you are productive and less tense.
- Be positive and avoid gossip and complaints. Voicing occasional grievances and annoyances can cause a negative stressful attitude in the workplace.
- Share problems and concerns with friends and people one can trust.
- During the work break try to do the opposite of whatever one do at work. For example if one stands all day sit for a bit.
- Share responsibilities with others and co-workers.
- Leave your work at the workplace.
- Exercise regularly. According to health professionals one should get at least 30 minutes of cardiovascular exercises per day in order to maintain a healthy heart and lungs.
- Eat a balanced diet to keep you active and healthy.
- Keep hydrating – Make it habit to drink about two liters of water per day.
- Focus on sleeping well to keep the days from irritable side effects.
- Learn about the relaxation methods available to ease daily tensions.

Measures to be taken by the management to prevent stress

- Address noise in the workplace. Background noise can impair and employee's ability to concentrate, resulting reduced performance and can also cause tension, headaches and increased irritability.
- Check for adequate lighting. Poor lighting can cause eye strain and increase fatigue.
- Improve the air quality of the workplace. Poor air quality can damage the ability to concentrate. Lack of ventilation can deplete the amount of oxygen in the air leading to headaches, tiredness and reduced concentration.
- Design the workspace more comfortably so as to improve the health and productivity of the worker.
- Allow the employees to have a say in job related decisions and actions.
- Ensure that workers have job securities and opportunities for career development.
- Define work role very clearly in order to avoid role conflict
- Provide organizational support / social support.
- Adapt working conditions to workers' differing physical and mental aptitudes.

- Design technology, work organization and job content in such a way that the employee is not exposed to physical or mental strain that may lead to illness and accidents.
- Introduce employee assistance programmes: ways of providing counseling services etc. to overcome the stress being faced by the employee.

III. CONCLUSION

Work stress is a real challenge for workers and their employing organization. For the employers not only it is import to monitor the workplace, identity and deal with stress problems but to promote healthy work and reduce harmful aspects of work. A good employer designs and manages work in a way that avoids common risk factors and prevent as much as possible foreseeable problems. Employers, managers and trade union representatives must therefore become aware of the culture of the organization and explore it in relation to the management of work stress.

"Rest is not idleness, and to
lie on the grass under tress
on a summer's day, listening to
the murmer of water,
or watching the clouds float
across the sky, is by no means
a waste of time".

- J. Lubbock.

"Take rest;
a field that has
rested gives a
bountiful crop".

- Ovid.

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Prevalence of cardiovascular disease in India and it is economic impact- A review

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***Abstract*- Background and Objectives**: Cardiovascular diseases have a major share in the incidence of non-communicable diseases. CVD is also one of the leading causes of deaths in India. It has outgrown the boundaries of gender, location of dwelling etc. A number of studies have been conducted time and again to find out the prevalence of cardiovascular disease. This article aspires to collate all the data gathered by such studies conducted after year 2000 and provide an overview of the prevalence of CVDs in India.

Methods: Studies published after 2000 in various national and international journals were reviewed to gather data on prevalence of CVD.

Results: Studies show an increased prevalence of cardiovascular disease in India as compared to other developing countries with recent trends showing incidence in younger age group. It is seen to affect almost all sections of the society from young to old and most affluent to least affluent.

Interpretation: Large scale and widespread incidence shows downgrading of the cardiovascular health status of Indians and emergence of CVDs as a chronic manifestation across the population. This affects the country's productivity owing to economic burden in an otherwise beneficial phase of demographic transition.

Conclusion: The prevalence has increased as indicated by studies in the last decade. Projections for future also estimate a similar trend. Need of the hour is to track down and closely monitor the prevalence of disease with maintenance of proper and detailed database at hospital, community and other levels. This shall facilitate in evaluating the effect of corrective measure and health policies also.

***Index Terms*-** Prevalence, Cardiovascular disease, India, Risk factors

I. INTRODUCTION

Cardiovascular diseases (CVD) have been leading cause of morbidity and mortality in India. Recent trends indicate that the disease has escalated to younger age groups also. It has a significant presence in males and females in both urban and rural population[1]. The prevalence of its associated risk factors has been found to exist increasingly in the population. With such a fast pace of increasing incidence, a number of epidemiological studies have been carried out in India to trace the prevalence of CVD over time. Some of them have forecasted the future incidence and prevalence of CVD in India. To formulate this review article, original articles in various national and international journals were searched through web. Only those studies which were conducted post 2000 were included. Key words such as "prevalence", "coronary heart disease", "cardiovascular disease", "heart disease", "in India", "risk factors" etc. were used to find articles. This article tries to embody the data collected so far by approximately 10-15 studies fulfilling the reference criteria. This article stands as an effort to develop an overview of the prevalence of CVD over the last decade as observed and quantified by different studies conducted on Indian population.

II. MATERIALS AND METHODS

Journal articles were referred online through PubMed and Google scholar search engines. Original articles from journals like Indian Journal of Medical research, Journal of the Association of the Physicians of India, Journal of Cardiovascular Disease Research and the Internet Journal of Cardiology were studied. Articles published by authors in international journals such as Journal of American College of Cardiology, British Medical Journal, Bio Med Central were also reviewed. Reports of organisations such as World Health Organisation (WHO), National Commission on Macroeconomics and Health (NCMH), a government of India undertaking, Centre for Chronic Disease Control (CCDC), National Cardiovascular Disease Database (supported by Ministry of Health and Family Welfare, Government of India and WHO) were studied to project the data. The keywords used for the search were "prevalence", "coronary heart disease", "cardiovascular disease", "heart disease", "in India", "risk factors" etc. Only those articles that were available in full text format were analysed to arrive at the data collated. Criteria for selection of articles were the year in which studies were undertaken and published. Studies conducted after year 2000 were referred to. All other studies ranging in the 90s were rejected. Any recent study that presented data on the basis of old studies was also rejected. Only those articles were included that reported prevalence in Indian residing in India. A number of studies on migrant Indians were also cited but they were not included in this review.

III. RESULTS

Prevalence: National

Cardiovascular diseases have been gaining importance in India recently because of increased incidence of the disease. It is the first among top 5 causes of deaths in Indian population (rural vs. urban, economically backward vs. developed states, men vs. women and at all stages vs. middle age)[2]. In 2000, there were an estimated 29.8 million people with CHD in India out of a total estimated population of 1.03 billion, or a nearly 3% overall prevalence[3,4]. According to World Bank estimates, CVD had a 31% share in the total burden of disease in 2001[5].In 2003, the prevalence was estimated to be 3-4% in rural areas and 8-10% in urban areas according to population based cross sectional surveys[6, 7].

Prevalence: Regional

Apart from a high overall prevalence, there are regional variations in the prevalence of CVD. The CUPs (no.5)[8]study found out the overall prevalence of CAD in native South Indian population to be 11% while the age standardised prevalence was computed to be 9%. The overall figure of 11% represents approximately a 10 fold increase in the prevalence of CAD in urban India during the last 40 years. Unadjusted CHD rates have ranged from 1.6% to 7.4% in rural populations and 1% to 13.2% in urban populations[2].Crude prevalence rate of CHD in urban areas of Northern states such as Jammu and Kashmir, Delhi and Uttar Pradesh and Western states such as Rajasthan have a prevalence rate of 6-10%. The rates in the rural areas were 6-7% in Jammu and Kashmir, 3-5% in Himachal Pradesh and Punjab among the Northern states while in Rajasthan, it was 3-5%[3].

Future trends: Gender, Age groups and Area

Future trend analysis indicated that 60% of the world's patients with heart disease, including CHD, would live in India by 2010[1].The forecast of prevalence rates (in percentage) shows that from 2000 to 2015 the number of urban males in the 20-29 years age group suffering from CHD will be almost double and the females of the same age group will keep up with their pace. This indicates the younger age of escalation of CVDs. In fact, the prevalence rate among women is likely to keep pace with that of men in all age groups. When the prevalence rates in the estimated data were compared across age groups i.e. from 20-69 years in both males and females, an increasing trend was observed. Also, it has been estimated that at the later stages of life, more number of women will contribute to the CVD inflicted population as compared to men. In case of rural men and women, the trend is anticipated to be static in the 20-29 years age group for 2000-2015. However, across age groups, it shows an increase in percentage prevalence in both males and females. On comparing the percentage prevalence of males and females across age groups from 2000-2015, a similar pattern is estimated wherein more number of females will suffer from CVD at a later age as compared to men[1]. Data also suggests that although the prevalence rates of CVD in rural population will remain lower than that of urban populations, they will continue to increase reaching around 13.5% of the rural age group of 60-69 as compared to 22% of urban age group of 60-69. The prevalence rates among younger adults (40 years and above) are also likely to increase[9].This trend can also be observed in term of the number of cases projected as follows:

TABLE I: Forecasting the number of cases (males and females) of coronary heart disease (CHD) in India[1]

Year/area	20-29yrs	30-39yrs	40-49yrs	50-59yrs	60-69yrs	Total
2000						
Urban	2,711,501	2,635,019	2,776,974	2,288,412	1,888,199	12,300,104
Rural	1,799,691	2,854,247	3,342,472	3,590,855	3,153,512	14,704,808
Total	4,511,192	5,489,266	6,119,446	5,879,296	5,041,711	27,040,912
2005						
Urban	4,138,045	3,869,904	4,116,830	3,171,320	2,582,790	17,878,889
Rural	2,012,363	3,383,816	4,217,201	4,544,974	3,849,544	18,007,899
Total	6,150,408	7,253,720	8,334,032	7,716,294	6,432,334	35,886,789

2010						
Urban	5,992,412	5,154,766	5,606,731	4,223,273	3,710,938	24,688,119
Rural	2,324,772	3,940,722	5,367,797	5,817,363	4,829,922	22,280,577
Total	8,317,184	9,095,489	10,974,527	10,040,636	8,540,860	46,968,695
2015						
Urban	8,167,924	7,927,846	8,493,463	6,156,089	5,346,975	36,092,297
Rural	2,324,087	4,523,697	5,816,588	6,852,050	5,913,624	25,430,046
Total	10,492,011	12,451,542	14,310,051	13,008,140	11,260,599	61,522,343

CVDs are the largest cause of mortality, accounting for around half of the death resulting from non-communicable diseases (NCDs). Overall, CVDs accounted for around one fourth of all deaths in India in 2008. CVDs are expected to be the fastest growing chronic illness by 2015 growing at 9.2% annually from 2000 onwards. A more worrying fact is that the incidence has gone up significantly for people between ages25-69 to 24.8%[10]. The down ward escalation of CVDs is of primary concern as it is affecting the productive population of India. The present evidence suggests an average mortality of 4% in the age group of 20-49 years and 6% in those above 50 years due to CVD. This may remain the same till 2015 if the current situation continues for the next 10-15 years[1].

According to a WHO report, the current age standardised CVD mortality rates among males and females in India (per 100,000) are 363-443 and 181-281 respectively[11]. No other data were found that assessed the current/recent prevalence of CVD in India.

IV. Economic Impact

It has been found that over 80% of deaths and 85% of disability from CVD occur in low and middle income countries[12, 13]. Among these, CVD affects Indians with greater frequency and at a younger age than counterparts in developed countries, as well as many other developing countries. In addition to high rates of mortality, CVD manifests here almost 10 year earlier on an average than other countries in the world, resulting in substantial number of deaths in working age group[6, 14]. In Western countries where CVD is considered to be a disease of the aged 23% of CVD deaths occur below 70 years of age while in India 52% of CVD deaths occur below 70 years of age[15,16]. Thus, India suffers a tremendous loss of productivity due to increased prevalence of CHD. The total years of life lost due to total cardiovascular disease among the Indian men and women aged 35-64 has been estimated to be higher than comparable countries such as Brazil and China. These estimates are predicted to increase by 2030, when differences may be even more marked[17].

TABLE I: Estimates of total years of life lost due to CVD in 2000 and 2030[17]

Country	2000		2030	
	Total years of life lost	Rate per 100,000	Total years of life lost	Rate per 100,000
India	9,221,165	3,572	17,937,070	3,070
Brazil	1.060.840	2,121	1,741,620	1,957
China	6,666,990	1,595	10,460,030	1,863

Age standardised CVD death rates in people 30-69 years old are 180 per 100,000 in Britain, 280 per 100,000 in China and 405 per 100,000 in India. Also, 50% of CVD related deaths in India occur in people <70 years of age, whereas only 22% of CVD related deaths in Western countries occurs in this age group[18]. According to the INTERHEART STUDY, the median age for the first presentation of acute Myocardial Infarction in South Asian (Bangladesh, India, Nepal, Pakistan, and Sri Lanka) is 53 years whereas that in Western Europe, China and Hong Kong is 63 years with more men than women affected. This median age in Asian men and women was also higher (58 and 54 years respectively). Studies carried out in India and other places suggest that Asians in general and Indians in particular are at increased risk of Myocardial Infarction at a younger age (<40years), irrespective of whether they have migrated to other countries or are resident Asians[14].The latest data estimates the age standardised burden of CVD (per 100,000) in males to be 3315-4228 DALYs (Disability Adjusted Life Years) while in females it is estimated to be 2584-3438 DALYs[11].

V. Discussion and Conclusions

The studies referred to indicate an alarming rate of prevalence of CVDs in India. In fact, the prevalence in India is higher than other countries of the same region. Keeping in mind the huge population of India, a prevalence rate of 11% is a disturbing figure, even though in a specific region in India, when translated into numbers. The escalation in the prevalence rates have been observed since the last decade and are expected to continue with the same pattern if the current situation prevails. These rates indicate newer patterns of the disease incidence. Previously thought to affect only high income countries, CVD burden is now being transferred to the developing countries as evident by it is presence in India. Moreover, these rates seem to be increasing disproportionately as compared to other countries. It is catching up in lower income groups also, in spite of the difference in the lifestyle, culture etc. indicating the urgency of addressing the associated risk factors. As indicated by the data, the prevalence is now indicated in rural areas also other than the clichéd urban areas indicating that as the disease matures and gets a stronger grip in the country, it will percolate to all categories of the population affecting the whole society. This can be confirmed as recent studies in India show that individuals with lower levels of income or education are at a higher risk suggesting that the prevalence is following the pattern seen with advanced epidemics in developed countries- the highest prevalence is shifting from the affluent to the less affluent[19]. There is an increasing trend for reversal in the socio-economic gradient for CVD (as already manifested in developed nations), with the poor and disadvantaged having equal and sometimes higher, burden of CVD and it is risk factors. This could be due to the change in the pattern of dietary habits, lack of health care facilities etc. in the lower strata.

The stark observation of reviewing these studies was that a number of them indicate the incidence of disease in younger age groups. In this regard, an increased prevalence of CVD related risk factors have been reported in this age group owing to lifestyle changes, work routines, culture influences etc. This means that India's productive population is getting affected causing an economic setback to the country. Between 2005 and 2015, India is projected to cumulatively lose USD 236.6 because of heart disease, stroke, and diabetes costing 1% of the GDP[10]. A 2000 estimate 0f 9.2 billion productive years of life lost in Indian adults secondary to overall CVD contributes to this economic decline. As CVD rates increase, this estimate will increase by 2030[17].

In older age groups, an increased prevalence can be collated to the demographic transition in India with a sharp decline in the death rate as well as the birth rate. The life expectancy of an average Indian male is 67.3 years and that of females is 69.6 years (as per the estimates for 2011-15)[4]. This transition has brought a larger number of people to the age group where the CVDs manifest. Thus, India has a larger population of vulnerable older adults that contribute to the CVD inflicted population.

To conclude, the study of prevalence studies shows that CVDs are slowly reaching out to all sections of the society. The estimates also indicate a pattern of increase in the incidence of CVD amongst various age groups and across genders. Therefore, a more detailed and continuous check on the prevalence of heart diseases is suggested to know the progress of the epidemic so that appropriate measure can be taken for prevention and control.

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Bayesian Analysis of Rayleigh Distribution

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Abstract: The Rayleigh distribution is often used in physics related fields to model processes such as sound and light radiation, wave heights, and wind speed, as well as in communication theory to describe hourly median and instantaneous peak power of received radio signals. It has been used to model the frequency of different wind speeds over a year at wind turbine sites and daily average wind speed. In the present paper, we consider the estimation of the parameter of Rayleigh distribution. Bayes estimator is obtained by using Jeffrey's and extension of Jeffrey's prior under squared error loss function and Al-Bayyati's loss function. Maximum likelihood estimation is also discussed. These methods are compared by using mean square error through simulation study with varying sample sizes.

Index Terms: Rayleigh distribution, Jeffrey's prior and extension of Jeffrey's prior, loss functions.

I. INTRODUCTION

The Rayleigh distribution (RD) is considered to be a very useful life distribution. Rayleigh distribution is an important distribution in statistics and operations research. It is applied in several areas such as health, agriculture, biology, and other sciences. One major application of this model is used in analyzing wind speed data. This distribution is a special case of the two parameter Weibull distribution with the shape parameter equal to 2.This model was first introduced by Rayleigh (1980), Siddiqui (1962) discussed the origin and properties of the Rayleigh distribution. Inference for model Rayleigh model has been considered by Sinha and Howlader (1993), Mishra et al. (1996) and Abd Elfattah *et al*. (2006).

The probability density function of Rayleigh distribution is given as:

$$f(y;\theta) = \frac{y}{\theta^2}\exp\left(-\frac{y^2}{2\theta^2}\right) \qquad for\ \ y \geq 0, \theta > 0 \qquad (1.1)$$

Recently Bayesian estimation approach has received great attention by most researchers. Bayesian analysis is an important approach to statistics, which formally seeks use of prior information and Bayes Theorem provides the formal basis for using this information. In this approach, parameters are treated as random variables and data is treated fixed. Ghafoor et al. (2001)] and Rahul *et al. (2009)* have discussed the application of Bayesian methods. An important pre-requisite in Bayesian estimation is the appropriate choice of prior(s) for the parameters. However, Bayesian analysts have pointed out that there is no clear cut way from which one can conclude that one prior is better than the other. Very often, priors are chosen according to ones subjective knowledge and beliefs. However, if one has adequate information about the parameter(s) one should use informative prior(s); otherwise it is preferable to use non informative prior(s). In this paper we consider the extended Jeffrey's prior proposed by Al-Kutubi (2002) as:

$$g(\theta) \propto [I(\theta)]^{c_1} \qquad , c_1 \varepsilon R^+$$

Where $I(\theta) = -nE\left[\frac{\partial^2 \log f(y;\theta)}{\partial \theta^2}\right]$ is the Fisher's information matrix.

For the model (1.1), the prior is given by

$$g(\theta) = k\left[\frac{n}{\theta^2}\right]^{c_1}$$

Where k is a constant. With the above prior, we use two different loss functions for the model (1.1), first is the squared error loss function which is symmetric, second is the Al-Bayyati's new loss function.

It is well known that choice of loss function is an integral part of Bayesian inference. As there is no specific analytical procedure that allows us to identify the appropriate loss function to be used, most of the works on point estimation and point prediction assume the underlying loss function to be squared error which is symmetric in nature. However, in-discriminate use of SELF is not appropriate particularly in these cases, where the losses are not symmetric. Thus in order to make the statistical inferences more practical and applicable, we often needs to choose an asymmetric loss function. A number of asymmetric loss functions have been shown to be functional, see Varian (1975), Zellner (1986), Chandra (2001) etc. In the present paper, we consider the above loss functions for better comparison of Bayesian analysis.

a) The first is the common squared error loss function given by:

$$l_1(\hat{\theta}, \theta) = c(\hat{\theta} - \theta)^2$$

Which is symmetric, θ and $\hat{\theta}$ represent the true and estimated values of the parameter. This loss function is frequently used because of its analytical tractability in Bayesian analysis.

b) The second is the Al-Bayyati's new loss function of the form:

$$l_A(\hat{\theta}, \theta) = \theta^{c_2}(\hat{\theta} - \theta)^2; \quad c_2 \varepsilon R.$$

Which is an asymmetric loss function, for details, see Norstrom (1996). This loss function is interesting in the sense that a slight modification of squared error loss introduces asymmetry.

MATERIALS and METHODS

Maximum likelihood estimation: Maximum likelihood estimation of the parameters of Rayleigh distribution is well discussed in literature (see Cohen, (1965) and Mann et al. (1975)).

Let $(x_1, x_2, \mathrm{K}, x_n)$ be a random sample of size n having the probability density function as

$$f(y;\theta) = \frac{y}{\theta^2}\exp\left(-\frac{y^2}{2\theta^2}\right) \qquad for \;\; y \geq 0, \theta > 0$$

The likelihood function is given by

$$L(y \mid \theta) = \frac{\prod_{i=1}^{n} y_i}{\theta^{2n}} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}}$$

$$\therefore \qquad Log\, L(y \mid \theta) = \sum_{i=1}^{n} \log y_i - 2n \log\theta - \frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}$$

The ML estimator of θis obtained by solving the

$$\frac{\partial}{\partial\theta} \log L(y \mid \theta) = 0$$

$$\Rightarrow \qquad -\frac{2n}{\theta}+\frac{\sum_{i=1}^{n} y_i^{\,2}}{\theta^3}=0$$

$$\Rightarrow \qquad \hat{\theta}=\sqrt{\frac{\sum_{i=1}^{n} y_i^{\,2}}{2n}} \qquad (2.1)$$

Bayesian estimation of Rayleigh distribution under Jeffrey's prior by using Squared Error Loss Function

Consider there are n recorded values, $\underline{y}=(y_1,...y_n)$ from (1.1). We consider the extended Jeffrey's prior as:

$$g(\theta)\propto\sqrt{[I(\theta)]}$$

Where $[I(\theta)]=-nE\left[\frac{\partial^2 \log f(y;\theta)}{\partial\theta^2}\right]$ is the Fisher's information matrix. For the model (1.1), the prior distribution is given by

$$g(\theta)\propto\frac{1}{\theta}$$

The likelihood function is given by

$$L(y;\theta)=\frac{\prod_{i=1}^{n} y_i}{\theta^{2n}}e^{-\frac{\sum_{i=1}^{n} y_i^{\,2}}{2\theta^2}}$$

The posterior density function is given by:

$$P(\theta\,|\,\underline{y}) \;\propto\; L(y;\theta)g(\theta)$$

$$\therefore \qquad P(\theta\,|\,\underline{y}) \;\propto\; \frac{\prod_{i=1}^{n} y_i}{\theta^{2n}}e^{-\frac{\sum_{i=1}^{n} y_i^{\,2}}{2\theta^2}}\;\frac{1}{\theta}$$

$$\Rightarrow \qquad P(\theta\,|\,\underline{y}) \;= k\frac{1}{\theta^{2n+1}}e^{-\frac{\sum_{i=1}^{n} y_i^{\,2}}{2\theta^2}}$$

Where $k^{-1}=\int_0^{\infty}\frac{1}{\theta^{2n+1}}e^{-\frac{\sum_{i=1}^{n} y_i^{\,2}}{2\theta^2}}d\theta$

$$\Rightarrow \qquad k^{-1}=\frac{\Gamma n}{2^{1-n}\left(\sum_{i=1}^{n} y_i^{\,2}\right)^n}$$

$$\Rightarrow \qquad k=\frac{2^{1-n}\left(\sum_{i=1}^{n} y_i^{\,2}\right)^n}{\Gamma n}$$

From (3.2), the posterior density of θ is given by

$$p(\theta \mid \underline{y}) = \frac{2^{1-n}\left(\sum_{i=1}^{n} y_i^{\,2}\right)^n}{\theta^{2n+1}\Gamma n} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}}$$

$$\Rightarrow \qquad p(\theta \mid \underline{y}) = \frac{2\left(\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right)^n}{\theta^{2n+1}\Gamma n} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}} \qquad (2.2)$$

Estimation under squared error loss function:

By using a squared error loss function $L(\hat{\theta},\theta) = c(\hat{\theta}-\theta)^2$ for some constant c, the risk function is:

$$R(\hat{\theta}) = \int_0^{\infty} c(\hat{\theta}-\theta)^2 \, p(\theta \mid \underline{y}) \, d\theta$$

$$\Rightarrow \qquad R(\hat{\theta}) = c\hat{\theta}^2 + \frac{c}{n-1}\left(\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right) - \frac{2c\hat{\theta}\,\Gamma\left(\frac{2n-1}{2}\right)}{\Gamma(n)}\sqrt{\frac{\sum_{i=1}^{k} y_i^{\,2}}{2}}$$

Now $\frac{\partial R(\hat{\theta})}{\partial \theta} = 0$, Then the Bayes estimator is

$$\hat{\theta}_1 = \frac{\Gamma\left(\frac{2n-1}{2}\right)}{\Gamma n}\sqrt{\frac{\sum_{i=1}^{k} y_i^{\,2}}{2}} \qquad (2.3)$$

b) Bayesian estimation of Rayleigh distribution under Extension of Jeffrey's prior by using Squared Error Loss Function

We consider the extended Jeffrey's prior are given as:

$$g(\theta) \propto [I(\theta)]^{c_1} \qquad , c_1 \varepsilon R^+$$

Where $[I(\theta)] = -nE\left[\frac{\partial^2 \log f(y;\theta)}{\partial \theta^2}\right]$ is the Fisher's information matrix. For the model (1.1), $g(\theta) \propto \frac{1}{\theta^{2c_1}}$

The likelihood function is given by

$$L(y;\theta) = \frac{\prod_{i=1}^{n} y_i}{\theta^{2n}} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}}$$

The posterior density function is given by:

$$P(\theta \mid \underline{y}) \quad \propto \quad L(y;\theta)g(\theta)$$

$$\therefore \qquad P(\theta \mid \underline{y}) \;\propto\; \frac{\prod_{i=1}^{n} y_i}{\theta^{2n}} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}} \frac{1}{\theta^{2c_1}}$$

$$\Rightarrow \qquad P(\theta \mid \underline{y}) = k \frac{1}{\theta^{2n+2c_1}} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}} \qquad (2.4)$$

Where $k^{-1} = \int_0^{\infty} \frac{1}{\theta^{2n+2c_1}} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}} d\theta$

$$\Rightarrow \qquad k^{-1} = \frac{\Gamma\left(n + \frac{c_1}{2} - \frac{1}{2}\right)}{2^{1-n+\frac{c_1}{2}-\frac{1}{2}} \left(\sum_{i=1}^{n} y_i^2\right)^{n+\frac{c_1}{2}-\frac{1}{2}}}$$

$$\Rightarrow \qquad k = \frac{2^{1-n+\frac{c_1}{2}-\frac{1}{2}} \left(\sum_{i=1}^{n} y_i^2\right)^{n+\frac{c_1}{2}-\frac{1}{2}}}{\Gamma\left(n + \frac{c_1}{2} - \frac{1}{2}\right)}$$

From (3.6), the posterior density of θ is given by

$$p(\theta \mid \underline{y}) = \frac{2^{1-n+\frac{c_1}{2}-\frac{1}{2}} \left(\sum_{i=1}^{n} y_i^2\right)^{n+\frac{c_1}{2}-\frac{1}{2}}}{\Gamma\left(n + \frac{c_1}{2} - \frac{1}{2}\right)} \frac{1}{\theta^{2n+2c_1}} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}}$$

$$\Rightarrow \qquad p(\theta \mid \underline{y}) = \frac{2\left(\frac{\sum_{i=1}^{n} y_i^2}{2}\right)^{n+\frac{c_1}{2}-\frac{1}{2}}}{\theta^{2n+2c_1}\Gamma\left(n + \frac{c_1}{2} - \frac{1}{2}\right)} e^{-\frac{\sum_{i=1}^{n} y_i^2}{2\theta^2}} \qquad (2.5)$$

Estimation under squared error loss function:

By using a squared error loss function $L(\hat{\theta}, \theta) = c(\hat{\theta} - \theta)^2$ for some constant c, the risk function is:

$$R(\hat{\theta}) = \int_0^{\infty} c(\hat{\theta} - \theta)^2 \, p(\theta \mid \underline{y}) \, d\theta$$

$$\Rightarrow \qquad R(\hat{\theta}) = c\hat{\theta}^2 + \frac{c\Gamma\left(n+c_1-\frac{3}{2}\right)}{\Gamma\left(n+c_1-\frac{1}{2}\right)}\left(\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right) - \frac{2c\hat{\theta}\,\Gamma(n+c_1-1)}{\Gamma\left(n+c_1-\frac{1}{2}\right)}\sqrt{\frac{\sum_{i=1}^{k} y_i^{\,2}}{2}}$$

$$\Rightarrow \qquad R(\hat{\theta}) = c\hat{\theta}^2 + \frac{c}{n-1}\left(\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right) - \frac{2c\hat{\theta}\Gamma\left(\frac{2n-1}{2}\right)}{\Gamma(n)}\sqrt{\frac{\sum_{i=1}^{k} y_i^{\,2}}{2}}$$

Now $\frac{\partial R(\hat{\theta})}{\partial \theta} = 0$, Then the Bayes estimator is

$$\hat{\theta}_2 = \frac{\Gamma(n+c_1-1)}{\Gamma\left(n+c_1-\frac{1}{2}\right)}\sqrt{\frac{\sum_{i=1}^{k} y_i^{\,2}}{2}} \qquad (2.6)$$

Remark 1: Replacing c_1= 1/2 in (2.6), the same Bayes estimator is obtained as in (2.3) corresponding to the Jeffrey's prior. By Replacing c_1= 3/2 in (2.6), the Bayes estimator becomes the estimator under Hartigan's prior (Hartigan (1964)). By Replacing c_1= 0 in(2.6), thus we get uniform prior.

c) Bayesian estimation of Rayleigh distribution under Jeffrey's prior by using Al-Bayyati's new loss function.

This section uses a new loss function introduced by Al-Bayyati (2002). Employing this loss function, we obtain Bayes estimators using Jeffrey's and extension of Jeffrey's prior information.

Al-Bayyati introduced a new loss function of the form:

$$l_A(\hat{\theta},\theta) = \theta^{c_2}\left(\hat{\theta}-\theta\right)^2; c_2 \varepsilon R.$$

Here, this loss function is used to obtain the estimator of the parameter of the Rayleigh distribution.

By using the Al-Bayyati's loss function, we obtained the following risk function:

$$R(\hat{\theta}) = \int_0^{\infty} \theta^{c_2}\left(\hat{\theta}-\theta\right)^2 p(\theta \mid \underline{y})\, d\theta$$

$$\Rightarrow \qquad R(\hat{\theta}) = \hat{\theta}^2\,\frac{\Gamma\left(\frac{2n-c_2}{2}\right)}{\Gamma(n)}\left[\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right]^{\frac{c_2}{2}} + \frac{\Gamma\left(\frac{2n-c_2-2}{2}\right)}{\Gamma(n)}\left(\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right)^{\frac{c_2+2}{2}} - \frac{2\hat{\theta}\Gamma\left(\frac{2n-c_2-1}{2}\right)}{\Gamma(n)}\left[\frac{\sum_{i=1}^{n} y_i^{\,2}}{2}\right]^{\frac{c_2+1}{2}}$$

Now $\frac{\partial R(\hat{\theta})}{\partial \theta} = 0$, Then the Bayes estimator is

$$\hat{\theta}_3 = \frac{\Gamma\left(\frac{2n-c_2-1}{2}\right)}{\Gamma\left(\frac{2n-c_2}{2}\right)}\sqrt{\left(\frac{\sum_{i=1}^{k} y_i^{\,2}}{2}\right)} \qquad (2.7)$$

Remark 2: Replacing $c_2 = -2$ in (2.7), we get the Bayes estimator under quadratic loss function with Jeffrey's prior. By Replacing $c_2 = 0$ in (2.7), the Bayes estimator becomes the estimator under squared error loss function with Jeffrey's prior that reduced to (2.3) By Replacing $c_2 = 1$ in (2.7), thus we get uniform prior.

Bayesian estimation of Rayleigh distribution under the extension of Jeffrey's prior by using Al-Bayyati's new loss function.

By using the Al-Bayyati's loss function, we obtained the following risk function:

$$R(\hat{\theta}) = \int_0^{\infty} \theta^{c_2} (\hat{\theta} - \theta)^2 \pi_2(\theta / \underline{y}) d\theta$$

$$\Rightarrow \quad R(\theta) = \hat{\theta}^2 \frac{\Gamma\left(\frac{2n+2c_1-c_2-1}{2}\right)}{\Gamma\left(\frac{2n+2c_1-1}{2}\right)} \left[\frac{\sum_{i=1}^{n} y_i^2}{2}\right]^{\frac{c_2}{2}} + \frac{\Gamma\left(\frac{2n+2c_1-c_2-3}{2}\right)}{\Gamma\left(\frac{2n+2c_1-1}{2}\right)} \left(\frac{\sum_{i=1}^{n} y_i^2}{2}\right)^{\frac{c_2+2}{2}} - \frac{2\hat{\theta}\Gamma\left(\frac{2n+2c_1-c_2-2}{2}\right)}{\Gamma\left(\frac{2n+2c_1-1}{2}\right)} \left[\frac{\sum_{i=1}^{n} y_i^2}{2}\right]^{\frac{c_2+1}{2}}$$

Now $\frac{\partial R(\hat{\theta})}{\partial \theta} = 0$, Then the Bayes estimator is

$$\hat{\theta}_4 = \frac{\Gamma\left(\frac{2n+2c_1-c_2-2}{2}\right)}{\Gamma\left(\frac{2n+2c_1-c_2-1}{2}\right)} \sqrt{\left(\frac{\sum_{i=1}^{k} y_i^2}{2}\right)} \qquad (2.8)$$

Remark 3: Replacing $c_1 = 1/2$ and $c_2 = 0$ in (2.8), we get the Bayes estimator under squared error loss function with Jeffrey's prior which is same as (2.3). By Replacing $c_1 = 1/2$ and $c_2 = -2$ in (2.8), we get the Bayes estimator under Quadratic loss function with Jaffrey prior.. By Replacing $c_1 = 0$ and $c_2 = 0$ in (2.8), thus we get uniform prior.

Simulation Study

In our simulation study, we chose a sample size of n=25, 50 and 100 to represent small, medium and large data set. The scale parameter is estimated for Rayleigh distribution with Maximum Likelihood and Bayesian using Jeffrey's & extension of Jeffrey's prior methods. For the scale parameter we have considered θ= 1.0 and 1.5. The values of Jeffrey's extension were c_1 = 0.5, 1.0, 1.5 and 2.0. The value for the loss parameter a = ±1.0 and ±2.0. This was iterated 5000 times and the scale parameter for each method was calculated. A simulation study was conducted R-software to examine and compare the performance of the estimates for different sample sizes with different values for the Extension of Jeffreys' prior and the loss functions.The results are presented in tables for different selections of the parameters and c extension of Jeffrey's prior.

Table 1: Mean Squared Error for $(\hat{\theta})$ under Jeffrey's prior.

n	θ	θ_{ML}	θ_{SL}	θ_{NL}				Remarks
				C2=1.0	C2=-1.0	C2=2.0	C2=-2.0	
25	1.0	0.0248	0.0212	0.0191	0.0234	0.0171	0.0257	C2=2
	1.5	0.0332	0.0373	0.0415	0.0338	0.0463	0.0310	C2=-2
50	1.0	0.0110	0.0122	0.0132	0.0114	0.0142	0.0106	C2=-2
	1.5	0.0129	0.0136	0.0144	0.0129	0.0153	0.0124	C2=-2
100	1.0	0.0026	0.0024	0.0024	0.0025	0.0023	0.0026	C2=2
	1.5	0.0107	0.0098	0.0093	0.0103	0.0089	0.0109	C2=2

Table 2: Mean Squared Error for $(\hat{\theta})$ under extension of Jeffrey's prior.

n	θ	C_1	θ_{ML}	θ_{SL}	θ_{NL}				Remarks
					C2=1.0	C2=-1.0	C2=2.0	C2=-2.0	
25	1.0	0.5	0.0248	0.0212	0.0191	0.0234	0.0171	0.0257	C2=2.0
		1.0	0.0248	0.0232	0.0210	0.0255	0.0189	0.0278	C2=2.0
		1.5	0.0248	0.0252	0.0229	0.0276	0.0207	0.0300	C2=2.0
		2.0	0.0248	0.0274	0.0250	0.0298	0.0227	0.0322	C2=2.0
	1.5	0.5	0.0334	0.0374	0.0415	0.0339	0.0464	0.0310	C2=-2.0
		1.0	0.0334	0.0330	0.0364	0.0301	0.0406	0.0278	C2=-2.0
		1.5	0.0334	0.0292	0.0321	0.0269	0.0356	0.0227	C2=-2.0
		2.0	0.0334	0.0261	0.0284	0.0243	0.0313	0.0231	C2=-2.0
50	1.0	0.5	0.0111	0.0122	0.0131	0.0113	0.0141	0.0105	C2=-2.0
		1.0	0.0111	0.0112	0.0120	0.0104	0.0130	0.0097	C2=-2.0
		1.5	0.0111	0.0104	0.0111	0.0096	0.0120	0.0090	C2=-2.0
		2.0	0.0111	0.0095	0.0103	0.0088	0.0110	0.0083	C2=-2.0
	1.5	0.5	0.0130	0.0136	0.0144	0.0129	0.0153	0.0124	C2=-2.0
		1.0	0.0130	0.0128	0.0134	0.0122	0.0142	0.0118	C2=-2.0
		1.5	0.0130	0.0120	0.0125	0.0116	0.0132	0.0113	C2=-2.0
		2.0	0.0130	0.0115	0.0118	0.0111	0.0124	0.0109	C2=-2.0
100	1.0	0.5	0.0027	0.0026	0.0025	0.0026	0.0024	0.0027	C2=2.0
		1.0	0.0027	0.0026	0.0026	0.0027	0.0025	0.0028	C2=2.0
		1.5	0.0027	0.0026	0.0025	0.0027	0.0024	0.0027	C2=2.0
		2.0	0.0027	0.0027	0.0026	0.0028	0.0025	0.0029	C2=2.0
	1.5	0.5	0.0108	0.0099	0.0094	0.0104	0.0090	0.0110	C2=2.0
		1.0	0.0108	0.0104	0.0098	0.0096	0.0093	0.0114	C2=2.0
		1.5	0.0108	0.0108	0.0102	0.0113	0.0097	0.0119	C2=2.0
		2.0	0.0108	0.0113	0.0108	0.0119	0.0102	0.0125	C2=2.0

ML= Maximum Likelihood, SL=Squared Error Loss Function, NL= New Loss Function,

In table 1, Bayes estimation with New Loss function under Jeffrey's prior provides the smallest values in most cases especially when loss parameter C_2 is ± 2. Similarly, in table 2, Bayes estimation with New Loss function under extension of Jeffrey's prior provides the smallest values in most cases especially when loss parameter C_2 is ± 2 whether the extension of Jeffrey's prior is 0.5, 1.0, 1.5 or 2.0. Moreover, when the sample size increases from 25 to 100, the MSE decreases quite significantly.

CONCLUSION

In this article, we have primarily studied the Bayes estimator of the parameter of the Rayleigh distribution under the extended Jeffrey's prior assuming two different loss functions. The extended Jeffrey's prior gives the opportunity of covering wide spectrum of priors to get Bayes estimates of the parameter - particular cases of which are Jeffrey's prior and Hartigan's prior.

Wehave also addressed the problem of Bayesian estimation for the Rayleigh distribution, under asymmetric and symmetric loss functions and that of Maximum Likelihood Estimation. From the results, we observe that in most cases, Bayesian Estimator under New Loss function (Al-Bayyati's Loss function) has the smallest Mean Squared Error values for both prior's i.e, Jeffrey's and an extension of Jeffrey's prior information.

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Measurement of Sustainability: Statistical Model

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Abstract- Till now, the question remains the same whether organizations are moving towards a sustainable future or not. The impact of policies on the sustainable growth of the organization. The main assumption in this model is that for calculating growth or development, GDP per capita alone cannot be considered as only criteria, a multi –criteria model must be used to calculate it. If GDP increases, by destruction of natural vegetation and by depletion of natural resources it cannot be considered development. In this paper I present a statistical model, such that by using that model any number of organizations can be compared or ordered in increasing or decreasing sustainability. These organizations can be as large as countries or can be as small as local companies. The model is prepared in such a way that it is not biased towards any organization or sector. It considers all the factors necessary for a sustainable growth or sustainable future.

Index Terms- Aggregation, Sub-Indicators, Normalization, Weighing.

I. INTRODUCTION

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs WECD (1987)" as stated by the Brudtland report of 1987. Concept of sustainability came into existence when we realize that GDP per capita alone cannot be considered as an indicator of development. As GDP per capita can be increased by destruction of natural resources, it cannot be considered as the development of the country or organization. Sustainability is a very important term for me and for every man present on the earth. As it is important for each and every person on this earth there is need to properly define and measure it, so that we can see the impact of each and every action on the sustainability. Sustainability measure has to be defined first so that a model can be created to calculate it. So, sustainability measure is defined as a pyramidal structure which is divided into three parts from top to base. On the bottom there are sub-indicators. These sub-indicators are the base of this model as the base of any structure. Sub-Indicators have concepts or ideas which we can measure in term of numbers or preference order. These sub-indicators are inter-related and belong to a group which comes at second level of this pyramid structure. Sub-indicators highly related are put under the same group. Then these groups are combined using several combination techniques for measuring sustainability

II. SUB-INDICATORS

First step involved in measuring sustainability is the selection of sub indicators. It is considered as the main part of the sustainability measurement because this decides on which grounds sustainability is going to be calculated. These should be selected on the basis of availability of data for the entire organization, source of the information, advice of experts & must be related to development of the organization.

It is possible that data may not be available for some organizations. To get that data a lot of techniques are present. Mean of those whose values are already present in place of missing values, after removing outliers. There are also frameworks ``missing completely at random" (MCAR) Rubin (1976), can be used to fill missing data but applicable for large populations only.

Multiple Imputation technique (Little and Rubin (1987) and Schafer (1997)) can also be used for imputation of missing values. Using such techniques and methods we have complete set of data of all the sub-indicators and of all the organizations available for analysis. There are also other techniques like Regression and Expectation Maximization (EM) imputation by Nardo (2005) can also be used for multivariate analysis.

III. NORMALIZATION

The data obtained from the sub-indicators give information of different kinds and units. For example: The profit of an organization is measured in money value, while the import and exports are measured as number of goods. So, to make all the sub-indicators of same standard, there is a need to normalize the data so that they can be used for comparison. Different normalization techniques that can be used for normalize the data Nardo (2005).

DISTANCE FROM A REFRENCE

I= delta(R)/R (reference)

R (reference) = the reference value from which we are calculating the distance

Delta(R) = the difference in values of sub-indicator and the reference

MINIMUM-MAXIMUM

I= (x-Min) / (Max-Min)

Min= Minimum value of the data from sub indicator, Max= Maximum Value of the data from sub-indicator, x= value of the sub indicator. All the normalized will be between 0 and 1.

STANDARDISATION

For each indicator we will calculate the mean and standard deviation (sigma). The normalization is

I= (x-mean) / (sigma)

It is the most common used method for normalization, it converts the values in such way that the mean of the normalized data would be 0 and the standard deviation is equal to one. By

this method all the sub indicators will have same mean and standard deviation, so all the sub indicators are scaled properly.

IV. WEIGHING

Different sub indicators are not equally important, so a method is required, that provides a tradeoff between the sub-indicators. Meaning how much increase in one can be compensated by decrease in other sub-indicator. Different weights can be given to different sub-indicators on the basis of their relevance, effectiveness of the source of data, availability etc. Weighing method should be selected in such a way that it is not inclined to any specific organization, giving high weight to that sub-indicator in which a particular organization is best or worst can led to wrong application. Therefore weighing method should be transparent and must not be biased (Michela Nardo, Michaela Saisana, Andrea Saltelli & Stefano Tarantola).Moreover, the reader should bear in mind that, no matter which method is used, weights are essentially value judgments and have the property to make explicit the objectives underlying the construction of a composite (Rowena et al., 2004)

In many composite indicators all the indicators are given the same weight when there is no statistical base or method (like in the case of Environmental Sustainability Index - World economic forum, 2002). This does not mean equal weighing because when sub-indicators are clustered into a group, group having number of sub-indicators will have high weightage.

Weighing can also be done on the basis of reliability of source of data; if data is taken from organizations then it could be given high weight while if data is taken from random surveys than low weight can be provided to it. There is one problem with equal weighing that if equal weight is given to two sub-indicators with high correlation than two times weight is given to that indicator. So, we need a statistical model which can give us the information on the correlations and provide weights according to that. There would always be some positive correlation between two sub-indicators of same group. Principal component analysis and Factor analysis are techniques which can provide weights according to their correlation.

V. PRINCIPAL COMPONENT & FACTOR ANALYSIS

In this method first step is to find the co-variance of each sub indicator with other indicator if no co-variance is there in between sub indicators than weight cannot be given with this method. If there is co-variance between the sub-indicators than second step is to find correlation matrix, in which each row contains correlation of one sub indicator to all other sub indicators. In third step eigenvectors and eigenvalues are calculated of correlation matrix. Eigenvector shows how dataset of sub-indicators are related along the lines of these vectors (Manly, 1994). Eigenvectors are arranged according to their eigenvalues and subsets of these eigenvectors are selected according to number of groups required. As not selecting all the eigenvectors will led to some uncertainty but if its eigenvalue is not comparable than it can be neglected. After selecting these eigenvectors, these vectors are rotated in such a way that for those sub-indicators who have less correlation with some eigenvector, finally after rotation it becomes negligible and get correlated with its own eigenvector (group). So, it is basically the process in which sub-indicators are clubbed to their respective group. After rotation weights are provided to sub-indicators according to the group in which they are clubbed. The groups get their weights by finding correlation with all the sub-indicators. Then sub-indicators in that group get their weight by multiplying the weight of group to the ratio of correlation of that sub-indicator to the sum of correlations of all sub-indicators in that group.

$$W_{ij} = W_j * (corr_{ij} / (\sum corr_j))$$

W_{ij} weight of ith indicator in jth group
W_j weight associated with jth group
$\sum corr_j$ Sum of correlation of all the sub-indicators in jth group
$corr_{ij}$ Correlation of ith indicator to jth group
Note that the correlation must be found with the rotated values.

VI. AGGREGATION

A lot of methods or techniques are already present there for aggregation. It can be divided into two types. In one calculations are done in a way that will give a numerical value and using that value, different organizations can be compared. Other approach is called discrete multi-criteria approach (Munda, 1995; Roy, 1996; Vincke, 1992). In which organizations are arranged in decreasing order of sustainability.

VII. LINEAR AGGREGATION

It comes under first type. It is used when all sub-indicators have same measurement units and ambiguities due to scale have been neutralized (Nardo, 2005).

$$S_j = \Sigma W_i * X_{ij} \qquad 1<= i \& i <= N$$

S_j represents the sustainability value of the jth organization
W_i represents the weight associated with ith sub-indicator
X_{ij} represents the value of ith indicator for jth organization.

VIII. GEOMETRIC AGGREGATION

It also comes under the first type. It is used when all the organizations are comparable to each other. Indicators are multiplied with weights appear as exponents.

$$S_j = \prod X_{ij} \wedge (W_i) \qquad 1<= i \& i <= N$$

S_j represents the susutainability value of jth organization
W_i represents the weight associated with ith sub-indicator
X_{ij} represents the value of ith indicator for jth organization.

Countries with low score should prefer a linear rather than geometric because if value of one of the sub-indicator is very low for an organization than it will take a very high value to

compensate that low value. Organizations will improve those sub-indicators in which their score is low, if geometric aggregation is used, while in linear aggregation to improve their sustainability organizations can continue to improve in which they are good.

IX. MULTI CRITERIA APPROACH

This technique comes under second category. It tries to resolve the conflict arising in comparison of organizations as some are in favor of one method of aggregation or some are in favor of the other one. So, in this method approach this dilemma is solved by pairwise comparison.

A set of sub-indicators are there for every organizations and their respective weights. For some indicators high values are preferred while for others low value is preferred. Example for pollution low value is preferred, but for profit high value is preferred. Therefore for those sub-indicators in which low value in preferred, subtract their standardized value from 1 so that they will change into high value preference Munda (1995, 2007).

Second step is to do pairwise comparison of one organization with all other organizations in an N×N matrix (N represents number of organizations) named comparison matrix. S_{jk} represents the comparison of jth organization with kth organization. Comparison is done by taking sum of the weights of sub-indicators, in which jth organization has more value than kth organization. Therefore

$S_{jk} + S_{kj} = 1$ for all j,k j<=N, k<=N

After calculation of comparison matrix, all the permutation of organizations are taken. These permutation are the arrangement of organizations in decreasing sustainability. Score of each permutation is calculated by summation of comparison values of organization at first position to all other organizations plus values of comparison values of second organization to rest, on the left of it this process continues till we reach to the end (Munda and Nardo 2003).

Example: If ABCD is the order of permutation of A, B, C & D organizations than score is equal to,

$$C_{AB} + C_{AC} + C_{AD} + C_{BC} + C_{BD} + C_{CD}$$

Permutation with highest score is considered best order. It is possible that one or two arrangements have same score.

X. CONCLUSION

Some organizations will be placed high and some will be placed low. The impact of each and every decision can be seen by changing the values of sub-indicators according to that value. Which decisions can led too sustainable development can be known after calculation. Whether someone likes or not, composite indicators are not the only way to calculate the development of the organizations. There will always be controversies on this topic, as everyone wants to be on the top. These models will never be seen as the goal of any organization, these are just numbers. These should be seen as a starting of topics and discussions.

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Enhancement of the Distribution System by Implementing LT- Less Distribution Technique

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Abstract- This paper presents an efficient method for reducing losses in existing LT- distribution system.The study is based on a real distribution feeder in Madhya Pradesh (M.P.) state. In this study, main focus is given on the reduction of distribution losses by converting "LT distribution system" to "LT- Less distribution system". Under this proposed LT- Less distribution system; power is distributed mainly through HT (11 KV) lines with small rating distribution transformers. This paper presents the comparison of existing LT- distribution system with proposed LT-Less distribution system in terms of losses.
In this paper, a program under Turbo C++ is designed to calculate power losses (I^2R loses) in the both existing LT-distribution system and proposed LT- Less distribution system.Moreover,the calculation of reduction in losses, annual savings and payback period of the proposed method has been done by using programming in Turbo C++.

Index Terms- LT- Less Distribution System, Calculation of I^2R Losses and Payback Period through Turbo C++ Programming.

I. INTRODUCTION

In agricultural area, India's power sector is characterized by inadequate power supply and financial insolvency. The efficiency of the existing distribution is generally low and the system losses are untenably high specifically at the long low tension (LT) networks. The delivery of power from sources to the consumer points is always accompanied with power losses. Such non-negligible amount of losses has a direct impact on the overall efficiency and financial issues of the existing distribution system. Therefore, method for losses reduction is essential for achieving the financial goals of distribution companies.To make it easier to investigate losses in electrical distribution system, it is helpful to divide different types of losses into two categories as Technical losses and Non-Technical losses. Reduction of technical losses leads to a real gain in energy and reduced capital-intensive investments.On the other hand,the reduction of non-technical losses improves the financial balance of the company concerned. Technical losses consist I^2R losses which occur especially in overhead distribution lines. The electrical energy losses in distribution lines arewasted in the form of I^2R losses.These I^2R losses are current depending losses and mainly caused by the use of low voltage in distribution.As in the existing distribution system; the current is high due to low voltage and thus occurs more I^2R losses [1,2]. Technical losses also include transformer losses.The transformer losses can be classified into two components, namely, no-load and load losses. No-load losses occur from the energy required to retain the continuously varying magnetic flux in the core and its invariant with load on the transformer. Load losses are a function of the winding current. It mainly arise from resistance losses in the conducting material of the windings and it varies with load. The other category, the non-technical losses mainly include electricity theft in existing distribution system. Electricity theft is done by direct hooking of loads in LT lines.Non-technical losses are also known as "Commercial losses". Mostly, non-technicallosses are associated with LT lines. In some regions, the electrical energy is illegally taking from the nearest LT line. Electricity theft by direct hooking and making unauthorized connections arethemost common and visible form of non-technical losses. Hence, these unauthorized load connections are the main sources of the non-technical losses. In this paper, I^2R losses and payback period is determined by using programming in Turbo C++.Themain focus of this research paper is to reduce distribution losses and improves thequality of power supply in the existing distribution system [3,4].

II. EXISTING LT- DISTRIBUTION SYSTEM

The loads in agricultural areas are widely dispersed and low tension lines run for long distances to feed a small load. In the LT- distribution system, large capacity transformer is provided at one point and release supply to each load through long LT lines. In some agricultural areas, length of LT (low tension) lines are much larger even up to 20 kms. Theexisting LT- distribution system consists 3 phase DTR of 63KVA, 100KVA or somewhere 200KVA and on each DTR about 20 to 30 such pump sets (depending on DTR capacity) are connected. Hence, long LT lines and many number of load connections with high capacitydistribution transformer resulting in the increase in I^2R losses, electricity theft losses, overloading and failure of distribution transformers etc. The existing LT- distribution system also affects voltage profile and performance of the distribution system. Such a system is not suitable for Indian conditions, especially in agricultural areas; as unsatisfactory voltage profile, higher losses and outages [5].

III. PROPOSED LT- LESS DISTRIBUTION SYSTEM

In this proposed LT- Less distribution system, 11 KV- HT lines are extended nearer to the loads as possible and power is distributed mainly through HT (11KV) lines. This proposed LT-Less distribution system employs small size distribution transformers of various capacity (16 KVA, 25 KVA) and release

supply to 4 or 5 consumers with unavoidable least (or almost nil) LT lines, preferably with insulated overhead cables [6].

IV. BENEFITS OF PROPOSED LT- LESS DISTRIBUTION SYSTEM

- Electricitytheftby direct hooking of unauthorized load connection is avoided.
- I^2R losses can be minimized to the lowest level.
- High quality of power supply and excellent voltage profile earns total consumer satisfaction.
- Prevention of unauthorized loads and consequently no over loading in transformer. Thus,negligible transformerfailures and minimal number of outages.
- In the event of transformer failure orany fault, only 4 or 5consumers will be affected.
- The authorized consumers assume ownership and take responsibility of the distribution transformer; as only 4 or 5 pump sets are connected on each DTR in agricultural area.
- No frequent fuse blow outs,less fluctuations and also less burnouts of motors. [7,8]

V.MATHEMATICAL FORMULA FOR POWER LOSSES AND CURRENT

The power losses in a line is based on the measured current of the load and can be calculated as:

Power losses = $I^2 \times R \times L$

Where, I: Current in Amperes, R: Resistanceof conductor in Ohms/Km, L: Length of line in Kilometers.

For 3 phase,Power losses = $3(I^2 \times R \times L)$ ……. (1)

Here, current can be calculated by usingthe formula as given below:

$$I = \frac{P}{\sqrt{3} \times V \times COS\emptyset}$$

Where, P: Capacity of load in distribution line, V: Voltage in distribution system, COSØ: Power Factor.

In this paper, the current is computed from the load and power loss for each consumer is evaluated by putting the value of corresponding current, line length and fixed value of resistance in equation1: $[3(I^2 \times R \times L)]$ for both existing LT- distribution system and proposed LT- Less distribution system [9].

VI. CASE STUDY

This case study includes calculation of power losses (I^2R losses) by using TC- Programming for the both existing LT- distribution system and proposed LT- Less distribution system and also a program under Turbo C++ is designed to calculate reduction in losses, annual savings and pay back period in order to check the feasibility of the proposed LT- Less distribution system.A case study of real distribution feeder in Hinotiya village is presented in this paper. The data along with single line diagram has been taken from Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company Limited (MPPKVVCL) [10,11].

VII. CALCULATION OF LOSSES IN EXISTING LT- DISTRIBUTION SYSTEM

The single line diagram of existing LT- distribution system of the Hinotiya Village is shown in figure 1. This figure shows a200 KVA distribution transformer is feeding the consumer's pump sets in the part of agricultural area of Hinotiya Village, (Madhya Pradesh).

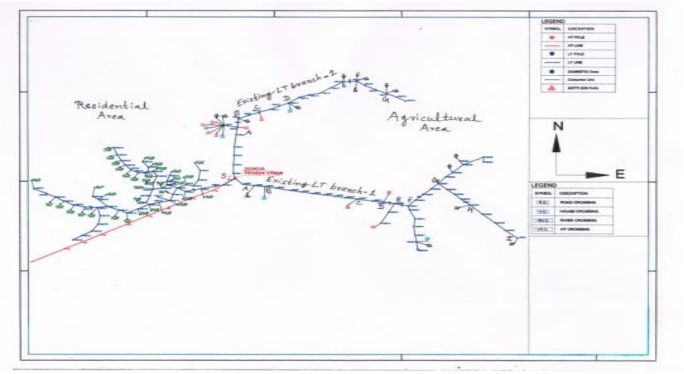


Figure 1:Existing LT- distribution system

A. Power Losses (I^2R Losses) in LT distribution System

To determine power losses (I^2R losses) in the existing LT line, the value of resistance of the conductor is required.Here,Weasel conductor of 30 sq. mm is used and the resistance for this particular conductor is 0.928 Ohm/Km. The power factor is assumed to be 0.8 andvoltage of the existing LT- distribution system is 433 volts. In figure 1, one main long distribution trunk line is taken for calculation of I^2R losses in the both LT branch-1 & LT branch-2 of the existing LT- distribution system. The length between one pole to another pole is 0.06 km. (say). Details of the consumers, loads, LT poles and length of the LT linefor the both existing LT branch-1 and LT branch-2are given in Table I and Table II respectively.

Table I. Data of existing LT branch-1

S. N.	Name of Consumer Point	No. of Poles	Length of LT Line (KM.)	Total Load in LT Line (HP)	Total Load in LT Line (Watts)
1.	A	2	0.12	47.5	35,435
2.	B	1	0.06	40	29,840
3.	C	8	0.48	35	26,110
4.	D	2	0.12	30	22,380
5.	E	1	0.06	27	20,142
6.	F	1	0.06	22	16,412
7.	G	4	0.24	14	10,444
8.	H	4	0.24	6	4,476
9.	I	4	0.24	3	2,238

In the both existing LT branch-1 and LT branch-2, the calculations of current and power losses are done by using programming in Turbo C++. The following flow chart represents the programming to calculate current and power losses in the existing LT- distribution system.

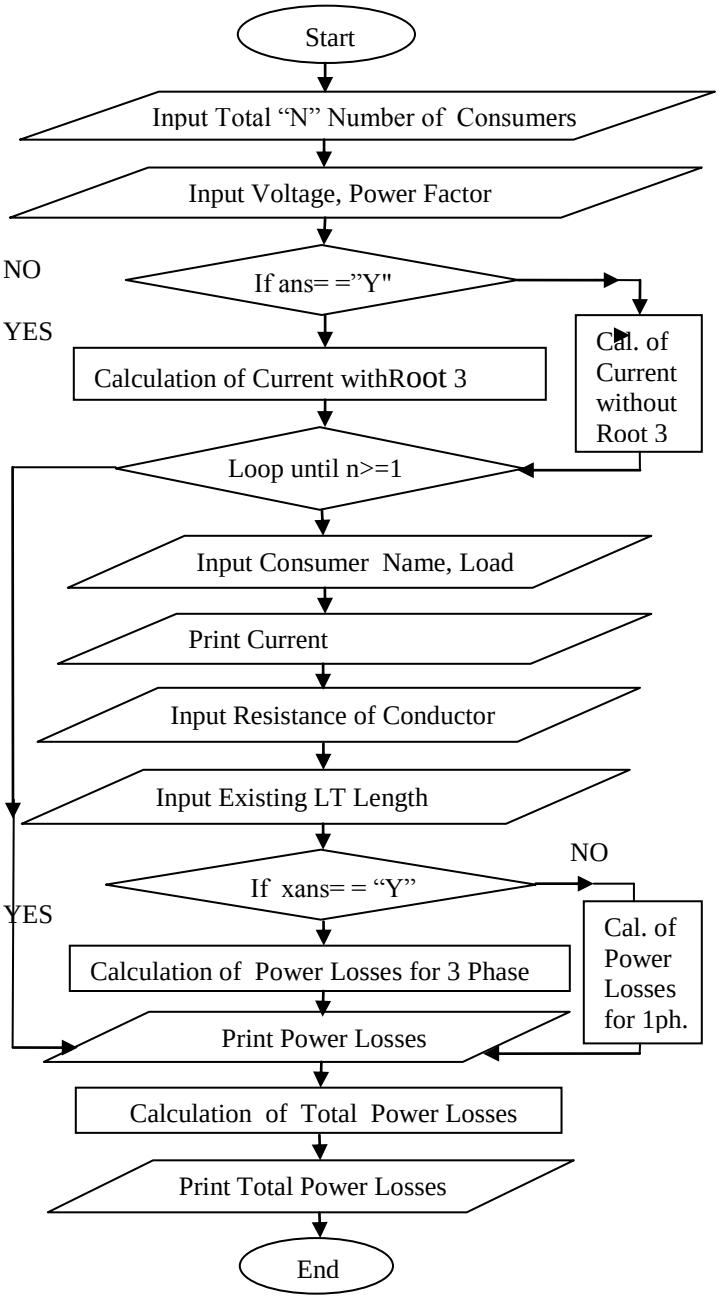
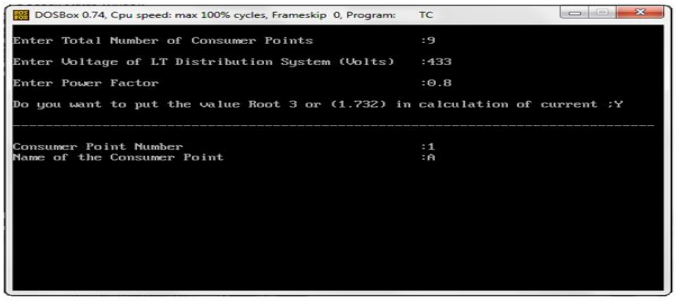
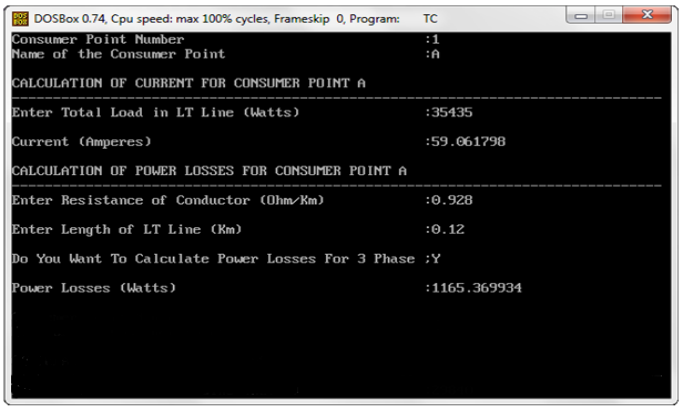


Figure 2: Flow chart for the calculation of power losses in existing LT- distribution system.

The output results of the current and power losses for data of Table I are shown below:

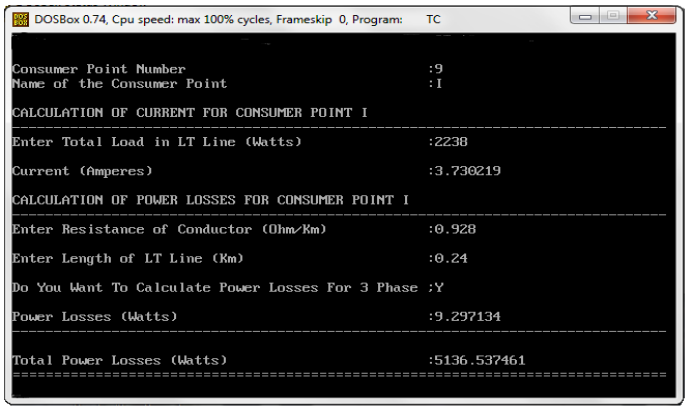


Screenshot 1: Total number of consumers in existing LT branch-1.



Screenshot 2: Current and power losses for the first consumerpoint "A" in existing LT branch-1.

Similarly, This process continues for all the remaining consumers of the existing LT branch-1. The screenshot of the last consumer point "I" and total power losses in existing LT branch-1 of the existing LT- distribution system is shown below:



Screenshot 3: Current and power losses for thelast consumerpoint "I" and total power losses in existing LT branch-1.

Hence, total power lossesin the existing LT branch-1 is 5136.537461 Watts.Similarly, This programming method is also applied in the existing LT branch- 2. Hence, current and power losses for the existing LT branch-2 are shown in Table II.

Table II. Data and power losses of existing LT branch-2

S. N.	Name of Con-sumer Point	No. of Poles	Length of LT Line (KM.)	Total Load in LT Line (HP)	Total Load in LT Line (Watts)	Current (Amp.)	Power Losses (Watts)
1.	A	**7**	0.42	66	49,236	82.064814	7874.672579
2.	B	1	0.06	25	18,650	31.085157	161.408578
3.	C	2	0.12	22	16,412	27.354938	249.989606
4.	D	3	0.18	17	12,682	21.137907	223.905979
5.	E	5	0.30	10	7,460	12.434063	129.126862
6.	F	1	0.06	8	5,968	9.94725	16.528238
7.	G	3	0.18	4	2,984	4.973625	12.396179

							Total-8668.028022

TotalLT- power lossesare evaluated by summing up the individual power loss of each load at the consumer point in LT branch-1 and LT branch-2 of the existing LT- distribution system. (refer- figure 1).
From Table I and Table II,
Total power lossesof the existing LT- distribution system
= [sum of power lossesin existing LTbranch-1
+ sum of power lossesinexisting LT branch-2]
= [5136.537461 Watts+8668.028022]= 13,804.56548 Watts

B. Transformer Losses in LT System

The transformer losses include no-load losses and full-load losses.In figure 1, a high capacity distribution transformer of 200 KVA is used to supply the power to the consumer's pump sets. For distribution transformer of 200 KVA, the fixed value of no-load losses and full-load losses are 550 Watts and 2800 Watts respectively.
Total Transformer Losses = (550 + 2800) = 3350 Watts.

C. Power Theft Losses in LT System

Power theft losses contribute to the 12% of total load. Hence, the sum of the all loads in existing LT branch-1 and LT branch-2 are 35,435 Watts and 49,236 Watts respectively.
Total Load (Watts) = (35,435 + 49,236) = 84,671 Watts
Thus, Total Power Theft Losses = 12% of Total Load (Watts)
= 12 % of 84,671 Watts
= 10,160.52 Watts

VIII. CALCULATION OF LOSSES IN PROPOSED LT-LESS DISTRIBUTION SYSTEM

The single line diagram of proposed LT- Less distribution system with small rating distribution transformers is shown in figure 3. In this diagram, LT- Less distribution has done only in the part of agricultural area of Hinotiya Village in which proposed HT lines are extended nearer to the consumer's pump sets as possible and power is distributed mainly through proposed HT (11 KV) lines.

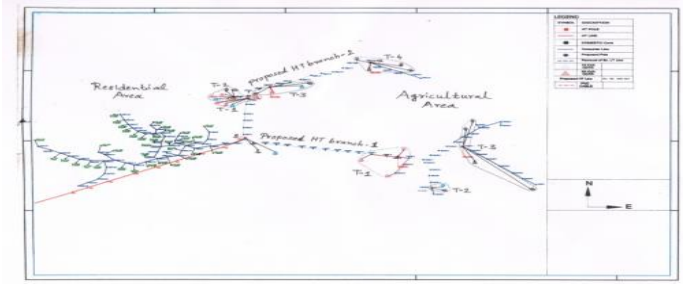


Figure 3: Proposed LT-Less distribution system

A. Power losses in proposed LT-Less distribution System

In the proposed LT- Less distribution system, voltage is 11000 Volts, as LT line is converted into 11 KV - HT line. The conductor of existing LT- distribution system is not replaced and the same existing conductor (i.e. weasel conductor) is used in proposed LT- Less distribution system. The resistance of the weasel conductor is 0.928 Ohm/Km.and power factor is assumed to be 0.8. In figure 3, one main long distribution trunk line is taken for calculation of I^2R losses in both HT branch-1 and HT branch-2 of the proposed LT- Less distribution system. Here, length between one pole to another pole is 0.06 km (say). Details of the consumers, loads,poles and length of proposed HT linefor the both proposed HT branch-1 and HT branch-2are given in Table III and Table IV respectively.The calculations of current and power losses in the both proposed HT branch-1 and HT branch-2 are done by using programming in Turbo C++. Hence, The following flow chart represents the programming to calculate current and power losses in the proposed LT- Less distribution system.

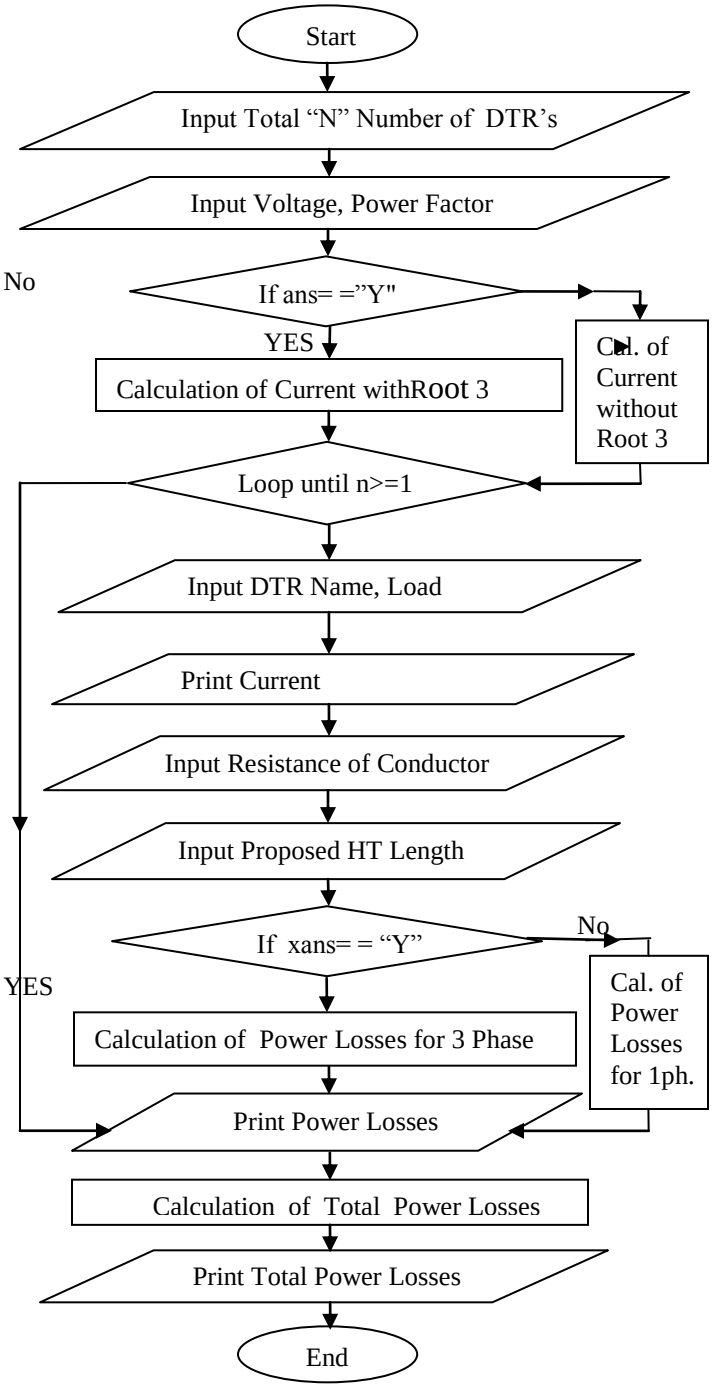
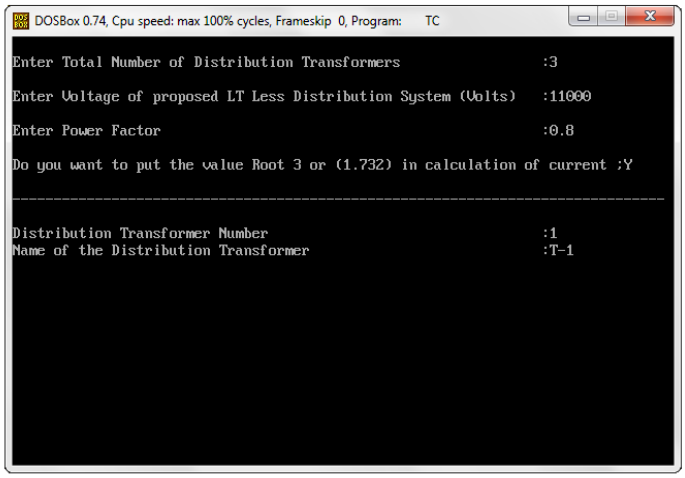


Figure 4: Flow chart for the calculation of power losses in proposed LT- Less distribution system.

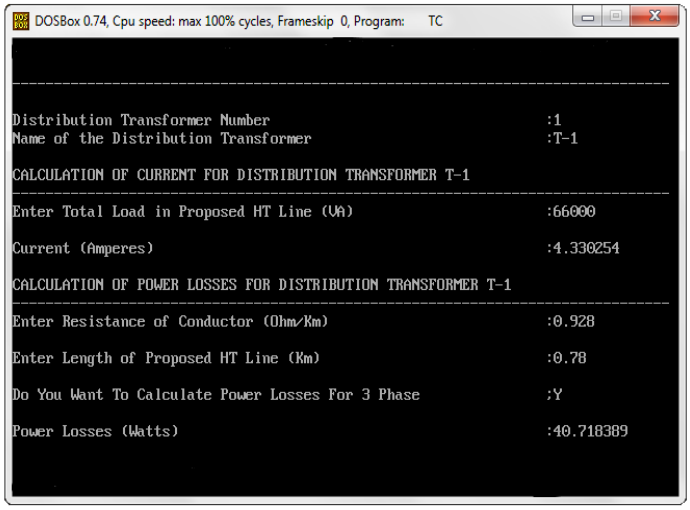
Table III.Data of proposed HT branch-1 in LT- Less distribution system

S. N.	Name of Distribution Transformer (DTR)	No.of Consumers Availing Load	No. of Poles	Length of HT Line(K M.)	Total Load in HT Line (KVA)
1.	T-1	3	13	0.78	66
2.	T-2	2	2	0.12	41
3.	T-3	4	5	0.30	25

From the data of Table- III, the current and power losses arecalculated by using Turbo C++programming in the proposed HT branch-1. Hence, the output results of the current and power losses for thedata of Table- III are shown below:

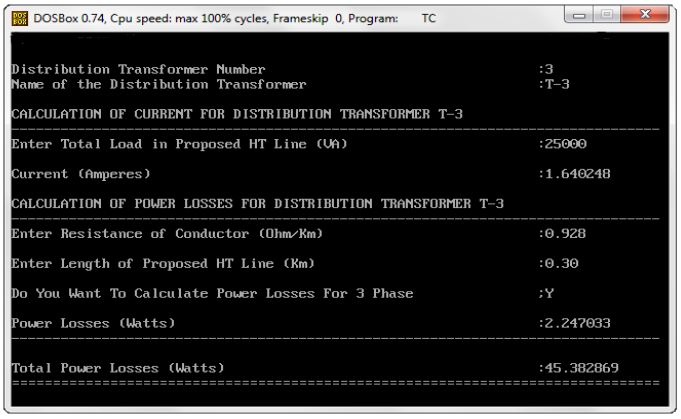


Screenshot 1: Total number of distribution transformers (DTR's) in proposed HT branch-1.



Screenshot 2: Current and power losses for the first distributiontransformer (DTR) "T-1" in proposed HTbranch-1.

Similarly, This process continues for all the remaining distribution transformers (DTR's) of the proposed HT branch-1. The screenshot of the last distribution transformer (DTR) T-3and total power losses in proposed HT branch- 1 of the proposed LT-Less distribution system is shown below:



Screenshot 3: Current and power losses for the last distributiontransformer (DTR) "T-3" and total power lossesin proposed HT branch-1.

Here, total power losses in the proposedHT branch-1 is 45.382869 Watts. Similarly, This programming method is also applied in the proposed HT branch- 2. Hence, current and power losses for the proposedHT branch-2 are shown in Table IV.

Table IV. Data and power losses of proposed HT branch-2 in LT- Less distribution system

S. N.	Name of DTR	No. of Consu-mers Availing Load	No. of Poles	Length of HT Line (KM.)	Total Load inHT Line (KVA)	Current (Amp.)	Power losses (Watts)
1	T-1	4	6	0.36	100	6.560991	43.143027
2	T-2	5	1	0.06	75	4.920743	4.044659
3	T-3	4	3	0.18	50	3.280495	5.392878
4	T-4	5	9	0.54	25	1.640248	4.044659
							Total-56.625223

Total HT- power lossesare evaluated by summing up the individual power loss of each load in the both HT branch-1 and HT branch-2 of the proposed LT- Less distribution system. (refer- figure 3)

From Table III and Table IV,

Total power lossesof the proposed LT- Less distribution system
= [sum of power losses in proposed HT branch-1
+ sum of power losses in proposed HT branch-2]
= [45.382869 Watts+ 56.625223]= 102.008092 Watts

B. Transformer Losses in LT- Less Distribution System

For 16 KVA DTR,The fixed value of no-load and full-load transformer losses are 60 Watts and 275 Watts respectively.

For 25 KVA DTR, The fixed value of no-load and full-load transformer losses are 110 Watts and 720 Watts respectively.

Total no-load losses for the proposed LT- Less distributionsystem= (Number ofDTR's) × (No-load losses)

Total full-load losses for the proposed LT- Less distributionsystem= (Number of DTR's) × (Full-load losses)

For the proposed LT- Less distributionsystem, number of various small rating DTR's (distribution transformers) aregiven in Table V. Hence, the value of no-load losses and full-load losses forthe proposed LT- Less distribution system is taken from Table V.

Table V. Transformer Losses in Proposed LT- Less DistributionSystem

S. N.	Capacity of Required Small Rating Distribution Transformers	No. of DTR's	TotalNo-Load Losses in Proposed LT- Less DistributionSystem (Watts)	TotalFull- Load Losses in Proposed LT- Less Distribution System (Watts)
1.	16	1	60	275
2.	25	6	660	4320
			Total- 720 Watts	**Total- 4,595Watts**

From Table V,
Total Transformer losses inthe proposed LT- Less distribution system = [sum of total no-load losses
+ sum of totalfull-load losses]
= [720 Watts + 4595 Watts] = 5315 Watts

IX. CAPITAL OUTLAY

It is estimated that total cost of the all required materials for the proposed LT- Less distribution system is Rs. 6, 80, 073.7603.

X. RESULTS

The results are obtained including comparison of existing LT - distribution system and proposed LT- Less distribution system, reduction in losses, annual savings and payback period.

A. Comparison of existing LT- distribution system and proposed LT- Less distribution system

The comparison of existing LT- distribution system and proposed LT- Less distribution system is given in Table VI.

Table VI.

S. N.	Parameters	Existing LT- Distribution System	Proposed LT- Less Distribution System
1.	Power Losses (Watts)	13,804.56548	102.008092
2.	Transformer Losses (Watts)	3350	5,315
3.	Theft Losses(Watts)	10,160.52	--
	Total -	**27, 315.08548 Watts**	**5417.008092 Watts**

Since, Total time period of the power supply in agricultural area is 8 hours of 24 hours in 250 days per annum.

Therefore,
Losses in terms of units in existing LT- distribution system
= (27,315.08548×8×250) ÷ 1000
= 54,630.17096Units

Losses in terms of units in proposed LT- Less distribution system
= (5417.008092×8×250) ÷ 1000
= 10,834.01618 Units

B. Reduction in losses, Annual Savings and Payback Period

The reduction in losses, annual savings and payback period are calculated by programming in Turbo C++. Hence, thefollowing flow chart represents the programming method.

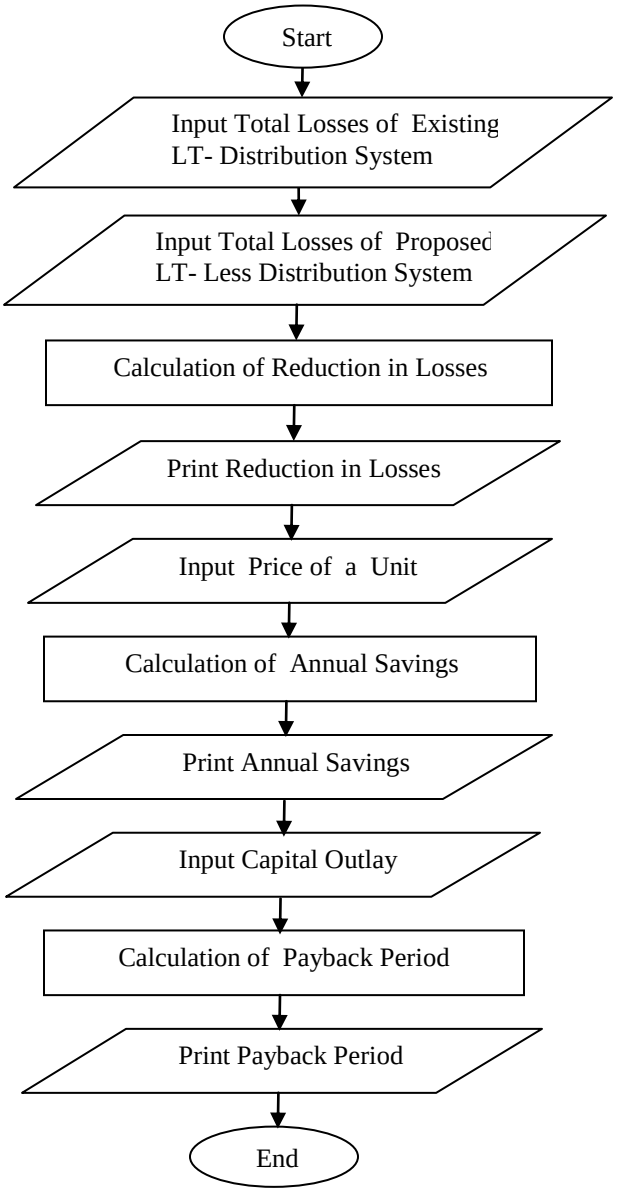


Figure 5: Flow chart for the calculation of reduction in losses, annual savings and payback period.

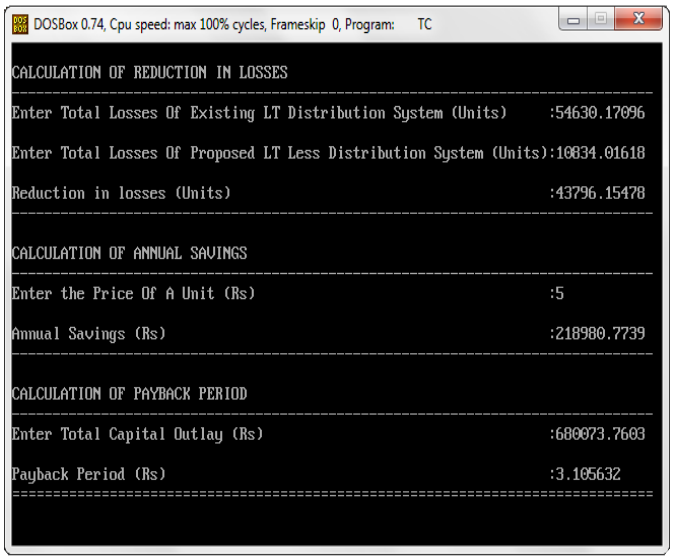
Here, the reduction in losses, annual savings and payback period are determined by the following formulas:

Reduction in losses (Watts)
= [Total losses of existing LT- distribution system
- Total losses of proposed LT-Less distribution system]

Annual Savings = Price of a unit × Reduction in losses per annum in terms of units

Payback Period = (Total Capital Outlay / Annual Savings)

Hence, the output result of the reduction in losses, annual savings and payback period is shown below:



Screenshot of Reduction in losses, annual savings and payback period.

XI. CONCLUSION

Effective implementation of LT-Less distribution technique has reduced the distribution losses ,failure of transformers, burning of agricultural pump sets etc. It is concluded from the study that the use of a small rating distribution transformer for 4 or 5 consumers has reduced the I^2R losses, electricity theft losses and outages. As in the proposed LT- Less distribution system, the registered consumers will feel ownership and take responsibility and not allow others to meddle with the LT lines, hence prevents the unauthorized load connections.Adoption of this innovative LT-Less distribution technique reduces both the technical as well as non-technical losses and improves the commercial and technical performance of the distribution system.It also provides better reliability and results in the increase in annual energy saving. However, initial cost is more because of use of more number of transformer, but it has been proved that the investment on conversion of existing LT- distribution system to proposed LT- Less distribution system can be easily recovered by the way of losses reduction and annual savings.In this paper, I^2R losses and payback period are calculated by using programming in Turbo C++in which it is found that losses are reduced by 80.168% and the payback period of the proposed LT- Less distribution system is 3.105 years.

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Model for Integrated Management of the Processes, Objectives, Risks and Performances

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Abstract: Organisation's subsistence and long-term sustained successin the conditions of international competitiveness and every day changes, depends on various key performances. Degree of accomplishing intended level of key performances depends on the processes management – of products or services (process results), objectives management – of strategic, tactical and operative, as well as, on performances management – of processes, products and services. While theoretical processes, as well as performances of processes, products or services are quite well defined, the problem is how to define to what the real objective strive. For example, in the ISO 9000:2005standard, *quality objective is something sought, or aimed for, related to quality,* or in ISO39000:2012 standard, *objective is result to be achieved, and performance is a measurable result*. Objectives are always oriented to some new performances of organization. Objectives and performances could mean activity, process or product, service or system or organization, in global. Obviously, result is the common denominator for all mentioned terms. In the realization of strategic, tactic and operative activities some risks can occur, which could influence their results. This requires risk management (ISO 31000:2009) process in combination with the all mentioned management aspects. The definition of risk itself has evolved from traditional to common one - *an effect of uncertainty on objectives,* and can be positive or negative, having the same aspects as objectives themselves. In this paper an original model of integrated management of the processes, objectives, risks and performances (IMPORP) is defined. It is proved to be practically management method for effective governing and managing of any organization.

Index Terms: *quality management, process, objective, risk, performance*

I. Introduction

Subsistence, especially sustainable organization success in the conditions of competitiveness and every day changes, does not depend only on one or few performances. It is necessary to continuously achieve acceptable level of all key performances of organization and its internal capabilities, according to stakeholders' requests.Degree of accomplishing intended level of key performances, from the methodological aspect, is the result of management process, in which products or organization's services are realized, and of management objectives whose effect should be increasing levels of processes themselves and their results, as well. This requires balanced guidance of the strategic and operative activities management. In the operative activities, as result of strategic activities, new process capabilities are integrated successively, and processes, products and services performances level is raised.

Process theorists have been wandering for a long time in terms of defining objectives. The problem was not so in the terms of measurability, predictability, challenging and feasibilityof the objectives, or of theirdeterminants of organisation level to which they are related (top level, individual functions, projects, products and processes), or in relation to time dimension (strategic, tactic and operative), as well. Actually, the problem has been always how to define place or point to which the objective strives. For example, quality objective is defined as: *'something sought or aimed for related to quality*'[6].

However, objectives have been always oriented to some new organisation performances. Intended levels of individual performances are required by these objectives, and then different methods for achieving these new levels are used.Within the framework of quality management an implicit relation between objectives and performances is established by their definitions. For example, in The Road Traffic Safety (RTS) management systems objective is defined as '*result to be achieved'*, and performance'*is measurable result*' [5]. In addition to that, performance, as well as objective could be related to activity, process, product, service, system or organisation, as a whole.On the other hand, product or service is defined as '*process result'*[6]. This is the way to reach terms of relations between processes, which realize products or services and performances, as measurable and accomplished results, and objectives that should be achieved. Obviously, result is common denominator for all mentioned terms.

Among realization of strategic activities and plans for achieving objectives, some risks can occur and influence their outcomes. The risks can occur in routine operative process activities, too, doesn't matter how well they are defined. This requires paying bigger attention to risk management, or to system management to maintain risk at the acceptable level, in combination with the all previously mentioned management aspects. The definition of risk itself evolved from traditional one that implies the risk as *'combination of an occurrence likelihood of a hazardous event or exposure(s)*'[8] to the general definition which implies the risk as '*an effect of uncertainty on objectives*'[4]. Therefore, according to new concept, effect of risk could be either positive or negative, which is

something new comparing to the traditional risk definition relating only to the negative results. New risk definition, like traditional one, is still related to potential events, as well as, to probability of their occurrences and consequences that they cause. Being related to the objectives, the risks have the same aspects as objectives themselves (i.e. national security, financial security, people's and health security, information security, food security, traffic security, environmental security etc.), and they could be applied to different levels or entities (i.e. strategic, functional, project, process or productive).

In the conditions of modern organisation guidance, management should make fast and high – quality decisions. The question is how to coordinate all mentioned components and to accomplish effective management, as well as how could help application of different standards for management systems in that. In this paper a model for integrated management of processes, objectives, risks and performances (IMPROP)is defined. In practice the modelproved to be a good management tool for effective guidance and management of any organisation faced to all challenges[15].

II. MODEL FOR INTEGRATED MANAGEMENT OF THE PROCESSES, OBJECTIVES, RISKS AND PERFORMANCES

2.1 Process input requirement and objectives

Process organisation is the basic of modern management systems. It includes management, which leads organisation and manages its processes and resources in performances accomplishing. The processes are key factor of modern organisation and they consist of activities and tasks, related to each other in that way they occur logically and accurately without any mistake, and by using the least of resources. They transform customers' requirements at input into products or services at output, adding process values in routine, secure and standard way. The processes integrate the three main attributes of the job - *motivated and trained people, techniques and tools*, and *procedures and method* of tasks performing [16]. By standardisation and automation of processes and using information technologies, every organisation can establish its management system structure in such way to function practically without any mistake, safely, reliably and with customers' and other stakeholders' trust. It is possible to establish structure of management system by using process organisations in mentioned way.However, the question is how such management system would function in the practice, containing high level of dynamism, risk and fluctuation?Figure 1 shows a general structure of management system, which consists of management that identifies and coordinates objectives achievement and plan realization, as well as processes and resources that realize products or services at customers' request.

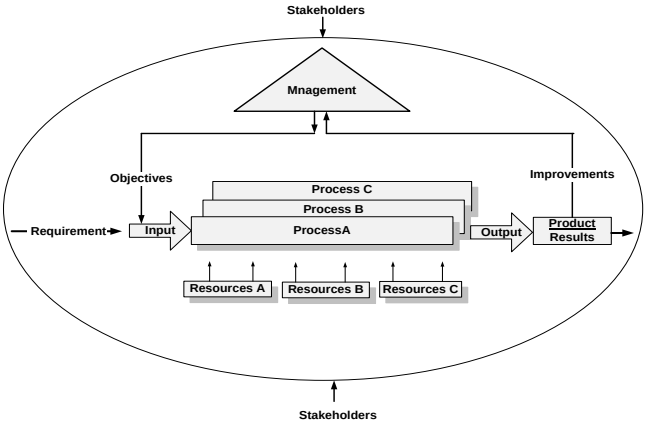

Figure 1: Management system general structure [10]

In order to be realized for a long term, first, it is necessaryto define precisely input for every process. An input consists of either products or services requirements that customer defines in an order or agreement or some other type of purchase, and of objectives that management should define, as well. Identifying requirements is generally standardized and it includes: requirements specifies by a customer, requirements which a customer did not show, but which are necessary for specified or intended use, regulation and law requirements applied on product, and all additional requirements, which organization considers to be necessary [7]. Processing requirements and their converting to product or service is also regulated by the same standard, and it does not pose any problem. Figure 1 shows simplified key business processes for products/service realization,where process values are added straight way to the customer. In general, all processes in an organization could be classified in four basic types [10]:

1. Management processes
2. Business processes
3. Processes for support (including security processes), and
4. Innovation and improvement processes.

Establishing and processing objectives is more complicated problem than establishing and processing requirements. While requirements are oriented to present, at particular projects or products/services, the objectives are oriented to the future, intended results, new products/services, higher business performances, etc. The objectives are defined by management, based on the established vision, mission, and value, or organization policy. All of these strategic management components must be based on present and future expectations of all stakeholders – customers, owners – shareholders, employees, partners and society, as well as, on assessment of internal and external conditions.

In the 50's, Peter Drucker developed management by objectives (MBO)system [13], which attracted great attention. In spite of the fact that this method was not structuredin detail, it defined objectives management concept and significantly influenced this approach to be applied at many organisations' management systems. At the beginning of 1990's this method was significantly adjusted and structured by development of today well known Balans Scorecard (BSC) method [14], used in many organizations with great success. Unlike traditional orientation at short-term profits and financial business perspective, the BSC includes the three additional categories of measuring from non – financial perspectives, such as: customers' satisfaction, internal business process, and learning and growth. Besides these business perspectives,the BSC includes four strategic processes for establishing relationship among strategic objectives and business performances, as well as twenty additional perspectives.

The authors developed an original IMPORP (**I**ntegrated **M**anagement of the **P**rocesses, **O**bjectives, **R**isks and **P**erformances) model and applied it in more than ten organizations, which already have been using the QMS according to the ISO 9001 standard [9]. This model consists of one process with ten unique aspects or objectives and performances perspectives. This model is proved to be applied in every organization [15].

2.2 Integrated management process of the objectives, risks and performances

Final result greatly depends on accuracy and integrity of defining objective coordinates. Therefore, it is very important to define comprehensively objective's coordinates and verify relationship between objective and risk to which it is exposed.Every objective must be determined by the three following basic dimensions [11]:

- *Performances dimension*, which represents intended levelof result, usually shown through indicators;
- *Timedimension,*when an objective should be achieved, and
- *Aspectsdimension* that shows stakeholders and capabilities or competition, which an objective refers to.

Intended result, which is denominator of every objective, most usually is not entirely accomplished, because of the risk factors that can occur. This is the reason why it is necessary to implement information[1]security management system (ISMS) [1] for maintaining risk at acceptable level. The problem emergesif an accomplished result has lower performances level and exceeds deadline that happens most often because of unpredictable influence of different risk factors. Implemented ISMS is an important cohesion factor of the objectives, risks and performances management process, as it provides reliable and secure functioning of business information system and maintains operative risk at acceptable level. Being accomplished performances of processes mostly depend on acceptable risk level.Figure 2 shows dimensions of every objective and its relationship with risks and accomplished results of organisation.

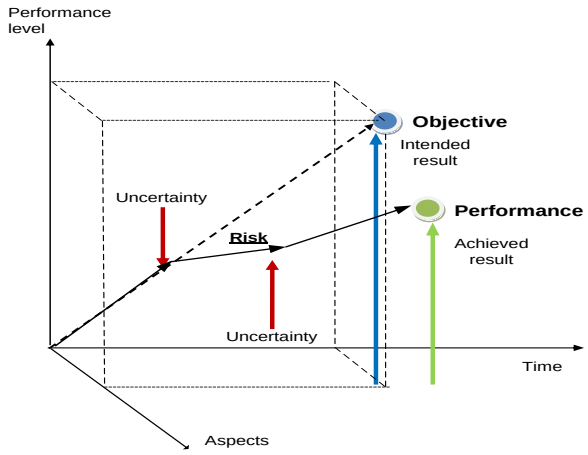

Figure 2: Dimensions of the objectives and risksimpact on the achieved results

[1]In the ISMS standard it is defined as *information asset* that consists of *pure information* (in electronic and printed forms and software), and *phisical* and *human* asset.

In order to establish relation between objectives as intended results, and performances as achieved results, it is necessary to determine indicators as measure of results level. It is important for objectives and performances management that objective and performance indicators are identical, whenever it is possible, andaspects of identical objective and performance to be defined.In the Figure 3 unique objectives aspects, as well as organisation's key performances with identical indicators are shown. Aspects of the objectives and performances are oriented to [10]:

a) All stakeholders that are:
   - Customers
   - Employees
   - Society
   - Partners, and
   - Owners or shareholders.

b) Internal capabilities and competitiveness of organization, which include:
   - Processes and management systems
   - Resources
   - Competitors
   - Products and service characteristics, and
   - Environment sustainability.

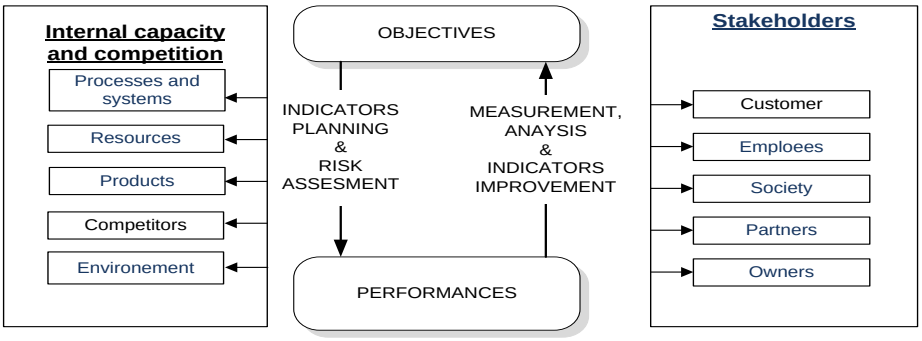

Figure 3: Aspects of the objectives and performances

In the first step, establishment of objectives is performed simultaneously with establishing key performances of organization. Then, objectives indicators are defined, which are, at the same time, performance indicators, too. Planning of indicators' value is doing during defining organization's objectives. For every indicator assessment and risk treatment should be done, too.Monitoring of indicators is doing during performances achievement in product/service realisation through regular activities. Improvement of the indicators values and objectives themselves is based on accomplished performances in the observed period of organization's business operation. So, the Deming's PDCA circle that depends on objectives (strategic, tactic, operative) time dimension is achieve.

Process of objectives deployment at all organizational levels, functions and processes (see Figure 4) is integrated into process of making and monitoring of annual business plan realisation. The process is developed as result of enlargement of quality management focus from quality systems compliance with standard requirements, to continuous achievement of organization objectives for all stakeholders. The key parts of objectives management process are as follows [10]:

a) *Defining general strategic objectives* at the level of whole organization based on statements of vision, mission and policy, and oriented to the all aspects for the period of four years.
b) *Defining tactic goals*for the entire organization within an annual business plan. These goals show strategic objectives' elaboration, adjusted for specific year. They contain financial and non financial objectives for entire organization with realistic and measurable indicators of organizational progress.
c) *Progress indicators determination* for each objective/goal that should be,as much as possible, identical with internal capacity performance indicators and organization's competitiveness (processes, resources etc.), and indicators of these processes results (products, services, financial results) oriented to stakeholders.

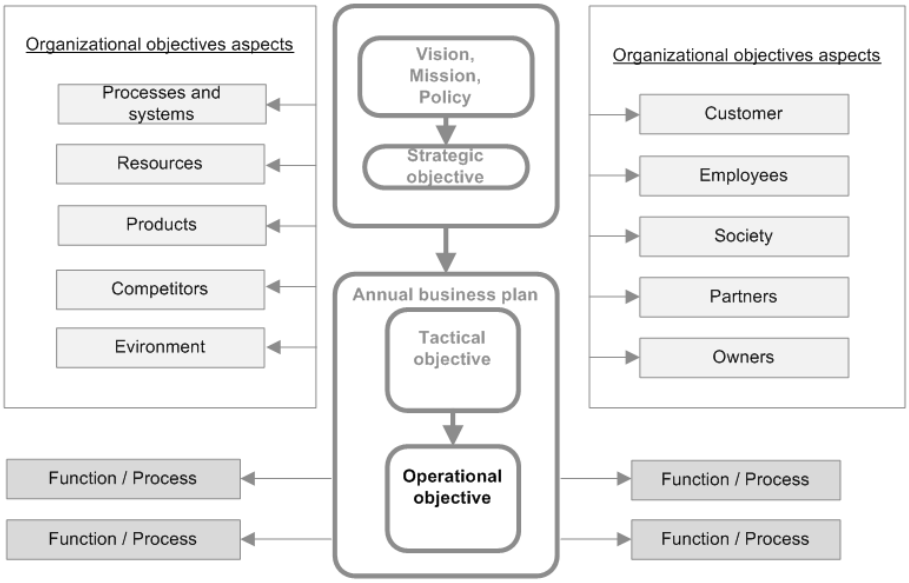

Figure 4: Process of quality objectives deployment

d) *Objectives deployment* for functions and all levels of entire organization is done by transferring tactic goals to operativetargetsfor each sector and process, together with accurate progress indicators. In this activity objectives could be additionally split up, according to key performances of specific organizational entity, and its processes and products.
e) *Determining plans* for objectives achievement represents an activity in the objectives management process in which process owner determines for every indicator:
   - Activities for achieving objectives
   - Activity owner responsible for objectives' realization
   - Strategic risks for achieving objectives
   - Adequate strategic responses and measures for risks mitigation
   - Activities and measures of deadlinesrealization
   - Financial and other required resources.

Figure 5 shows activities plan for objectives achievement. The objective in Figure 5 is defined with the two indicators. For every objective indicator there are two strategic activities with required resources for objective achievement. For every strategic activity risk factorsthat could influence objective achievement should be assessed,. In the first step risk identification is performed. Number of risk factors may be bigger or less than, or equal to the number of strategic activities. In this case five risk factors are identified where some risks are common for many strategic activities. In next step, risk assessment level is determined, by which a basic for evaluating and estimating risks is created. Evaluation helps to make decisions for risks treatment.

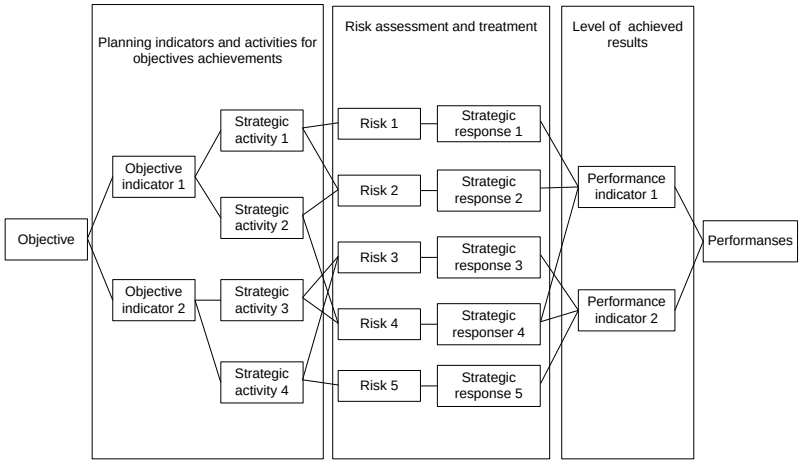

Figure 5: Planningachievement of objectives

Depending on risk assessment results, strategic responses and measures should be determined for appropriate risk treatment that may include [4]:

- *Avoiding risk*, like not initiating planned strategic activity
- *Increasing risk*, when it could lead up to new initiatives for improvement,
- *Eliminating risk causes*, such as vulnerabilities,
- *Changes of risk likelihood and consequences*, e.g. by reducing exposition to threats,
- *Distribution or sharing risk* with stakeholders (contractors, financial institutions etc.).

f) *Monitoring of objectives achievement* can be done by measuring and keeping track of data, which are used for confirming performance indicators, during regular operative activities in product realization.

g) *Objectives achievement analysis* is performed by creating SPC – Statistic Process Control graphic analysis of relations between progress of planned objectives indicators, and level of achieved performance indicators results.Effectiveness of objectives achievement counts as ratio of achieved to planed results. If decreasing of specific indicator is planed, effectiveness is counted as ratio of planed to achieved results [12].

h) *Qualitative review and objectives improvement* is done by management, as a part of regular analysis of business plan quantitative markers achievements. During this review, improvements of objectives are identified as input for next business plan.

2.3 Management system standardization

Management system standardization is becoming main question of organization functioning in twenty first century. Beside organization owners, whose priorities are profit and fastest return of capital investment, the different stakeholders (such as: customers, community, employees, suppliers and government) put higher pressure and set requirements to organizations in an organized way. They intended to adjust their management systems according to various standards, and to be sure in advance that they will fulfil their requirements and expectations.

Certification of different management systems according to international standards is becoming organizations' priority. The most important standards for management systems and standards for their effective support, as well as related stakeholders are shown in Table 1.

Table 1: Standards for management systems and their effective support

Management system / support for effectiveness		**Standard**	Stakeholders
Abbreviations	**Name**		
Standards for management systems to certification			
QMS	Quality Management System	ISO 9001:2008	Customer
EMS	Environmental Management System	ISO 14001:2004	Community
OHSMS	Occupational Health and Safety Management System	OHSAS 18001:2007	Employees
FSMS	Food Safety Management System	HACCP/ ISO 22000:2005	Customer
FMS	Financial Management System	Sarbanes – Oxley Act	Shareholders
ISMS	Information Security Management *Systems*	ISO/IEC 27001:2005	Shareholders
SMS	Security Management Systems	ISO/PAS 28000:2005	Shareholderscommunity
CTCL	General requirements for the competence of testing and calibration laboratories	ISO / IEC 17025:2005	Customer
ENMS	Energy Management Systems	ISO 50001:2011	Customers community
RTS	Road Traffic Safety Management Systems	ISO 39001:2012	Customers community
Support standards for common affectivity of integrated management systems			
GSR	Guidance on Social Responsibility	ISO 26000: 2010 (*)	Stakeholders

Management system / support for effectiveness		Standard	Stakeholders
Abbreviations	**Name**		
MSSO	Managing for the sustained success of an organization — A quality management approach	ISO 9004:2009 (*)	Stakeholders
RM	Risk Management	ISO 31000:2009 (*)	Stakeholders

III. STRUCTURE OF THE MODEL FOR INTEGRATED MANAGEMENT

Integration of all mentioned management systems with current systems in organization into an operative management system has major significance for their managers. Effectiveness of every management system is measured by their objectives achievement level. Purpose of every mentioned management system is to define management methodology of:

- Policy and particular system objectives;
- Risks which influence objectives achievement, and
- Processes and resources which are appropriate for fulfilling stakeholders' requirements, needs and expectations.

Figure 6 shows functional structure of integrated management system, which provides application of IMPROP model, shown in figures 3, 4, 5.

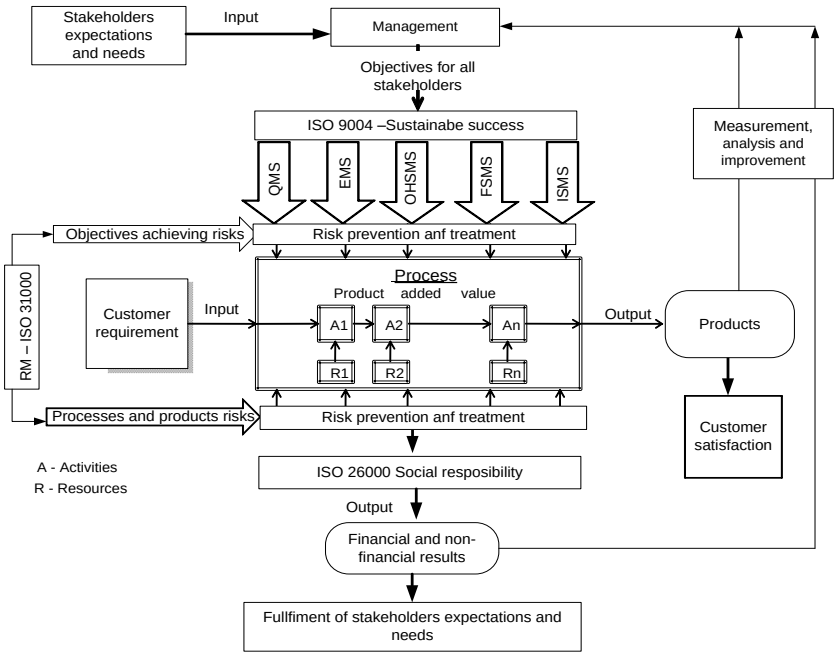

Figure 6: Functional structure of the integrated management system model

By establishing individual management systems according to appropriate standards that are shown vertically in Figure 6, a structure of partial management systems is defined, as fallowing:

- QMS, according to ISO 9001 standard intended for defining processes for input transformation and adding product value, and for risk non-conformance prevention (treatment), and for confirmation and realization of quality objectives.
- EMS, according to ISO 14001 standard, purposed for environment risk prevention (treatment) and environment objectives and program determination and realization.
- OHSMS, according to OHSAS 18001 standards, made for occupational health and safety risk prevention (treatment), as well as occupational health and safety objectives and program determination and realization..

- FSMS, according to ISO 22000 standard, made for food safety risk prevention (treatment) and determination of objectives and HACCP plans for food safety.
- ISMS, according to ISO/IEC 27001 standard made for information security risk prevention (treatment), and determination of information security management system objectives and programs etc.

Customers' requirements, as routine activities, are inputs in process, and for objectives defining they are needs and expectations of stakeholders that management must identify. Similar to it, the process outputs to customers are products and services, and to other stakeholders whose results are performances of achieved objectives can be defined.

Using standards, which are shown horizontally in Figure 6, provides unique methodology establishmentfor common and balanced effectiveness of integrated management systems, so that:

- ISO 9004 standard provides guidance for organizations support to achieve sustainable success in satisfying their customers and other stakeholders' needs and expectations, through balanced objective achievement of integrated management system, as a whole,
- ISO 31000 standard provides common approach and support to standards of different management systems that deal with specific risk aspects,
- ISO 26000 standards help to organizations for establishment of social responsibility objectives that contribute to sustainable development.

Using IMPROP model is possible in the case of using one or more management system standards. Standards for management system effectiveness support are complementary among themselves and it is recommended to use them simultaneously. It is especially important to emphasize significance of team work in application of this model, because multidisciplinary experience and creativity as result of exchanged views are required.

IV. CONCLUSION

In searching for quick answers, because of changes in environment, modern management is obliged to continuously raise performances level of its organization. The managers must make strategic and operative plans and decisions at the same time, too. However, requirements for quality and reliability need standardization of not only products but also management system itself. Thesearenot small challenges for the management'sactivities.

The IMPROP model, presented in this paper, joins all requirements faced to managers in methodological terms and provides input to integrated and simultaneous management of the processes, objectives, risks and performances. This model can be integrated into structure of any standardized management system according to international standards, such as: ISO 9001, ISO 14001, ISO 27001 etc.

It is generally accepted that integration of individual management system structure itself, in the terms of responsibility, documents, audits, review etc., is already very well known fact. The IMPROP model goes one step ahead and establishes unique and balanced effectiveness of integrated management systems and management system as a whole, using standards for sustainable success, social responsibility and risk management.The results of the IMPROP model application in different organizations using existing infrastructure and practice of drafting and monitoring business plan, proved to beeffective management method for any organization[9], [10], [11], [12] and [15]. This model has been created as an open system in which specific objectives and performances of the organization can be included optionally.

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Estimating the Level of Phosphate Solubilising Bacteria and Azotobacter in the Vermicompost of Eudrilus Eugeniae and Perionyx Excavatus with Various Combinations of Cow- Dung and Saw-Dust

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Abstract- Vermicomposting using *Eudrilus eugeniae* and *Perionyx excavatus* was carried out from May to October 2012 by Tray method wherein the worms were fed with cow-dung and saw-dust. The phosphate solubilising bacteria and Azotobacter were estimated in both precompost and vermicomposts prepared in different ratios of the raw materials (1:1, 1:1.5, 1:2 and 1:3). The samples were serially diluted between $10^{\square\square}$ $\square\square 10^{\square\square}$ and inoculated on to the Pikovskaya's medium and Jensen's medium which were then incubated for 24 h. The total number of phosphate solubilising bacteria and Azotobacter colony was counted. Each colony was stained with methylene blue and identified by its morphological characters. Three different groups of Phosphate solubilising bacteria (*Bacillus, Streptomyces,and Pseudomonas)* and one nitrogen fixing bacteria *(Azotobacter***)** were identified.

Index Terms- Vermicompost, Pre-compost, *Eudrilus eugeniae*, *Perionyx excavatus*, Phosphate solubiliser, Azotobacter.

I. INTRODUCTION

In sustainable agriculture, vermicompost plays a crucial role. In this technology, the organic wastes are converted into nutrient compounds with the help of earthworms as natural reactor [1]. The vermicompost contained desirable nutrients, plant growth hormones and high levels of soil enzymes [2,3]. Previously, the vermicompost was produced from various organic materials such as horticultural residues [4], mushroom wastes [5], horse wastes [6], pig wastes [7,8] brewery wastes[9], sericulture wastes[10], municipal sewage sludge [11,12] agricultural residues [13] weeds [14] cattle dung[15] industrial wastes [16,17] sludge from paper mills and dairy plants [18,19] domestic kitchen wastes[20], urban residues and animal wastes[21,22]. The vermicompost productions mainly rely on earthworm species, and the desirable composition of the feeding materials. The earthworm species life cycle, feeding habits and reproduction must be known in order to produce high quality vermicompost. The vermimicrobial populations play a crucial role to hold the nutrients over longer periods without adverse impacts on the environment; the microbial populations also help to solve the acid soil problems, because the pH of vermicompost materials is neutral to alkaline. The diverse population of the microorganisms favours the biochemical reactions between vermicompost and the plants. So it's very important to isolate and identify the microbes from vermicompost[23]**.** The microbial composition in vermicompost varies based on the type of earthworm and feeding materials. In this work, we used the following earthworm species *i.e*., *E. eugeniae* and *P. excavatus* to produce vermicompost. The *E. eugeniae* which is commonly called 'African Night crawler' has high rates of growth and reproduction and is capable of decomposing large quantities of organic wastes rapidly [24]. *P. excavatus*, a tropical earthworm is extremely prolific for use in vermiculture. It is a commercially produced earthworm. They are also known as "blues" or "Indian blues". This species is particularly good for vermicomposting in tropical and sub-tropical region [25]. Mayiladuthurai taluk (study area) in Nagapattinam district is regarded as a portion of "Granary of Tamil Nadu" supports diverse assemblage of earthworm species coupled with other agricultural wastes and hence the present study assumes importance.

II. MATERIALS AND METHODS

Collection of raw materials:

The raw materials such as cow-dung was collected from Mannampandal area, and the saw-dust collected from two different saw mills located at Mayiladuthurai in Nagai district.

Pre-composting and vermicomposting:

The pre-compost was prepared by mixing cow-dung and saw-dust in the ratio of 1:1, 1:1.5, 1:2 and 1:3 separately in plastic bowls and by sprinkling water for the first two days. After 20 days the pH of the pre-compost was adjusted to be neutral (pH 7). 6 kg of each ratio was taken in a set of five experimental and control plastic trays (46 cm length,26 cm width,13.5cm depth) for each species (*E. eugeniae* and *P. excavatus*). The earthworms were inoculated in the appropriate trays and the trays were covered with nylon mesh to protect them from the predators. Moisture was maintained in the composts for 40 days by sprinkling water daily. After the treatment the vermicomposts were collected, and then the phosphate solubilising bacteria and Azotobacter colonies were isolated and their populations were counted by using colony count method.

Isolation of phosphate solubilising bacteria:

2g of vermicompost as well as pre-compost and raw cow-dung were serially diluted with distilled water from $10^{\square\square}$ to $10^{\square\square}$ separately. 45g of Pikovskaya's medium (26) was dissolved in 1000 ml of distilled water and autoclaved for about 30 min.

Then the medium was poured in the petriplates and allowed to cool. After solidification the serially diluted samples were inoculated by pour plate method in the appropriate plates. The plates were incubated at 37°C for 48 h and the bacterial colonies with different phosphate solubilisers were counted and identified by their physical characteristic features such as size, form and shape, and by simple staining using methylene blue dye.

Isolation of Azotobacter in vermicompost:

2g of vermicopost as well as pre-compost and raw cow-dung were serially diluted with distilled water from $10^{\square\square}$ to $10^{\square\square}$separately. 47g of Jensen's medium (26) was dissolved in 1000 ml of distilled water and autoclaved for about 30 min. Then the medium was poured in the petriplates and allowed to cool. After solidification the serially diluted samples were inoculated by pour plate method in the appropriate plates. The plates were incubated at 37°C for 48 h and different types of Azotobacter were counted and identified by their different colour, physical characteristic features such as size, form and shape, and by simple staining using methylene blue dye. After forty eight hours they become brick red colour and they were confirmed as Azotobacter.

III. RESULTS AND DISCUSSION

Vermicomposts were prepared by using different composition of cow-dung and saw- dust by inoculating two different earthworm species *viz*., *E. eugeniae* and *P. excavatus* .The phosphate solubilising bacteria [27,28] and Azotobacter colonies [29] were isolated from each vermicompost as well as precompost. Totally, three different bacterial colonies (Bacillus, Streptomyces and Pseudomonas *sp*.) were isolated and identified based on their colony morphology as well as microscopical structure of the individual bacteria and it was shown in Fig 1. Bacillus, Streptomyces and Pseudomonas *sp*. and are all the most powerful phosphate solubilizers [30] and one nitrogen fixing bacteria[31] such as Azotobacter (Fig 2).

In the present study the Phosphate solubilisers and Azotobacter colonies length in compost were measured based on both before and after of *E. eugeniae* and *P. excavatus* and it was shown in Table 1. From the results, the *E. eugeniae* treated vermicompost showed a maximum phosphate solubilisers and azotobacter colonies length. The population of microorganism was significantly increased by 30 per cent in *E. eugeniae* treated samples and the results were shown in Table 2 and 3. The population of bacteria in microbially enriched manures (cow dung and saw dust) showed significantly increased by 50 per cent as compared to the manures treated with *E. eugeniae and P. excavatus*

The results further revealed that Phosphate solubilisers are the most powerful solubilisers as they contain insoluble mineral phosphates which get converted as the single phosphates sources [32]. Azotobacter in the presences of vermicompost is reported to be more effective than other bio-fertilizers. They mainly promote nitrogen fixing of the soil [33]. The phosphate solubilising bacteria and Azotobacter in vermicompost of an unusual waste (saw-dust) was checked and vermicompost of saw-dust with cow-dung at different ratios favoured the growth of certain phosphate solubilising bacteria such as Bacillus, Streptomyces, and Pseudomonas *sp*. and nitrogen fixing bacteria Azotobacter as well as the phosphate solubilising capacity of these bacteria has already been verified by many investigators [27,28]. Further, the results of present study support the role of earthworm in recycling the saw wastes in an effective manner with environmental protection. Hence, we suggest to utilising the saw-dusts in the preparation of vermicomposts using earthworms such as *E. eugeniae* and *P. excavatus* without polluting the environment. Further, the vermicomposts prepared by using saw-dusts as substrate would be more suitable natural fertilizer to improve the soil fertility since they contain significant quantity of Azotobacter and phosphate solubilising bacterial population. Further, vermicastings are effective bio–fertilizers containing beneficial soil micro-flora and earthworm cocoons. When covered with a layer of mulch in the soil, they produce a huge earthworm population of organic fertilizer and in this way it is an essential component of natural farming.

IV. CONCLUSIONS

In conclusion, the experimental data here demonstrate that the vermicompost produced by *E. eugeniae* and *P. excavatus* is capable of producing Azotobacter and phosphate solubilising bacterial populations. The results of the microbial population indicated that the Azotobacter and phosphate solubilising bacterial population is 50 % higher in *E. eugeniae* produced compost using cow-dung and saw-dust mixer. The valuable bacterial strains quantified in this study may be useful in the production high quality compost for sustainable agriculture.

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Figure captions:

Figure 1. Culture plate Results showing different Phosphate solubilizing bacteria in Pikovskaya's medium .

Figure 2. (a) Culture plate results showing Azotobacter in Jensen's medium. (b) Microscopic view results (40x) of Azotobacter collected from vermicompost, after staining with methylene blue dye

Table1. A comparison of mean length and width of Phosphate solubilizing bacterial (PSB) colonies and Azotobacter colonies in control and vermicomposts of two different species *(E. eugeniae* and *P. excavatus)*.

S. No.	Species		Mean Length of PSB and Azotobacter colonies (cm)	Mean Width of PSB and Azotobacter colonies (cm)
1	Control		0.84 ± 0.4094	0.48 ± 0.2513
2	Vermicompost	*E. eugeniae*	1.31 ± 0.3685	0.85 ± 0.3478
3		*P. excavatus*	0.85 ± 0.2989	0.49 ± 0.1526

S. No.	Different Ratios of	Control	*E. eugeniae*	*P. excavatus*

Table 2. A comparison of mean length and width of microorganisms treated with various ratios of cow-dung and saw-dust in vermicomposts of E. eugeniae and P. excavatus

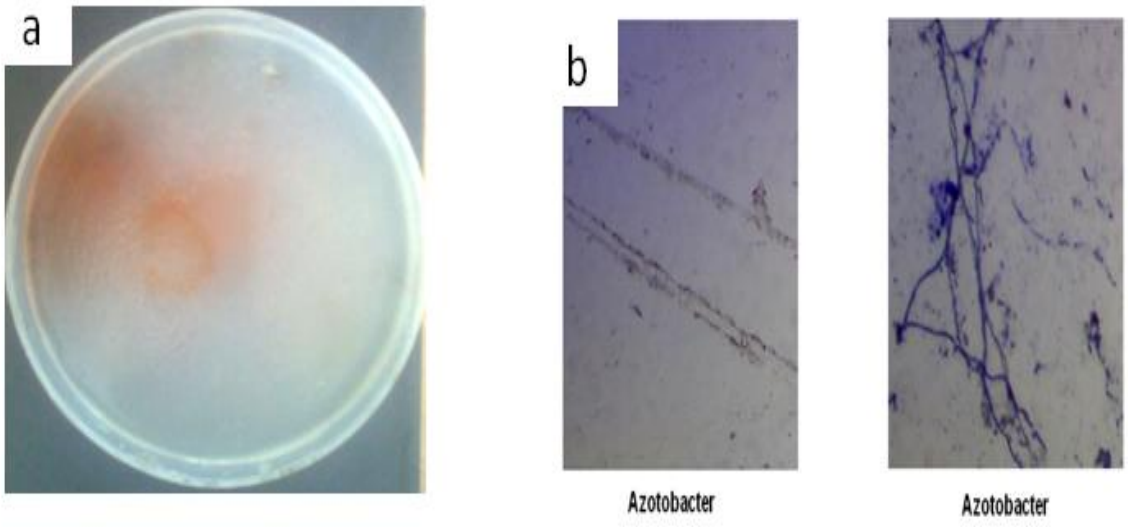
		Length (cm)	Width (cm)	Length (cm)	Width (cm)	Length (cm)	Width (cm)
1	Cow-dung	0.68 ± 0.22	0.34 ± 0.15	1.33 ± 0.56	0.84 ± 0.43	0.84 ± 0.18	0.47 ± 0.13
2	1:1	0.59 ± 0.20	0.29 ± 0.09	1.07 ± 0.46	0.59 ± 0.32	0.89 ± 0.30	0.57 ± 0.23
3	1:1.5	0.72 ± 0.38	0.42 ± 0.17	0.87 ± 0.45	0.55 ± 0.33	0.94 ± 0.45	0.69 ± 0.36
4	1:2	0.70 ± 0.30	0.46 ± 0.23	1.24 ± 0.33	0.79 ± 0.38	0.78 ± 0.30	0.47 ± 0.19
5	1:3	1.42 ± 0.70	0.70 ± 0.23	0.90 ± 0.46	0.48 ± 0.23	0.83 ± 0.37	0.48 ± 0.18

Table 3. Analysis of Variance (ANOVA) to study the impact of length and width of phosphate solubilizing bacteria and Azotobacter in vermicomposts (E. eugeniae and P. excavatus)

S.no	Parameters	Sources	DF	Seq ss	Adj MS	F	P
1	Length	Species	2	2.89	1.47	9.48	0.00
2		Ratio	4	0.41	0.07	0.44	0.78
3		Dilution factor	4	1.74	0.43	2.81	0.03
4		Error	131	20.27	0.15		
5		Total	141	25.31			
6	Width	Species	2	1.43	0.71	10.20	0.00
7		Ratio	4	0.13	0.03	0.47	0.75
8		Dilution factor	4	0.65	0.16	2.35	0.06
9		Error	131	0.05	0.07		
10		Total	141	11.26			

Figure 1.

Figure2.



An Efficient Synthesis of 2-Substitutedphenyl-4-(4-Methoxyphenyl)-5-phenyl-1H-imidazole from 4-Methoxybenzil under Microwave irradiation

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Abstract- An eco-friendly method has been employed for the synthesis of 2-Substitutedphenyl-4-(4-methoxyphenyl)-5-phenyl -1H-imidazole under microwave irradiation .The synthesis of 2-Substituted phenyl -4- (4-methoxyphenyl)-5-phenyl-1H-imidazoles by one step condensation of an substituted aldehyde ,4-methoxyl benzil ,ammonium acetate .The structure of the product were characterized by ^{1}HNMR ,IR ,elemental analysis , and melting point .In conclusion of this method gives some advantages such as a green method , good yield , simple procedure , easy work up , needed short reaction time , less expenditure of energy , and less pollution .

Index Terms **–** Trisubstituted imidazoles, Solvent free , MW irradiation , multi-component reaction .

I. INTRODUCTION

Imidazole is an organic aromatic heterocyclic compound with the formula$C_3H_4N_2$. Imidazole ring system has many pharmacological properties and play important roles in biochemical processes. Derivatives of imidazole were reported for anti-inflammatory [1-4], analgesic [5], anti-convulsant [6-7]. Triarylimidazoles are used in photography [8] as photosensitive compounds. Many of the substituted imidazoles are known as inhibitors of fungicides, and herbicides, plant growth regulators and therapeutic agents [9]. Several substituted imidazole are known as inhibitors of p-38 Kinase [10]. Highly substituted imidazole , like Lipidilines A and B [11] used to exhibit micro molar cytotoxicity against several human cancer cell lines . Literature survey reveals that there are several methods for synthesizing them , mainly using nitriles and esters [12-14].In resent years , substituted imidazoles are substaintially used in ionic liquids [15] that has been given a new approach to "Green Chemistry ".There are several methods for the synthesis of 2,4,5-trisubstituted imidazoles by three component cyclocondensation of a 1,2-diketone , with an aldehyde and ammonium acetate which comprise the use of microwave [16-17] ,Ionic liquid [18] , refluxing in acetic acid [19-20] ,Silica sulfuric acid [21] ,$NiCl_2.6H_2O$ / Al_2O_3 ,Iodine [23] ,$Zr(acac)_4$ [24] ,Sodium bisulfite[25] ,L-proline [26] .Most of these synthetic methods suffer from one or more serious drawbacks such as laborious and complex work-up and purification ,significant amounts of waste materials ,high temperature ,low yields , long reaction times and the of expensive reagents

We were reported a reliable , rapid , and environmentally benign method for the synthesis of 2-Substitutdphenyl-4-(4-methoxyphenyl)-5-phenyl-1H-imidazoles has been developed under microwave

irradiation .Compared to previous reported methodologies , the present protocol features , simple operations , short reaction time , environmental friendliness , less pollution , saving of energy and good yield .

II. EXPERIMENTAL SECTION

Materials - Substituted aromatic aldehyde , Anisaldehyde , Benzaldehyde , Sodium Cyanide ,ethanol ,Conc. Nitric acid ,Ammonium acetate ,glacial acetic acid is required chemicals purchased from merk and S-d fine chemicals .All the reported melting points were taken in open capillaries and are uncorrected .IR spectra were measured by using Perkin Elmer Model 2000 Spectrophotometer and are given in cm^{-1} using KBr disc ,^{1}HNMR spectra were measured in DMSO by using Bruckner Avance 400MHz spectrophotometer using TMS as an internal standard .The purity of all the synthesized compound was tested by TLC on silica gel plate using ethyl acetate , petroleum ether (80 : 20)and iodine was used as a visualizing agent .Microwave synthesis was carried out on a ETHOS 1600 , Milestone microwave reactor .

- **General procedure for the synthesis of 4-Methoxybenzil [1-(4-Methoxyphenyl)-2-phenylethan-1,2-dione] (C_2)**

Took 5.5 gm 2-hydroxy-1-(4-methoxyphenyl)-ethan-1-one (C1) dissolved it in 12ml glacial acetic acid then added 18 ml Conc. Nitric acid slowly to a reaction mixture with controlled temperature by using ice-bath .Refluxed the reaction mixture for 2 hours until the complete evolution of brown gas , stopped reaction and cooled , poured into crush ice-cold water with stirring obtained a solid product , Filter, dried it, the crude product was recrystallized from ethanol .

Yield- 65% , M.Pt- 63 ^{O}C , M.Wt- 240 , Formula- $C_{15}H_{12}O_3$.
IR (KBr cm^{-1}) 3071.27 (C-H Ar) , 2991.10 (C-H ali –OCH_3), 1676.27 (C=O) , 1535.59 (C=C) , 1208.17 (C-O) .
^{1}HNMR (400MH_Z , DMSO) 3.9 (S ,3H ,-OCH_3) , 7.2 (d ,2H, phenyl) , 7.5 (d ,2H , phenyl) , 7.96 (1H phenyl) , 8.0 to 8.6 (m , 4H) .
Anal .Caculation for $C_{15}H_{12}O_3$

Element	C (%)	H(%)	O(%)
Found	75.06	4.91	19.85
Calcd	75.00	4.95	19.83

***Synthesis of 2-(Substituted phenyl)-4-(4-Methoxyphenyl)-5-phenyl-1H-imidazoles (4a-4l) under Microwave irradiation :-**

A mixture containing 1-(4-methoxyphenyl)-2-phenylethan-1,2-dione (0.1 mol) ,ammonium acetate (0.2 mmol) , aromatic aldehyde (0. 1 mmol) was taken in a 100ml beaker added 2 to 3 drop of glacial acetic acid .The reaction mixture was mixed properly with the help of glass rod and put in a microwave oven .The mixture was irradiated at 145 W and irradiated for a period 30 sec at a time , After each irradiation the reaction mixture was removed from the microwave oven for shaking .The total period of microwave irradiation was 1- 6 min (Table -1) .After TLC (Petrolium ether : ethyl acetate 9:1) indicating the starting materials of 4-methoxybenzil and aldehyde had disappeared .The reaction mixture was cooled to room temperature and poured into ice water (50 ml) obtained solid

product , filter washed with water , dried and recrystallized from ethanol to get the corresponding product (4a-4l) were confirmed by IR , ^{1}HNMR melting point , and elemental analysis .

***Spectral Data of 2-(Substituted phenyl)-4-(4-methoxyphenyl)-5-phenyl-1H-imidazoles: –**

1. 2-Phenyl-4-(4-Methoxyphenyl)-5-phenyl-1H-imidazole (4a) --

Solid Colourless , M.Pt- 210 ^{O}C . Formula – $C_{22}H_{18}ON_2$, M.Wt- 326.

IR (KBr cm^{-1}) 3440 (N-H) ,3021 (C- H arom) , 2920 (C-H aliph) , 1675 (C=N) , 1426 (C=C aro) 1092 (C- O)

^{1}HNMR (400 MHz , DMSO) 4.04(S, 3H –OCH_3), 6.8 (d, 2H) , 7.0 (d, 2H),7.2 (d ,2H) ,7.3 to8.1(m ,8H) , 9.2 (S , 1H , N-H)

Anal. Calculation for $C_{22}H_{18}ON_2$ –

Element	C(%)	H(%)	O(%)	N(%)
Found	77.55	5.63	8.98	7.86
Calculated	77.59	5.56	8.96	7.90

***2-(4-Chlorophenyl)-4-(4-Methoxyphenyl)-5-phenyl-1H–imidazole (4 b) –**

Colourless solid , M.Pt- 242 ^{O}C , Formula- $C_{22}H_{17}N_2OCl$, M.Wt- 360.5

IR (KBr cm^{-1}) 3454 cm^{-1}(N-H) , 3054 cm^{-1}(C-H arom) ,2938 cm^{-1}(C-H ,aliph) , 1682 (C=N) , 1426 (C=C) ,1092 (C-O Str) , 761 cm^{-1}(C- Cl) .

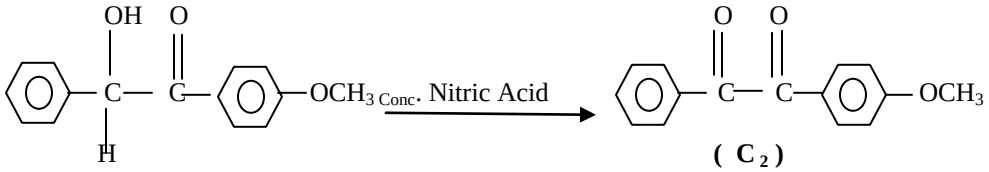
^{1}HNMR (DMSO) 4.09 (S , 3H , -OCH_3) , 6.9(d ,2H) , 7.2(d, 2H) ,7.3 (d ,2H) ,7.4 to 8.1 (m, 7H) , 9.31 broad Singlet (1H , N-H)

Anal. Calculation for –$C_{22}H_{17}N_2OCl$.

Element	C (%)	H(%)	O(%)	N(%)	Cl(%)
Found	**73.20**	**4.76**	**4.45**	**7.80**	**9.81**
Calcd	**73.23**	**4.71**	**4.43**	**7.76**	**9.84**

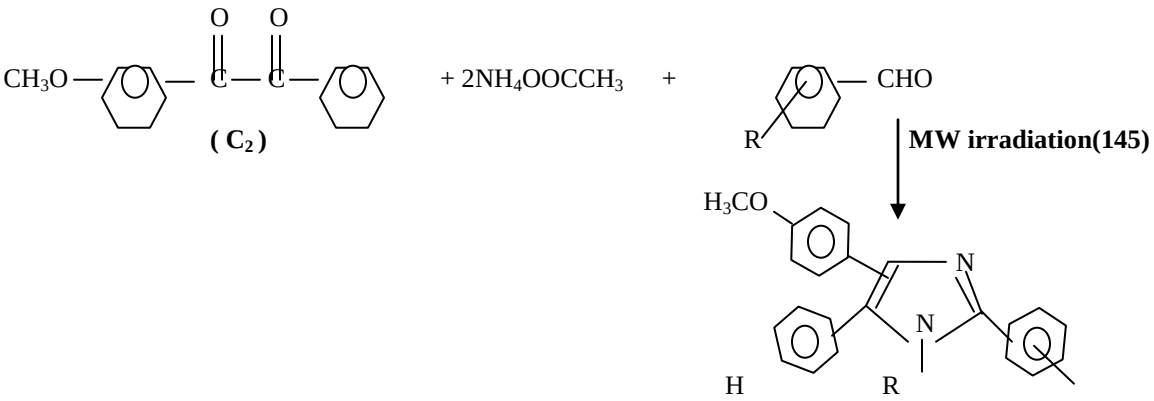
Reaction :-

1) **Step -1**



(C_2)

2) Step-2



R – H , 4Cl , 4-OCH_3 , $4NO_2$, $4N(CH_3)_2$, 2(OH) , 4(OH) -3-(OCH_3) ,3,4,5-(OCH_3) ,2Cl , 4(OH)

The other compounds of this series (4a-4l) were prepared similarly and are recorded in table-1

Table :-1 , Physicochemical data of the synthesized imidazole derivatives (4a-4l)

Entry	R	M.Pt (^OC)	Yield (%)	Time (min)	Formula
4a	-H	210	85	4	$C_{22}H_{18}ON_2$
4b	-4Cl	242	81	5	$C_{22}H_{17}ON_2Cl$
4c	-4OCH_3	208	93	4	$C_{23}H_{20}O_2N_2$
4d	-4NO_2	212	80	5	$C_{22}H_{18}O_3N_3$
4e	-2NO_2	178	85	3	$C_{22}H_{18}O_3N_3$
4f	-4$N(CH_3)_2$	200	71	4	$C_{24}H_{23}ON_3$
4g	-2OH	223	79	4	$C_{22}H_{18}ON_2$
4h	-4(OH)-3-(OCH_3)	239	80	4	$C_{23}H_{20}O_3N_2$
4i	3,4,5-(OCH_3)	232	87	5	$C_{25}H_{24}O_4N_2$
4j	2-Cl	180	79	3	$C_{22}H_{17}ON_2Cl$
4k	-4OH	195	83	6	$C_{22}H_{18}O_2N_2$
4l	-3NO_2	187	91	5	$C_{22}H_{18}O_3N_3$

III. RESULT AND DISCUSSION

We have modified the solid supported technique to an environmentally friendly neat synthesis in which the reaction is carried out in the absence of catalyst .2-Substitutedphenyl-4-(4methoxyphenyl-5-phenyl-1H-imidazole (4a-4l) were synthesized by reagent such as 4-Methoxybenzil , Substituted benzaldehyde and ammonium acetate under microwave irradiation in good yield .Ammonium acetate plays an important role in the reaction . If ammonium acetate is deficient , 4-methoxybenzil can't transform completely .The physical

data of compounds were collected and presented under compound name and spectral data. The yield of the compounds was in the range 71 -93 % , most of them are colorless crystalline solids. The IR spectrum of compound 4a shows the characteristic band at 3440 cm^{-1} due to the N-H.The IR spectrum of compound 4a,4b,4c shows the characteristic band at 1500 -1600 cm^{-1} due to –C=N .The 1HNMR spectrum of compound 4a,4b shows signal of N-H at 9.2 , 9.3 single of N-H at which confirmed the presence of N-H bond of imidazole .**We have presented efficient synthesis of 2-Substitutedphenyl-4-(4-Methoxyphenyl)-5-phenyl- 1H-imidazoles in the absence of catalyst under microwave irradiation .**

IV. CONCLUSION

In Conclusion a reliable rapid and environmentally benign method for synthesizing 2-Substitutedphenyl-4-(4-methoxyphenyl)-5-phenyl-1H-imidazole(4a-4l) has been developed compared to previous reported methodologies ,**the present protocol features ,simple operations ,short reaction time ,environmental friendliness and good yields ,low pollution and simple experimental procedure and easy workup .**

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CASE STUDY OF A RARE CASE OF NODULAR HIDRADENOMA OF THE FINGER

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Abstract- Nodular Hidradenoma, also known as solid-cystic or clear cell Hidradenoma or acrospiroma, is a benign adnexal tumor that arises from the distal excretory duct of eccrine sweat glands. The lesion can occur anywhere on the body e.g axilla, face, arms, thighs, trunk, scalp and pubic region but the most common site is head. Our patient was a 37 year old male, a K/c/o PLHIV since 2 years on ART presenting with a recurrent nodular hidradenoma of the 5th digit of his right hand. A Ray's amputation of the 5th digit was performed. The patient is currently asymptomatic at the 3rd post-operative month.
Index Terms- Acrospiroma, Adnexal tumor, Hidradenoma, Nodular

I. INTRODUCTION

Nodular Hidradenoma(a.k.a. solid-cystic or clear cell Hidradenoma or **acrospiroma)** is a benign adnexal tumor that arises from the distal excretory duct of eccrine sweat glands. It usually presents as slowly enlarging, solitary, freely movable nodule, solid or cystic, measuring on an average 0.5-2cm in diameter, but may reach 6.0cm or more. The lesion is hypothesised to occur anywhere on the body e.g. axilla, face, arms, thighs, trunk, scalp and pubic region but the most common site is head[(1,2)]. The tumour is most commonly seen involving the trunk with distal extremity involvement extremely rare. Most commonly it is seen in the age group of 20-50 years and is rare in children.It occurs twice as commonly in women as compared to men. Though traditionally considered a benign tumour, recent reports of malignant transformation have also been reported[(13)].

II. CASE STUDY

Our patient was a 37 year old male, a K/c/o HIV since 2 years on Anti-Retroviral Therapy. He presented with a nodular swelling over the proximal inter-phalangeal joint of his right 5th digit since 1 year. Patient gave h/o 2 surgeries in the past 4 months and 10 months back for the same condition followed by recurrence. He also complained of pain at the site since the last 15 days. Local examination showed a 4 by 3 cm firm tender mass over the proximal inter-phalangeal joint with absent mobility over the phalangeal joints and deformity of the digit. Skin involvement in form of thinning, tenseness and redness were seen with skin fixity to the underlying mass. Digital movements of the 5th digit were completely lost. Histopathology report of a previous excision done 4 months back was s/o nodular hidradenoma. In view of recurrence, loss of functionality of digit, skin involvement and severe tenderness only partially responsive to analgesics, a decision to amputate the digit was taken after informed consent. Thus a Rays amputation with primary closure of the digit was performed. Histopathology report of the specimen confirmed the diagnosis of Nodular Hidradenoma with local infiltration.

Figure 1 gross appearance

Figure 2Skiagram of Hand

III. DISCUSSION

Sweat gland neoplasms are extremely rare neoplasms. They can be classified into benign and malignant variety. The benign variety have been sub divided into subtypes such as nodular, apocrine and clear cell based on their histo-pathological presentation. The malignant form or Sweat gland carcinomas are those that possess an infiltrative and/or metastatic potential. They are generally classified into two groups. The first group comprises malignant tumours that closely mimic their benign counterparts while tumours in the second group do not have a benign counterpart. Behboudi et al, performed Immuno-histochemical analysis of these neoplasia, majority have shown dna changes in the form of **t(11;19)(q21;p13)** translocations resulting in ***MECT1/MAML2***. This change is similar to that seen in Warthin's tumour[(6)].

Nodular hidradenomas are usually seen in third to fifth decade of life and are twice more common in females.[(2)]Clinically the tumour usually presents as an asymptomatic, solitary, 0.5 to 6 cm sized, skin coloured intra-dermal nodule, slightly elevated above the surrounding skin.[(1,2)]Occasionally brown, blue or red discoloration and surface erosions or ulceration may be observed. It is a slow growing tumour and rapid growth may represent trauma, haemorrhage or a malignant change.[(2-5)]

Differentiation depends upon biopsy and immune-histochemical staining.[(8)]Histopathology shows both solid and cystic components in varying proportions. The tumour has tubular lumina lined by cuboidal or columnar cells and variably sized cystic spaces. The solid portions contain two types of cells: polyhedral cells with basophilic cytoplasm and glycogen containing pale or clear cells with a clear cytoplasm and a round nucleus.[(7)]The histology of malignant hidradenoma resembles that of its benign counterpart. The criteria for malignancy include poor circumscription, presence of nuclear atypia and mitotic activity, predominantly solid cell islands, infiltrative growth pattern, areas of necrosis and angio-lymphatic permeation[(8),(10),(11)]. Nodular hidradenoma is labeled as atypical when there is no evidence of invasive features but it has a high mitotic rate or nuclear atypia. The exact frequency of Nodular hidradenoma and their risk of transformation into malignant tumors is not known. However, mitotic activity and cellular pleomorphism may not be accurate predictors of clinical behaviour. Malignant hidradenocarcinoma are usually known to arise de novo and malignant transformation of benign nodular hidradenoma has rarely been reported.[(3)]

Clinical differential diagnosis includes basal cell and squamous cell carcinoma, melanoma, metastatic tumor, dermatofibroma, pyogenic granulomas, heamngioma, leiomyoma and other cutaneous adnexal tumors.[(1,2).]

Treatment of benign, atypical and malignant nodular hidradenoma is surgical excision with adequate margins to minimize the risk of recurrence followed by histologic confirmation of adequacy of excision.[(12)]

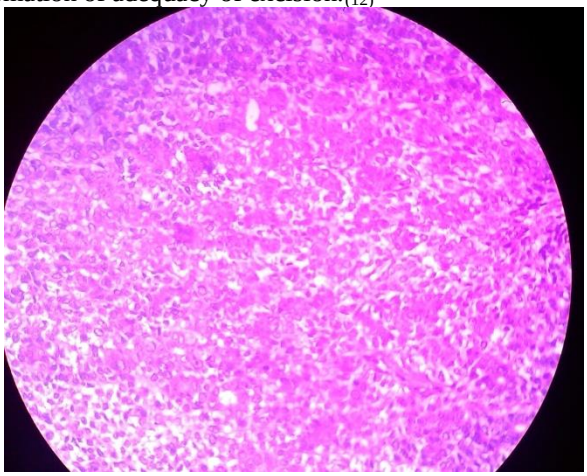

Figure 3 view under 100X microscope

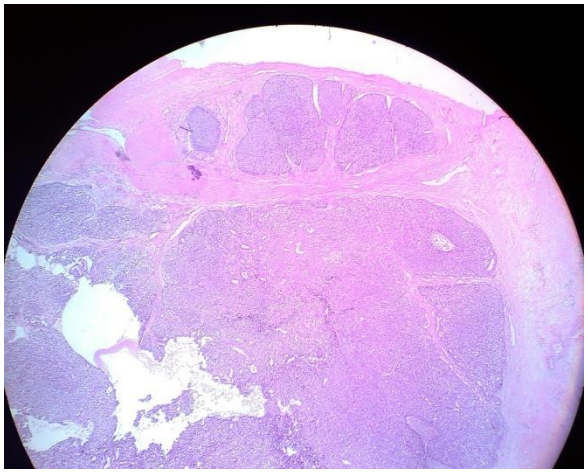

Figure 4 view under 10X microscope

Figure 5 view under 40X microscope

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Circular Iterative Model to develop Computer Based Tutorial (CBT)

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Abstract **-** A software development life cycle model is a characterization of various steps involved in the development of a software product. These phases in a software model range from planning to implementation and maintenance of the software. There are many existing software development life cycle models which are applicable for developing various types of software products. Despite the existence of many models, there are many complex projects that cannot be successfully developed using the same.

With the emerging trends in computer technology and use of computers in various fields, there has been advancement and growth in the field of education as well. Computer-based tutorial and other e-learning software's are quite popular these days, thus giving the privilege of easy and flexi-learning. A Computer-based tutorial is basically an interactive software program which is created as a learning tool. Tutorials help people learn new skills in a step by step process and hence ensure that the user is following the same.

A computer-based tutorial has become really popular and the process of its development is becoming a necessity today. Developing a computer-based tutorial may seem a very simple and easy going task but with due research in the same field reveals that many uncertainties arise during the development of an e-learning tutorial.

Hence there is a need for a flexible yet understandable model, which can be implemented in order to develop computer-based tutorial software. As, there is need for a model, a sequence of steps which constitute a circular model can be implemented for a project like e-tutorial. The steps in the circular sequence may keep iterating so that timely updating may be made to the software accordingly. The circular iterative model can prove to be beneficial for developing all types of e-tutorial softwares.

Index Terms **-** Computer based tutorial, SDLC Model for e-tutorial, Circular iterative model, Software Process model to develop a CBT.

I. INTRODUCTION

Software development may take many forms and one such is the development of the software as a whole, following certain steps in a sequential manner to achieve a desired output. The needs and problems of the customer can be taken as the requirements of the client and the delivery of the product may be satisfactory software that is a solution to the problems of the customer. Software is basically a set of machine readable instructions (in the form of a computer program) which serves a purpose to the user. Any product delivered to the customer as a solution to their problems, which can be used on a computer system may be termed as a software. Software can be an application, a file or a tutorial that is developed with the help of any programming code. "A computer based tutorial is any course of instruction whose primary means of delivering instruction is a computer. This computer based tutorial may be delivered by means of a software product installed on a single computer, through a corporate or educational intranet, or over the Internet as Web-based training . CBT can be used to teach almost any conceivable subject, but it is especially popular for computer-related studies. People often take advantage of CBT to learn how to run a particular computer application, such as Microsoft Excel , or to learn a computer programming language, such as Visual Basic." [1] The main advantage of computer-based tutorials is to enable users to discover, review and practice in a safe environment before using a new software application. [2]

A computer based tutorial (CBT), also known as courseware, may be an end software product to any educational institute, or any corporate organization that needs to train its employees. Hence it is very essential to develop a high quality tutorial which is without any defects and is flexible for updating and making changes every now and then. Updating a computer based tutorial is a mandatory factor for any e-learning tutorial, as timely updating need to be made in order to keep pace with the advancement, additions and changes made in the subject matter. There are many generalized and specific models that are devised for development of a software product. With research and a comparative study, it is noted that the existing software development lifecycle models like the Waterfall model, Agile model, V-shaped, Prototyping model etc., are not quite suitable for developing a computer based tutorial. The phases vary completely when a computer based tutorial is to be delivered as a software product to the customer. A prototyping model can be suitable for developing a CBT, but when it comes to flexibility, the phases need to be altered. Thus a proper model that supports the development of a courseware is essential.

A software model that enables a flexible process to build a computer based tutorial is the need of the hour and hence as a solution to this problem a circular iterative model is suggested in this research paper that if adopted ensures the development of a computer based tutorial software that is easily built with proper understanding of the same. The phases in the model cover every

possible situation encountered in developing a computer based tutorial, starting from imparting knowledge to the customer to timely modifications. It is noted that many organizations that demand a courseware as software are not quite clear of "what" a computer based tutorial is and "how" it functions. The circular iterative model for developing a computer based tutorial bridges this gap of how and what, by introducing a briefing phase in the lifecycle of the model for developing a computer based tutorial. The circular model is a flexible model that can adapt to frequent changes to be incorporated in the software.

Hence the focus of this research paper is to highlight the importance of a computer based tutorial as a software product and devise a suitable model that is flexible and easily adoptable to build a computer based tutorial software. The research paper will also compare and highlight the problems faced in developing the CBT by using the other generalized models that are existing for the development of software.

II. PROPOSED WORK

Software development lifecycle is a process by which the developers develop a software product for the needs of the stakeholders. A software lifecycle model plays a very crucial role in the development of software. It is observed that there is no specific model that can be adopted for developing a courseware or (CBT). Research reveals that computer based tutorial is often misunderstood as a web based training application program instead of for a software package as a whole. From the following mentioned lines it is clearly understood that a computer based tutorial is also a software product that is deliverable to the customer as a fulfillment to their needs.

"A software product is any deliverable piece of code that functions as an independent product which serves some purpose to the user." The requirement of a customer is converted into programming code, is implemented and delivered to the customer as a solution to his/her problem. Similar is the case of computer based tutorial software, where the CBT is a deliverable piece of code that functions as an e-tutorial thus serving a useful purpose to the stakeholder.

Take an example of an organization that wishes to train its employees by using a computer based tutorial. So here the requirement is a computer based tutorial which will be used for providing web based training to employees, and the same can be developed by means of programming code and can be delivered to the organization. The phases involved in developing computer based tutorial software are more or less similar to the phases in any other existing software development lifecycle models. But the problem with other models is that there is no room for frequent updating and altering in the lifecycle process, which is very much important with subject to a computer based tutorial. Since there is greater need and demand for web based tutorials, it is desired to have a software life cycle model that will be suitable for developing a CBT. A **"Circular Iterative model"** is devised in this paper which if adopted, helps to successfully build a computer based tutorial. All the possible situations that are encountered while developing a courseware are covered in the circular iterative model.

The circular model consists of eight sequences of steps that are iterated after a point of time in order to help maintain the software up to date. The model covers all the possible milestones that are encountered while devising a computer based tutorial. Starting from briefing the stake holder about what and how of a computer based tutorial to making modifications to the software as and when required by the customer, all possible factors are covered in the model.

A computer based tutorial is such software where the basic design may continue to remain the same but the content that is fed in the software needs to be updated according to the requirements of the customer. This model which is specifically designed for developing CBTs, gives more importance to the after development phases, i.e., the modification and updation of the software. The model can be implemented to develop CBTs of any category that can be developed within a tentative period of 6 to 8 months of time. The lifecycle of developing a computer based tutorial does not come to an end very easily unless and until a new such tutorial software is developed or the current one is discarded due to lack of use and complete change in the content of the tutorial.

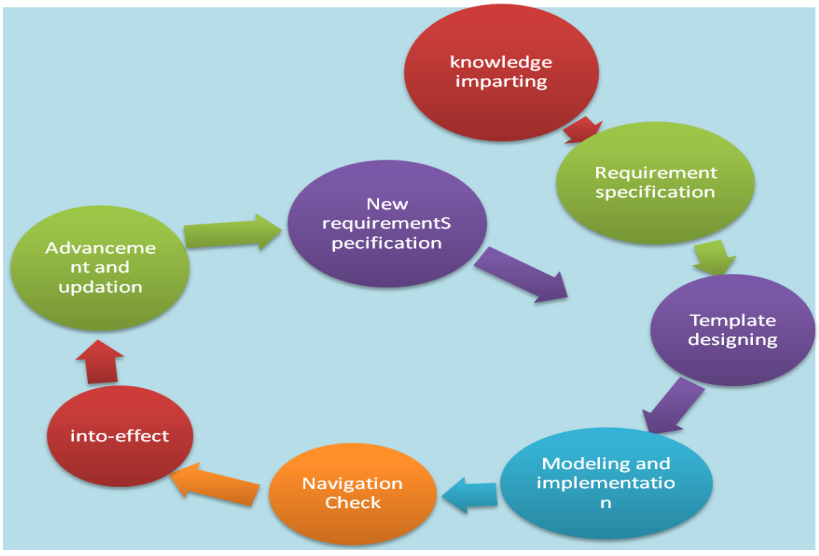

Figure 1: Circular Iterative Model for developing a Computer Based Tutorial (CBT)

Figure 1 shows the eight phases of a Circular Iterative model for developing a CBT. The name of the model is circular iterative model as the phases in the model continue to iterate in a circular fashion throughout the life time of the software. The CBT software does incur wear and tear as any other hardware product but is discarded if the use of it is no longer needed. Each phase in the model plays a vital role in devising an e-tutorial. A detailed explanation of what and how of every phase in the circular iterative model is explained in the following lines:

(1)Knowledge imparting:-
It is noted that many of the stakeholders are not aware as to what a computer based tutorial is and how it functions. Many customers desire a software product but do not know the "what" and "how" of the software. They just want a product that satisfies the needs and problems of their organization. As the name implies, in this phase the developers brief the customers bout the computer based tutorial and how it functions on the whole.

(2)Requirements Specification:-
The second phase in the circular iterative model is similar to the second phase in the waterfall model. Requirements phase focuses on defining and capturing the needs and problems that a software application is to address and solve. [8] Here the stakeholders are interviewed personally and the requirements that are expected out of the CBT are finalized and a software requirement specification (SRS) document is prepared. The specifications vary with the purpose of the computer based tutorial. The preconditions given by an organization may differ from that of an educational institution.

(3)Template Designing:-
On the basis of requirements of the stakeholders, the template for the computer based tutorial is designed. The template may be a prototype of the software that contains the basic design of the e-tutorial. The design of the CBT is created using any programming language of other web development tools. The design of the template is documented as software design document (SDD) which acts as a reference for further development of the software. The goal of preparing an SDD is to simplify the process further. The design of the CBT should be flexible enough to incorporate further changes.

(4)Modeling and Implementation:-
The next phase after template designing in the circular iterative model is the Modeling and implementation phase where the final design of the CBT is incorporated and the data is fed into the software, which counts for the implementation phase. The software design document that is prepared in the earlier phase acts as an input to the modeling and implementation phase. The data that is fed into the software is added after a through proof reading. The subject matter of the tutorial may be in any form like text, pictures, and videos and so on. Based on the type and content of the tutorial required divisions are made and data is added accordingly.

(5)Navigation Check:-
The next step in sequence is the navigation check and testing phase whereby every possible link to every part in the software is checked thoroughly. The navigation of data plays a very vital role in the courseware. Any wrong navigation can cause a problem in the software. Various kinds of testing is performed on the code in order to check for faults or defects if any.

(6)Into effect:-
The next phase after navigation and testing in the circular iterative model is the Operation and into effect phase where the computer based tutorial is implemented on the computer and is ready.The computer based tutorial can now be delivered to the customer for use. But the lifecycle of the circular iterative model does not end here. The other phases in the model are used to carry out changes and modifications that are made to the tutorial.

(7) Advancement and Updating:-
The next phase in sequence after the operation and into effect phase is the advancement and updation phase. This phase is the most important phase in the development of a computer based tutorial. Many lifecycle models call this as the maintenance phase but with respect to a CBT, advancement and updation plays a very significant role. Advancement and updation phase involves addition of new modules, deletion of existing modules, altering or updating the data of the software based on the new requirements and specifications. In this phase all the changes and advancements are identified.

(8)New Requirements Specifications:-
This phase is the last phase in the circle of a circular iterative model. Here the stakeholders are interviewed for new requirements and specifications for the changes that are to be made to the data in the computer based tutorial. Then again the template design phase is repeated in a circular fashion to remodel the computer based software. This circular iteration continues until the product is in use and modifications are needed.

The circular iterative model is devised in order to provide solution to developing a CBT. Many developers may be experts in designing a web based tutorial but such a model helps save development time as the developer will know what to do next. The cost incurred to develop such software can also be minimized if the process of developing the courseware is known prior. Thus the circular iterative model may prove to be beneficial to many software developers.

III. CIRCULAR ITERATIVE MODEL VS OTHER SOFTWARE PROCESS DEVELOPMENT MODEL

Research in the field of software and computer based tutorials is an everlasting task as there are new advancements and developments made in computer technology. It is observed that the use of CBTs for training and development has increased to 60% in the last few years. As there is growing use of computers in every field, man wants everything to be computerized. Such is an example of a courseware, where training and education is imparted through a software application called a computer based tutorial or a web based tutorial. [3] Table 1 shows the comparative study between waterfall, Prototyping and circular iterative model

Table 1: Comparative Study

Criteria	Waterfall Model	Prototyping Model	Circular Iterative Model
Meaning	A waterfall model is a software development model that includes 5 phases in a sequence. The developer must complete every phase before going into the next phase. [9]	A prototyping model is a software development model where a prototype of the software is developed as per current available requirements. [10]	The circular iterative model is a software development model that consists of 8 phases in a circular sequence, iterated to develop software.
Application	Usually applicable for small scale projects where the prototype is not required until the final product is developed.	Suitable for building software's that have changes in requirements of the users until the development of the completed.	Best suitable for developing CBT projects, where the post development process of the project plays a vital role in the lifecycle of the software.
Features	When a waterfall model is implemented for developing a CBT, the user does not get to see a template or prototype of the CBT, which is very essential factor for developing a courseware.	The prototyping model overcomes the disadvantage of the waterfall model by producing a prototype before the development of the final product but, it does not emphasize much on the after development phase (maintenance and updating) of the CBT.	The Circular Iterative Model combines the phases of prototyping model and the waterfall model and incorporates the maintenance and updating phase thus making it best suitable for developing CBT software
	The waterfall model is a traditional model and has generalized steps that may be common to all projects but does not incorporate iteration for updating the software, which is the most vital when CBTs are taken into account.	The prototyping model iterates only the requirements of the customer and proceeds with the phases of the traditional model. It does not iterate all the steps during the maintenance of the software.	The Circular Iterative model iterates the steps in a circular sequence thus enabling advancement and updating of the computer based tutorial.

Advantages of Circular Iterative Model:

- The model incorporates a "Knowledge imparting phase" where the customers are briefed about the CBT. Such a phase is absent in any of the previous traditional models.
- The model emphasizes more on updating and advancement of the CBT which is mandatory for the development and lifecycle of a computer based tutorial.

Project Study:

Five CBT projects developed using traditional process model were taken for study and their relative metrics are calculated using Cost Constructive Model (COCOMO). Table 2 shows the various metric values for CBT projects developed using traditional model

Table 2: Calculation of various metric values for CBT projects using traditional process model

Name of the CBT	LOC (excluding content)	Effort (E)	Productivity (P)	Time (in months)	No of defects found	Defect rate
A CBT on C++ and data structures.	2460	8723.54	0.2819	6	300	0.12
A CBT on entrepreneurship and development.	2400	8500.27	0.2823	5.5	254	0.10
A CBT on Economics.	2900	10368.81	0.2796	6.5	313	0.10
A CBT on retail Marketing.	6400	23806.75	0.2688	7	391	0.10
A CBT on production management.	3356	12087	0.2776	4.5	211	0.06

The effort is calculated in using the formula:

EFFORT (E) $=a_b (LOC)^{b_b}$ [5]
Where a_b and b_b are co-efficient and are tabulated with categories organic, semi-detached and embedded.
The values for the two co-efficient are taken as 2.4 and 1.05 respectively.

The productivity of the above computer based tutorials is calculated using the formula:

Productivity (P) $= \frac{KLOC}{E}$ [7]
Defect Rate = No of defects found / LOC

Table 3: Calculation of various metric values for CBT projects using Circular Iterative Model

Name of the CBT	LOC (excluding content)	Effort (E)	Productivity (P)	Time (in months)	No of defects found	Defect rate
A course ware on Marketing management	2790	9956.24	0.28602	3	100	0.03
An e-tutorial on computer research systems	3680	13315.31	0.2761	3.5	200	0.05
A CBT on principles of management and marketing	4530	16562.06	0.2626	2	268	0.05
A CBT on cyber law and ethics	2100	7388.24	0.2842	2	112	0.05
A CBT on market research and analysis	6120	22714.34	0.2694	5	290	0.04

The above data shows the projects that are implemented using the circular iterative model. It is noted that the time required completing the project and the defect rate is less when compared to the projects that are developed using other basic and traditional models which is depicted graphically in figure 3 and figure 4.

Figure 2: Chart showing the Defect Rate

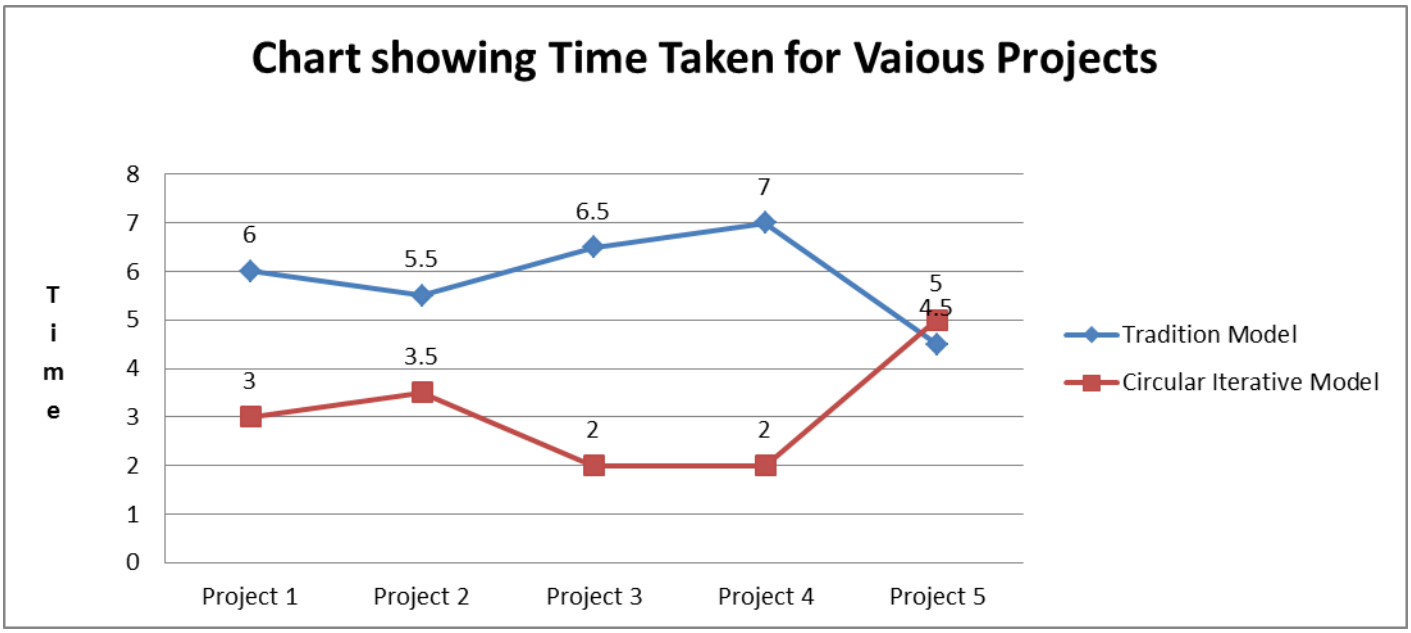

Figure 3: Time taken for Various Projects

IV. CONCLUSION

The data tables and the graphs clearly show that the number of defects and development time is considerably reduced when projects are developed using the circular iterative model. The lines of code, effort and productivity vary from project to project depending on the subject matter, but the development time and defect can be compared as metric in order to derive conclusions. So the graphs mainly emphasizes a comparison of the projects developed using basic or traditional models and the projects that are implemented using the Circular iterative model.

From the above mentioned research findings it is clearly understood that developing a CBT may seem an easy task but when the after-maintenance factors are taken into account, updating the CBT becomes the most crucial factor of the lifecycle. CBTs may be developed using many traditional models and would have been very successful, but the incorporation of the Circular iterative model enhances the development of CBT and makes the purpose of it even more clear by giving a name to every phase of the development of a courseware.

Other models do not emphasize much on the after development phases, but as the nature of CBT projects demand a strong updating phase, the Circular iterative model is more suitable for development of CBTs**.** This model enhances the development of CBT.

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Mobile Money System: The Bangladesh Experience

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Abstract- This study is about the Mobile Money System in Bangladesh. Major objectives of this study are to give an overview about cost, usage and all other benefits of Mobile Banking as well as to produce a scenario of Mobile Banking in Bangladesh. Both the primary and secondary data have been used for the study purpose. The major findings of this study are 94% respondents think that it saves time than traditional banking, the highest number of respondents use Mobile Banking for 'Air-time top-up' service, out of 50 respondents 92% have replied it is less costlier than traditional banking, 100% respondents have agreed that it is speedy, and 100% respondents have opined any type of set can be used for Mobile Banking. Besides, 64% respondents have mentioned that DBBL plays a significant role in mobile baking sector, whereas 28% respondents have agreed that Bkash performs a vital role. Although this concept is new in Bangladesh but its potentiality is high and already it has started to contribute in the economy significantly. From this research, other researchers and policy makers will get an insight about the Mobile Banking in Bangladesh.

Index Terms- M- Banking, Bkash, . ICTD, IBMC, SMS, NFC.

I. INTRODUCTION

Mobile financial services (MFS) is a method to offer financial services which integrates banking with mobile wireless networks that makes enable users for executing banking transactions. It indicates the ability to make deposits, withdraw, and to send or receive money from a mobile account and habitually such services are enables by the use of bank agents which permit mobile account holders to transact at independent agent locations outside of bank branches (BB, 2012). Mobile phone has turned into a device for daily usage which generates an opportunity for the development of banking services for the unbanked people who have access to a cell phone with the help of mobile phone banking. The remarkable progression of mobile sector all over the world has made an exclusive chance for delivering financial as well as social services through mobile network (Kabir, 2013). Mobile money system is one of the updated services of banking business which has developed some significant banking operations in the pockets of people. It also averts fake activities of banking which creates some new economic relationship between a bank and its customers (Parvin, 2013). Mobile Banking eliminates the time as well as space shortcomings from banking operations like, balance inquire and fund transfer from one account to another account without visiting bank branches (Mishra and Sahoo, 2013). Mobile Banking enhances efficiency, offers access financial and banking services, generates new opportunities for income generation and improving governance and give poor people a voice. It is required for each country which wants to adopt m-banking for increasing economic development and creation of wealth to produce an informed m-banking development strategy for main streaming Mobile Banking services in the productive sectors as a matter of economic survival (Macharia and Okunoye, 2013).

The first Mobile Banking services was established in European Banks before 1999 via SMS, which is known as SMS banking as well as later on its operated via mobile web. However, the new era of banking in Bangladesh 'Mobile Banking', through any mobile device, was inaugurated at 31st March 2011 by Dutch Bangla Bank Limited (DBBL). At present, in Bangladesh, almost every bank has Mobile Banking operations. Mobile Banking also directly deals with Foreign Exchange through remittance payment. Some of the Banks including Dutch Bangla Bank Ltd, Bangladesh Islamic Bank Ltd, Mercantile Bank Ltd as well as Brac Bank Ltd has already made strategic alliance with different international Money Exchanger for receiving remittance from foreign countries. The study will be a practicable one for those who want to do research further about Mobile Banking in Bangladesh as well as feasible one for the actual and potential customers of Mobile Banking. It will also be an important one for the government when the government will need information about Mobile Banking. The prime motive of this study is to produce the scenario of Mobile Banking in Bangladesh.

II. LITERATURE REVIEW

The outcomes of (Chian-Son, 2012) has revealed that individual intention to accept Mobile Banking is significantly influenced by social factors, perceived financial cost, performance expectancy, and perceived credibility, in the order of their influencing strength. According to Hasan et al. (2010), e-banking facilitates to the Bangladeshi banking sector in various ways, however Bangladeshi customers have lack of sound knowledge regarding e-banking providing by banking industry in Bangladesh. Rahman et al. (2012) have found in their study that the new challenges of E-banking in Bangladesh are to formulate and execute policy from the perspectives of society, banks, regulatory authorities and government as well. According to Ahmad et al. (2012), Mobile Banking saves time compared to traditional banking, majority customers use Mobile Banking for Air-time-top-up service and it is costlier than traditional banking. The prospect of mobile phone banking is high, although this concept is new in Bangladesh. Sharma (2011) has identified that banks have welcomed wireless and mobile technology into their boardroom to offer their customers the freedom to pay bills,

planning payments while stuck in traffic jams, to receive updates on the various marketing efforts while present at a party to provide more personal and intimate relationships. The main objective of her study is to examine consumer adoption of a new electronic payment service as Mobile Banking and the factors influencing the adoption of Mobile Banking. Cheney (2008) has obtained that three relatively new communication technologies – SMS text messaging, wireless Internet access, and near field communication (NFC) that are making important contributions to mobile financial services. Online banking and contactless payments and consumer's experience with them are also studied as building blocks‖ to mobile financial services. In addition, her analysis considers other factors that are affecting adoption patterns, including financial inclusion opportunities, data security problems, and coordination issues. Together, the building blocks and these other factors will influence how markets for mobile financial services develop. Ismail and Masinge (2011) have found that customers in the BOP will consider adopting Mobile Banking as long as it is perceived to be useful and perceived to be easy to use. But the most critical factor for the customer is cost; the service should be affordable. Furthermore, they also claimed that the Mobile Banking service providers, both the banks and mobile network providers, should be trusted. Trust was found to be significantly negatively correlated to perceived risk. Trust therefore plays a role in risk mitigation and in enhancing customer loyalty. Klein and Mayer (2011) have discovered that by unbundling payments services into its component parts, Mobile Banking provides important lessons for the design of financial regulation more generally in developed as well as developing economies. Donner (2008) has emphasized the need for research focusing on the context of m-banking/m-payments use. In his research he has suggested that the challenges of linking studies of use to those of adoption and impact reflect established dynamics within the Information and Communication Technologies and Development (ICTD) research community. Rochanakitumnuai and Speece (2003) have investigated why corporate customers do not accept Mobile Banking, which can assist banks to implement this self-service technology more efficiently. They have found that banks offer service via this channel claim that it reduces costs and makes them more competitive. Those already using Internet banking seem to have more confidence that the system is reliable, whereas non-users are much more service conscious, and do not trust financial transactions made via Internet channels. Non-Mobile Banking users tend to have more negative management attitudes toward adoption and are more likely to claim lack of resources. Legal support is also a major barrier to Internet banking adoption for corporate customers.

III. METHODOLOGY

Data has been collected from various sources; there is a combination of both primary and secondary data that has been used in this research. Primary data have been collected by using a questionnaire with relevant questions to know the services of Mobile Banking those banks are offering at present. Here both the Mobile Banking customers and the employees of the banks are interviewed. By using convenient sampling method, sixty customers are selected from those customers who get Mobile Banking service directly or indirectly who can know account balance in their mobile phone through SMS after debit card transaction) from the selected banks. The questions which are related to the various services of Mobile Banking are measured by a five-point Likert Scale. Different journals, books, internet and reports of the banks have been used as the important sources of secondary data.

IV. FINDINGS

4.1 Responses of Respondent about Usages, Cost and other Benefits of Mobile Money System

Table 1: Responses of Respondent about Usages, Cost and other Benefits of Mobile Banking

Statement	Yes	%	No	%
Heard about Mobile Banking	50	100	-	0
Have Mobile Banking account or not	27	55	23	45
Cost of Mobile Banking lower than traditional banking	46	92	4	8
Mobile Banking is more safety and speedy than traditional banking	48	96	2	4
Foreign remittance can be sent to Mobile Banking account	45	90	5	10

Source: Field Survey

Mobile money system is a new technology which was introduced in 31st March 2011 through DBBL. In my survey, I took 50 people as my sample survey. Most of them were student and others work in different Mobile Banking Company and 100% of them have said they know about Mobile Banking. So, it is clear to understand that Mobile Banking has already reached to each and every stakeholder of banking industry. Many people heard about Mobile Banking. But some of them yet have not felt that they should use it as they are happy to use traditional banking system. Some people feel interest to use it. About 55% respondents have replied they have Mobile Bank account and 45% respondents have not mobile bank account according to the survey. But those did not open Mobile Banking account yet they are the potential customer for future. Around 92% respondents have said Mobile Banking has lower cost compare to general banking and only 8% respondents have opined in some cases mobile baking costs more than traditional banking. So, it suggests that Mobile Banking more cost effective than conventional banking. Since Mobile Banking is a new technology in Bangladesh, people may worry about it safety as well as time it needs for working but I got a tremendous result from my survey. Around 96 percent respondents have opined that

Mobile Banking is safer and speedy than conventional banking while only 4 percent respondents has replied it may involve risk according to my survey. A positive aspect of mobile phones is that mobile networks can reach remote areas at low cost. I have found that 90 percent respondents said they receive foreign remittance through their Mobile Banking account while near about 10% respondents have replied that remittance cannot be sent to Mobile Banking account. So, it is one of the best services of Mobile Bank.

4.2 Responses of Respondent about Different Services of Mobile Banking

Table 2: Responses of Respondent about Different Services of Mobile Money Syatem

Statement	Extremely Good	Very Good	Good	Not Good	Extremely Not Good
Utility payment and Air-time top-up of Mobile Banking	21	17	7	2	3
Withdraw from Bank branch and agent	29	14	3	2	2
Withdraw from ATMs and fund transfer via Mobile Banking	16	21	8	3	2

*Using weights of 5, 4, 3, 2, and 1 for extremely good, very good, good, not good, and extremely not good respectively.
Source: Field Survey

Table 1, depicts that more than 42% respondents have replied that both utility payment and air-time to-up are extremely good, while 34% respondents have said that these services are very good and only 14% respondents have replied both are good. But, on the other hand, 6 % respondents have opined that these services are extremely not good and 4% respondents have replied as not good. When respondents have been asked about the withdraw money from bank branch and agent services of Mobile Banking, more than 58% have replied that these services are extremely good, 28% have replied as very good services and 17% have said these services are very good. From another point of view, 4% respondents have replied these services are not good and 4% have replied as extremely not good respectively. Both withdraw from ATMs and fund transfer services are extremely good, have said 32% respondents and at the same time 42% respondents have opined that these services are very good. Afterward, more than 16% respondents have said these services are good. But then 6% respondents have replied that these services are not good and 4% have said as extremely not good.

4.3 Responses of Respondent about more Convenient Banking in Bangladesh

Table 3: Responses of Respondent about more Convenient Banking in Bangladesh

Statement	Mobile Banking	%	Traditional Banking	%	E-Banking	%
About more convenient banking in Bangladesh	37	74	8	16	5	10

Sources: Field Survey

Table 2, illustrates that about 74 percent respondents have replied that Mobile Banking is more convenient than other banking while 10 percent respondents have said about E-banking and rest 16 percent respondents have urged that traditional baking is more convenient.

4.4 Responses of Respondent about Mobile Set Type that's needed for Mobile Banking Operation

Table 4: Responses of Respondent about Mobile Set Type that's needed for Mobile Banking Operation

Statement	Any kind of Mobile Set	%	Smart Phone	%	Multimedia Set	%
About Mobile Set Type that's needed for Mobile Banking Operation	46	92	3	6	1	2

Table 3 shows that Mobile Banking requires multimedia or smart phone for its operation. But according to my survey, more than 92 percent respondents have replied that Mobile Banking does not require any multimedia phone set. Any kind of mobile set can be used for Mobile Banking. On the hand, 6 % respondents have opined it requires smart phone and only 2% respondents have believed that multimedia phone set needed for Mobile Banking.

4.5: Responses of Respondent about Best mobile bank in Bangladesh

Table 5: Responses of Respondent about Best Mobile Bank in Bangladesh

Statement	DBBL	%	Bkash	%	IBBL	%	EBL	%
About best Mobile Bank in Bangladesh	33	64	14	28	2	4	2	4

Table 5 reveals that around 64 percent respondents have said that Dutch Bangla Bank Ltd is providing good services, 28 percent respondents have replied that Brac Bank Bkash providing good services and rest of the respondents have opined about other bank. So, DBBL is seems to be the market leader of Mobile Banking according to customer perception.

4.7 Scenario of Mobile Banking in Bangladesh

As a first service provider of Mobile Banking in Bangladesh DBBL has been providing different types of services through their Agents, Bank Branches, Mobile Banking Branches and ATMs since 31 March, 2011. DBBL has 126 general bank branches, 374 Mobile Banking branches, more than 2375 ATM booths and more than 25576 agents throughout the country, which are providing Mobile Banking services around the year. In addition, DBBL also has more than 22 Mobile Banking biller and more than 774 merchants, those are directly receiving DBBL Mobile Banking services. DBBL is the first Mobile Banking company who has introduced withdraws money from ATMs booth, without any cards, with mobile baking account. At present DBBL have around two million clients of Mobile Banking.

Transaction through Mobile Banking service has been increasing at a rate of 20% every month. The central bank has already approved 25 banks to operate Mobile Banking services. Some 5 million people now make the use of different services under Mobile Banking services being provided by 17 banks through their 70 thousands outlets across the country. The number of transactions reached to around 450,000 per day, involving a substantial amount of Tk1.12 billion. Provision of banking and other related financial services such as cash-in, cash-out, merchant payment, payment of utility bills, disbursement of salaries, handling of foreign remittance, disbursement of money to the beneficiaries of government allowances and other financial supports, withdrawal of money from automated teller machine (ATM) booths through mobile technology devices with the use of mobile phones, do largely come under the operational domain of Mobile Banking. The Brac Bank-initiated Mobile Banking service, 'Bkash', is at present the country's leading service-provider in Mobile Banking. There are, in all, 16 such service-providers, all of them being in the banking sector. Dutch-Bangla Bank and Islami Bank Cash are next in line, after 'Bkash', as the service-providers in Mobile Banking, in terms of volume of transactions, clientele coverage and number of personnel, directly or indirectly, involved in the process of making such services available to the people. The number of users availing themselves of mobile banking facilities in the country has hit 52.54 lakh as of June 10, 2013. 26 Banks has got permission for providing Mobile Banking services. Responding to a question, the official said the central bank had given permission to 26 banks so far for providing mobile banking services. The banks that have already introduced the services are Trust Bank, Eastern Bank, Brac Bank, Mercantile Bank, AB Bank, Dhaka Bank, Dutch Bangla Bank, Premier Bank, Southeast Bank, Prime Bank, Bank Asia, UCB, NCC Bank, First Security Islami Bank, Islami Bank, Commerce Bank and Standard Bank. On the other hand, Sonali Bank, Jamuna Bank, ONE Bank, IFIC Bank, Al Arafah Islami Bank, Exim Bank, Janata Bank, Shahjalal Bank Limited and City Bank NA are yet to introduce the mobile banking service.

V. CONCLUSION

Mobile Banking started with the idea to bring the poor under the umbrella of banking sector especially rural poor as there are not much bank facilities, also there savings is low so they feel shy to go to bank. Near about 55% people have Mobile Banking account but this industry has potential customers. As it is a new method of banking people haven't 100% faith on it. Mobile Banking is real time on-line banking, available anytime, anywhere throughout the country, it is convenient, affordable and secure, it is much more effective in developing savings habits, it will make access to banking and advanced payment transactions at affordable cost, it is much safer, speedy and safeguard against fraudulent transactions. All of the characteristics of Mobile Banking make life easier. In Mobile Banking, a confidential pin code is used by the user. PIN ensures security of money and protects fraudulent transactions. So, Mobile Banking is fully secured. It is also believed by 96% respondents, but about 4% respondents say it is not secured as they cannot fully trust on online banking than traditional banking system. One benefits of Mobile Banking that it is very speedy process. Transaction can be done anytime anywhere quickly in less time. So, 100% people believe that it is a speedy process. Around 92% respondents have said Mobile Banking has lower cost compare to general banking. Above 70% respondents have believed that all the services of Mobile Banking are very good. It has been revealed that any kind of set can be used for Mobile Banking operations from the 92% respondents answer. It has been known that Dutch Bangla Bank Ltd is the number one in Mobile Banking industry in Bangladesh from customer's perception. But then, it has been found that Bkash is in number one position on the basis of the transaction from Bangladesh Bank website.

Since Mobile Banking is a new technology in Bangladesh, its need mass advertisement to inform the potential customers. It has been found that people do not have 100% faith on Mobile Banking operation. So, through advertisement the banker should inform all the security issues about Mobile Banking. Another point is that all the actual customers do not know all available services of M-banking. Before opening account customers should be informed about all services of Mobile Banking. If actual customers use these services then their value of life-style will gradually increase. To catch the potential customers all available services of Mobile Banking should be disclosed. Moreover, though Mobile Banking is cost effective, some customers believe that in case of cash in and cash out via agent takes more cost than traditional banking. So, Banks should concern about cost because most of the customers are from rural area as well as unbanked community. At present, 17 banks have launched this M-banking operation and within recent future all bank should initiate this operation for the economic development of Bangladesh. Finally, Bangladesh Bank should monitor all the matters related to Mobile Banking. Most of customers do not know how to write a message and also most of them are illiterate. So, they are unfamiliar with English language. And next, most of the customers did not visit any ATM booth yet and even they do not

believe money can be withdrawn from an ATM booth. So, before going to use the Mobile Banking services they should be trained. Bankers should organize different training session across the country for the people those do not know how to use all the services for Mobile Banking.

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Defining and Solving the Organizational Structure Problems to Improve the Performanceof Ministry of State for Environmental Affairs - Egypt

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Abstract - The structured problem solving is important methodology in improve the organization performance. This study is aiming to provide more insight that determines the organizational problems, solutions for the ministry of state for environmental affairs which it is one of the most critical issues effect the administration fields. Firstly, we discuss the concept of organization structured and organization structured types. Secondly, we focus on the signs of poor organizations structured which it indicate that the organization is deeply need to solve the mentioned problem. Thirdly, we discuss the base of structured problem solving is the Deming circle: And introduce the Bank's 6 steps process of the problem solving. then discuss the important of a create and maintain healthy organization structured manner using team in problem solving. Finally, we discuss the arguments against using a structured problem solving.

Keywords: Organizational structure, OS types, Poor OS, Healthy OS, OS arguments, OS procedures.

1. Introduction

Organizational structure refers to the way that an organization arranges people and jobs so that its work can be performed and its goals can be met. When a work group is very small, and face-to-face communication is frequent, formal structure may be unnecessary, but in a larger organization decisions have to be made about the delegation of various tasks. Thus, procedures are established that assign responsibilities for various functions. It is these decisions that determine the organizational structure[08].

In an organization of any size or complexity, employees' responsibilities typically are defined by what they do, who they report to, and for managers, who reports to them. Over time these definitions are assigned to positions in the organization rather than to specific individuals. The relationships among these positions are illustrated graphically in an organizational chart. The best organizational structure for any organization depends on many factors including the work it does, its size in terms of employees, revenue, the geographic dispersion of its facilities, and the range of its businesses[05].

The organizational structure consists of activities such as task allocation, coordination and supervision, which are directed towards the achievement of organizational aims. It can also be considered as the viewing glass or perspective through which individuals see their organization and its environment[16].

The organizational structure affects organizational action in two ways. First, it provides the foundation on which standard operating procedures and routines rest. Second, it determines which individuals get to participate in which decision-making processes, and thus to what extent their views shape the organization's actions [14].

2. Organizational structure types

2.1. Functional structure

Employees within the functional divisions of an organization tend to perform a specialized set of tasks. This leads to operational efficiencies within that group. However it could also lead to a lack of communication between the functional groups within an organization, making the organization slow and inflexible[08] .

Generally functional organization is best suited as a producer of standardized goods and services at large volume and low cost. Coordination and specialization of tasks are centralized in a functional structure, which makes producing a limited

amount of products or services efficient and predictable. Moreover, efficiencies can further be realized as functional organizations integrate their activities vertically so that products are sold and distributed quickly and at low cost. For instance, a small business could make components used in production of its products instead of buying them[03].

A disadvantage of functional groupings is that people with the same skills and knowledge may develop a narrow departmental focus and have difficulty appreciating any other view of what is important to the organization; in this case, organizational goals may be sacrificed in favor of departmental goals. In addition, coordination of work across functional boundaries can become a difficult management challenge, especially as the organization grows in size and spreads to multiple geographical locations[02].

2.2. Divisional structure

Also called a "product structure", the divisional structure groups each organizational function into a division. Each division within a divisional structure contains all the necessary resources and functions within it[09]. Divisions can be categorized from different points of view. One might make distinctions on a geographical basis (a US division and an EU division, for example) or on product/service basis (different products for different customers: households or companies). In another example, an automobile company with a divisional structure might have one division for SUVs *(Sport Utility Vehicle)*, another division for subcompact cars, and another division for sedans. Each division may have its own sales, engineering and marketing departments.

Organizations that are spread over a wide area may find advantages in organizing along geographic lines so that all the activities performed in a region are managed together. In a large organization, simple physical separation makes centralized coordination more difficult[06]. Also, important characteristics of a region may make it advantageous to promote a local focus. For example, marketing a product in Western Europe may have different requirements than marketing the same product in Southeast Asia. Companies that market products globally sometimes adopt a geographic structure. In addition, experience gained in a regional division is often excellent training for management at higher levels.

Large, diversified companies are often organized according to product. All the activities necessary to produce and market a product or group of similar products are grouped together. In such an arrangement, the top manager of the product group typically has considerable autonomy over the operation. The advantage of this type of structure is that the personnel in the group can focus on the particular needs of their product line and become experts in its development, production, and distribution. A disadvantage, at least in terms of larger organizations, is the duplication of resources[08]. Each product group requires most of the functional areas such as finance, marketing, production, and other functions. The top leadership of the organization must decide how much redundancy it can afford [05].

2.3. Matrix structure

The matrix structure groups employees by both function and product. This structure can combine the best of both separate structures. A matrix organization frequently uses teams of employees to accomplish work, in order to take advantage of the strengths, as well as make up for the weaknesses, of functional and decentralized forms[09]. An example would be a company that produces two products, "product a" and "product b". Using the matrix structure, this company would organize functions within the company as follows: "product a" sales department, "product a" customer service department, "product a" accounting, "product b" sales department, "product b" customer service department, "product b" accounting department. Matrix structure is amongst the purest of organizational structures, a simple lattice emulating order and regularity demonstrated in nature.

Because the matrix structure is often used in organizations using the line-and-staff setup, it is also fairly centralized. However, the chain of command is different in that an employee can report to one or more managers, but one manager typically has more authority over the employee than the other manager(s). Within the project or team unit, decision making can occur faster than in a line-and-staff structure, but probably not as quickly as in a line structure[05].

Weak/Functional Matrix: A project manager with only limited authority is assigned to oversee the cross functional aspects of the project. The functional managers maintain control over their resources and project areas[03].

Balanced/Functional Matrix: A project manager is assigned to oversee the project. Power is shared equally between the project manager and the functional managers. It brings the best aspects of functional and projectized organizations. However, this is the most difficult system to maintain as the sharing of power is a delicate proposition[03].

Strong/Project Matrix: A project manager is primarily responsible for the project. Functional managers provide technical expertise and assign resources as needed[03].

3. Signs of Poor Organizational Structure

The organizational structure of a business is the framework that facilitates communications and efficient work processes. When business problems emerge, signs often exist within the design or components of the organizational structure. In some cases, these signs can be early indicators of significant problems that need to be addressed[20].

- **Low Productivity**

Productivity is a key metric for almost every business. Low productivity levels can indicate a problem in an organization's structure. Through inefficient resource allocation, poor vertical communication and employee empowerment constraints, employees may not have the proper environment to complete their work assignments in an efficient manner.

- **Unequal Workload**

Poor organizational structure can cause an unequal distribution of work between departments or divisions. When some areas of a company are routinely understaffed and work overtime to meet workload requirements, while other areas struggle to find sufficient work to keep every employee busy, the organizational structure has not been optimized for business requirements.

- **Lines of Communication Unclear**

Employees routinely bypassing the standard chain of command in a company could be a sign of poor organizational design. Employees with complaints or suggestions should typically provide feedback to their manager or occasionally to their manager's boss. In an optimal business, employees should feel their voices are heard through the standard management path. In an organization with a poor structure, employees may feel the need to go directly to a department head, vice president or even the president to express concerns or recommendations.

- **Lack of Teamwork**

Bad organizational structure does little to foster the concept of teamwork. Departments may be unwilling or unable to cooperate with each other, and workers within departments may not feel a sense of camaraderie [04]. Workers may focus on their individual tasks and not offer assistance to others unless directed to do so by a supervisor.

- **Slow Decision Making**

Slow decisions can hamper sales opportunities and innovations. If an organizational structure is not optimized to direct decision making authority to the appropriate person, or must travel through multiple layers of management before a result is rendered, the organizational structure may need to be changed[03]. A leaner or departmental decision-making process may be needed to foster an innovative spirit in the company.

- **Lack of Innovation**

Companies with bad organizational structure are often slow to innovate. A pipeline for new ideas may not exist, and even if it does, poor communication may mean that the idea never reaches the right source for development and implementation. Consequently, workers who come up with new ideas may keep them to themselves or take them to a new employer.

4.Organizational problems of Environmental Affairs

Although an increased financial allocations for environmental and sustainable development over the long run there are common and variety of problems, such as bloated management , poor communication and poor customer service.

Evaluation and reporting of the Egyptian's environment, on the hand the Assumptions which should put in our consideration the UNDP-GEF (United Nations Development Programme - Global EnvironmentFacility)Medium-Size Project (MSP) document as follows [10,12]:

- Weak accountabilities, particularly at the individual level.
- Weak integration of technical and scientific expertise. This leads to gaps/duplications in activities between different technical and scientific institutions.
- Poor coordination between entities responsible for the data collection and management. This is primarily resulting from a lack of institutional frameworks to specify this coordination. This lack of coordination leads to incompatibilities of data and data collection and management, resulting in limitations of data exchange thus leading to gaps/duplications in data collection.
- Lack coordination of project activities with related government and donor-funded initiatives.
- Miss all appropriate government and non-government stakeholders are involved in the project.
- Administration problems when disbursement of funds as per operational procedures consistent with financial management standards of the Government and UNDP-GEF.

The Environment Affairs organizations structure could be represent more the than structure from **Functional structure that** Employees within the functional divisions of an organization tend to perform a specialized set of tasks, for instance the nature protection , climate change department (Figure 1)**. Divisional structure that** Divisions can be categorized from different points of view. One might make distinctions on a geographical basis (Cairo governorate and Alx. governorate for example) (Figure 2 & figure 3). **Matrix structure that** The employees by both function and product. This structure can combine the best of both separate structures. A matrix organization frequently uses teams of employees to accomplish work, in order to take advantage of the strengths, as well as make up for the weaknesses, of functional and decentralized forms [109]. for instance the Industrial Pollution project and Eco-friendly Products project (Figure 4),

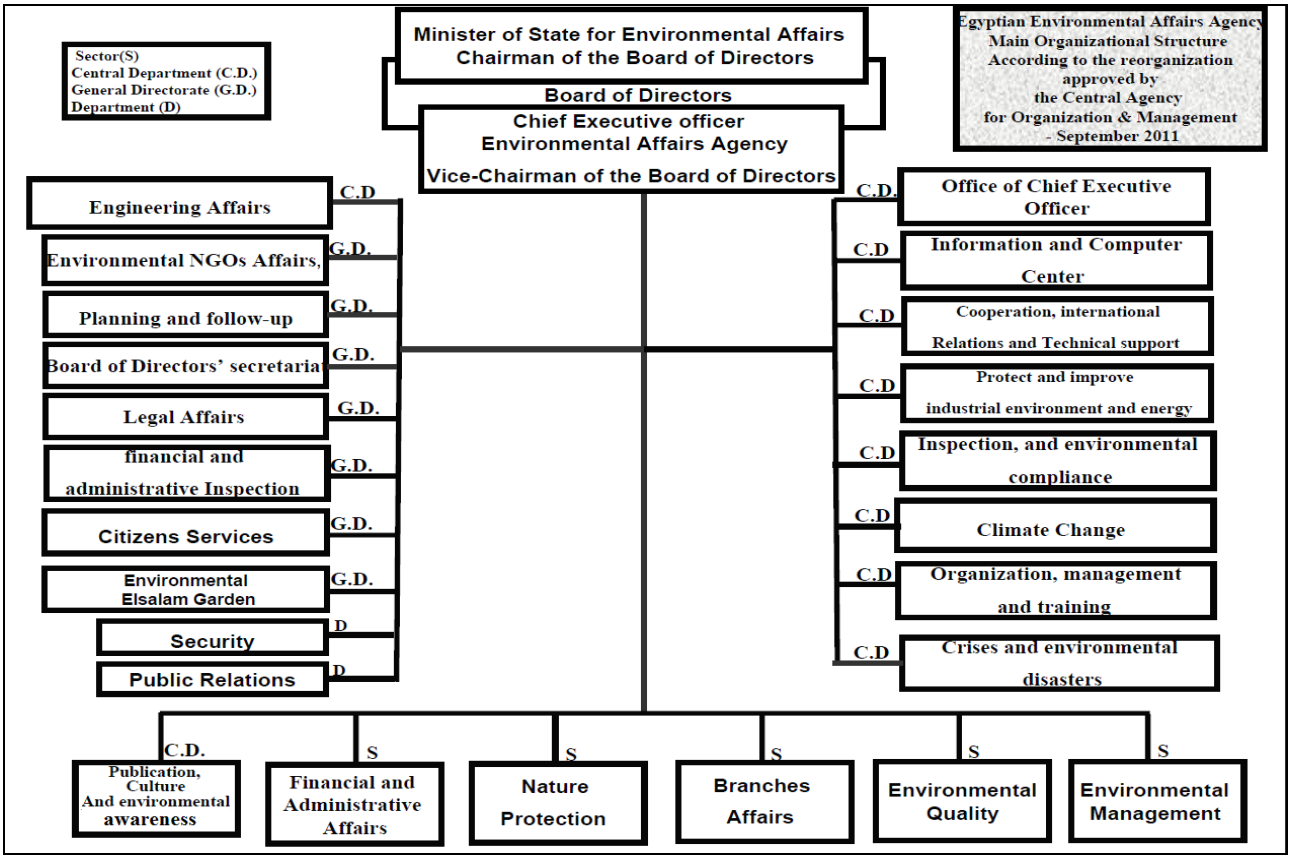

Figure 1. functional structure model in ministry of state for environmental affairs (MSEA)

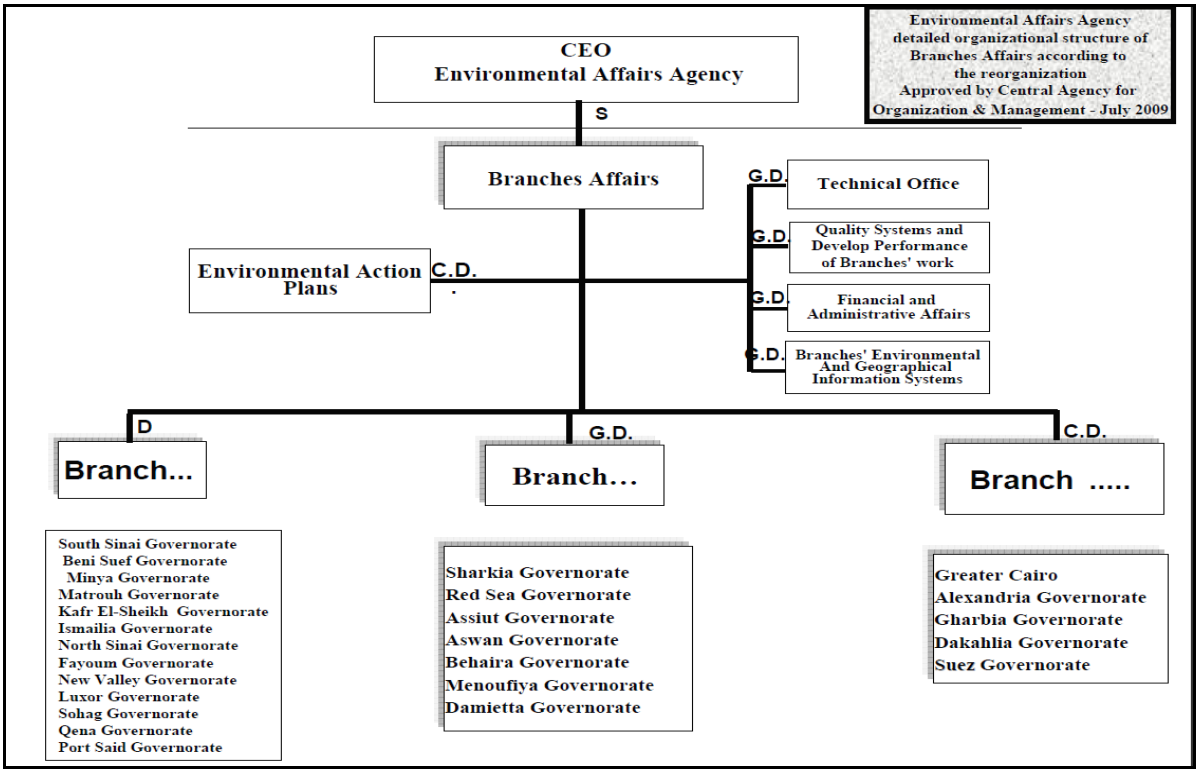

Figure 2. Divisional structure model in ministry of state for environmental affairs (MSEA) 1/2

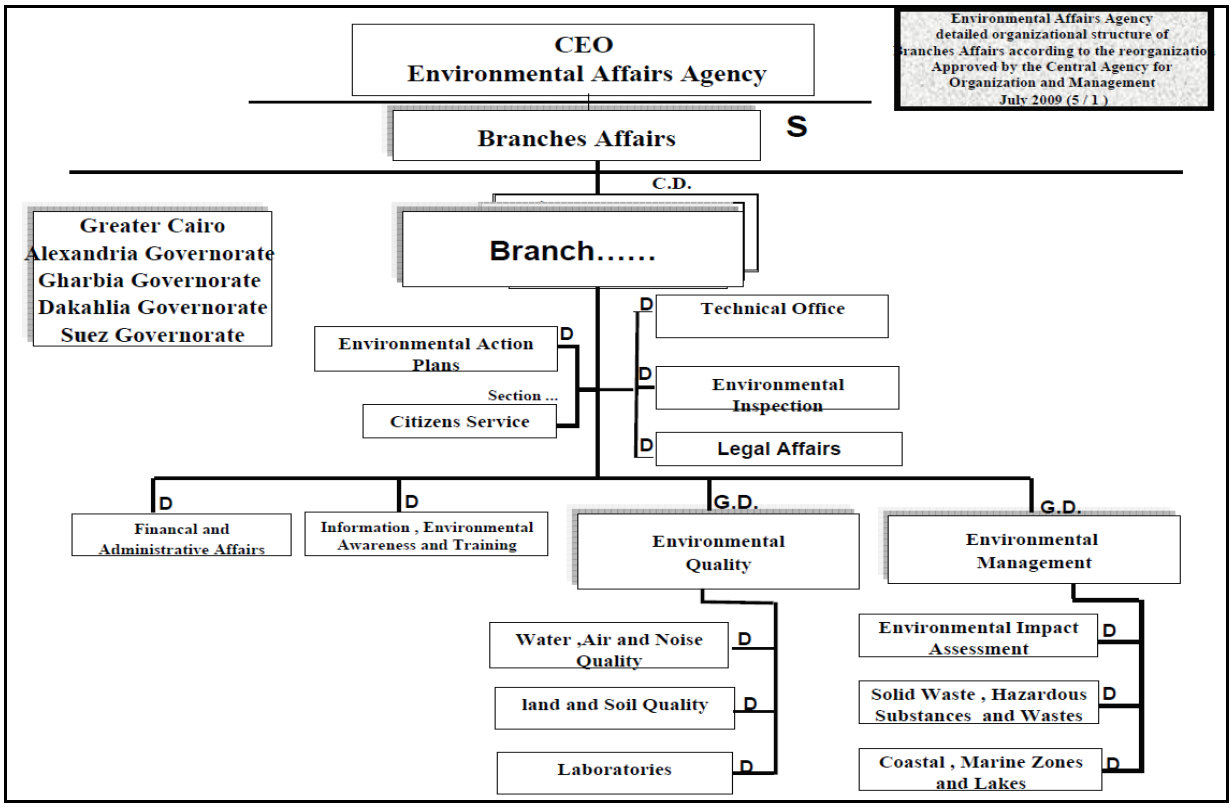

Figure 3. Divisional structure model in ministry of state for environmental affairs (MSEA) 2/2

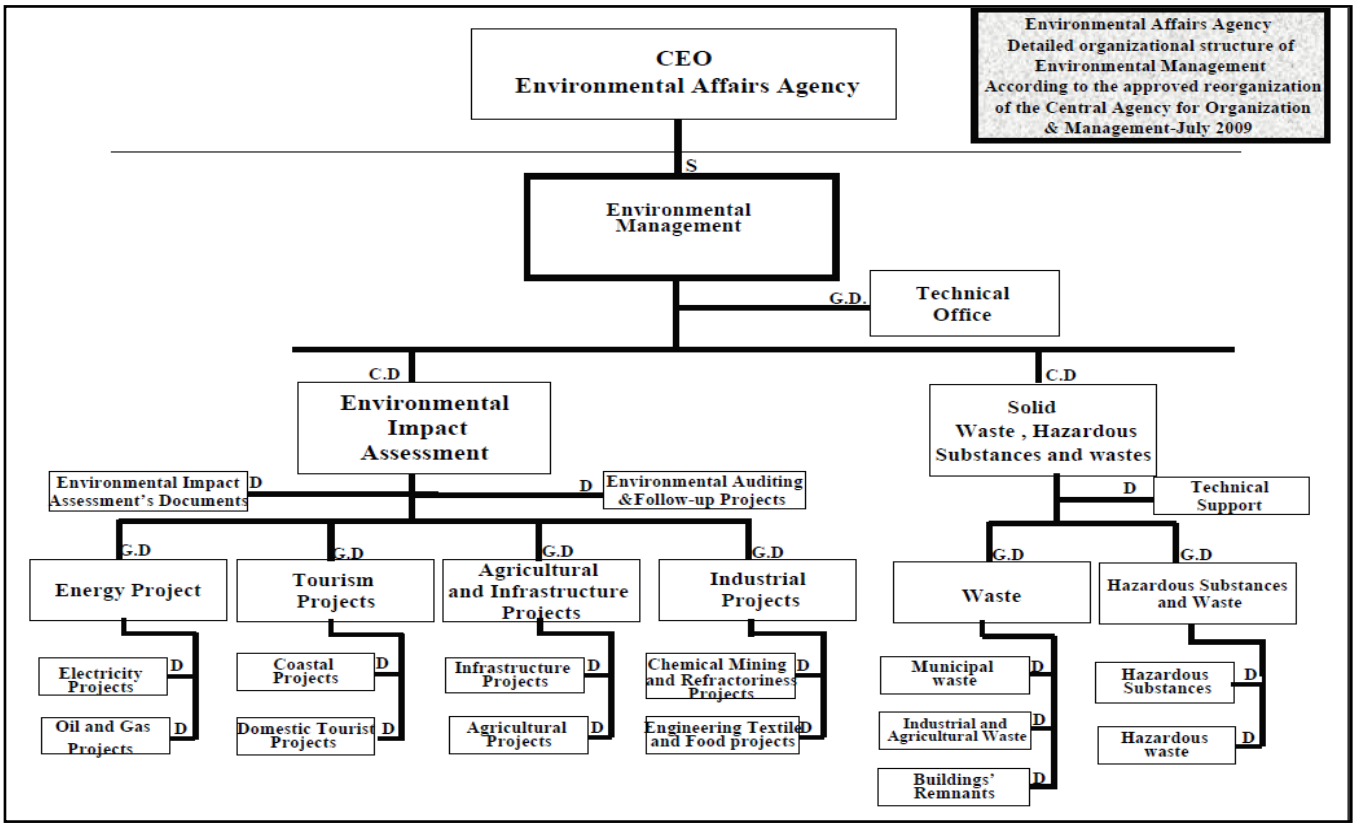

Figure 4. Divisional matrix model in ministry of state for environmental affairs (MSEA)

5. Solutions of organizational problems of Environment Affairs

To improve a organization's performance by successfully solving problems that is causing dissatisfaction for internal or external customers we need focus on Elimination of Root Cause problems.

Organizational change is the movement of an organization from one state of affairs to another. A changein the environment often requires change within the organization operating within that environment[13]

Change in almost any aspect of a organization's operation can be met with resistance, and different cultures can have different reactions to both the change and the means to promote the change. To better facilitatenecessary changes, several steps can be taken that have been proved to lower the anxiety of employees and ease the transformation process. Often, the simple act of including employees in the change process can drastically reduce opposition to new methods. In some organizations, this level of inclusion is not possible, and instead organizations can recruit a small number of opinion leaders to promote the benefits of coming changes[05].

Organizational change can take many forms. It may involve a change in a company's structure, strategy , policies, procedures, technology, or culture. The change may be planned years in advance or may be forced on an organization because of a shift in the environment. Organizational change can be radical and swiftly alter the way an organization operates, or it may be incremental and slow. In any case, regardless of the type, change involves letting go of the old ways in which work is done and adjusting to new ways[06]. On the other hand we need to focus in two terms whenever we need to plan, to create and to maintain the new organizational structure form:

Centralization

Organizations with a centralized structure have several layers of management that control the company by maintaining a high level of authority, which is the power to make decisions concerning business activities. With a centralized structure, line and staff employees have limited authority to carry something out without prior approval. This organizational structure tends to focus on top-down management, whereby executives at the top communicate by telling middle managers, who then tell first-

level managers, who then tell the staff what to do and how to do it. Since this organizational structure tends to be fairly bureaucratic, employees have little freedom. Centralized organizations are known for decreased span of control a limited number of employees report to a manager, who then reports to the next management level, and so on up the ladder to the Head [14].

Decentralization

Because individual creativity can be stifled and management costs can be greater in a centralized organization, many organizations continue to downsize into a more decentralized structure. Decentralization seeks to eliminate the unnecessary levels of management and to place authority in the hands of first line managers and staff thus increasing the span of control, with more employees reporting to one manager. Because more employees are reporting to a single manager than before, the managers are forced to delegate more work and to hold the employees more accountable. Downsizing has also helped to change the flow of communication, so that top management hears staff concerns and complaints in a more direct manner and management has a more hands on approach. The hands on approach involves less bureaucracy, which means there is a faster response to situations that demand immediate attention. This structure also takes advantage of bottom up communication, with staff issues being addressed in a timely manner [15].

The restructuring generally takes place at the mid management level. Because some middle managers have lost their jobs, been laid off, or simply taken advantage of early retirement and severance packages, their positions have been phased out, thus helping to reduce unnecessarycostly salaries and increasing employee span of control. Many middle managers who stayed in their current "positions" found that their jobs have changed to being coaches, or team leaders, who allow their employees greater freedom in completing their work responsibilities [16].

The chain of command is the protocol used for communication within organizations. It provides a clear picture of who reports to whom. Quick decisions can be made in decentralized organizations because approval usually has to come only from the manager one level higher than the person making the decision.

FinallyThe tendency is to offer decentralization, in which some power is devolved to field level, as a solution to the problem of tensions between field offices and headquarters. However, decentralization can have the paradoxical effect of increasing bureaucracy as organizations devolving power on the one hand, tend to set up all sorts of control measures on the other.

6. The methodology of structured problem solving

6.1 concept

It should be important to understand the concept of problem and structured problem solving. it is known that a problem is defined as a discrepancy between an existing standard or expectation and the actual situation[09].

Heads have define the concept of structured problem solving as a structured process that identifies, analyzes, and eliminates the discrepancy between the current situation and an existing standard or expectation, and prevents recurrence of the root cause[08].

6.2. Structured problem solving methodology

it has been developed the structured problem solving methodology in the early years of the quality revolution. [16] . Through the structured problem solving, identifying the root cause and implement a solution that prevents recurrence and contributes to quality continuous improvement. Within the quality development, there are the deferent forms of the problem solving methodology [04].

6.3. The procedure and the tools of structured problem solving

Base on the Deming cycle[20]. it has been developed the common procedure of the structured problem solving, which will give us a snapshot of the structured problem solving. there are 6 steps in the problem-solving process. They should normally be taken in sequence (Figure 4).

Step 1: Identifying and selecting problem. It is necessary to define a problem as the difference between the target and the actual. A problem report should be written base on measurements.

Step 2: Analyzing the problem cause. In this step, only spend time on finding the cause(s) and not to go to think about the solutions.

Step 3: Generating potential solutions. It is necessary to explore alternatives because only one solution is not good enough.

Step 4: Selecting and planning the best solution. Makes sure the right people do the right things at the right time and planning the best solution results in low cost.

Step 5: Implementing the solution. Seeing the job through to conclusion is necessary, with appropriate contingency lanning in case some of the new ideas do not quite work out.

Step 6: Evaluating the solution. Reviewing the results is very important, that will be sure the problem really has been solved.

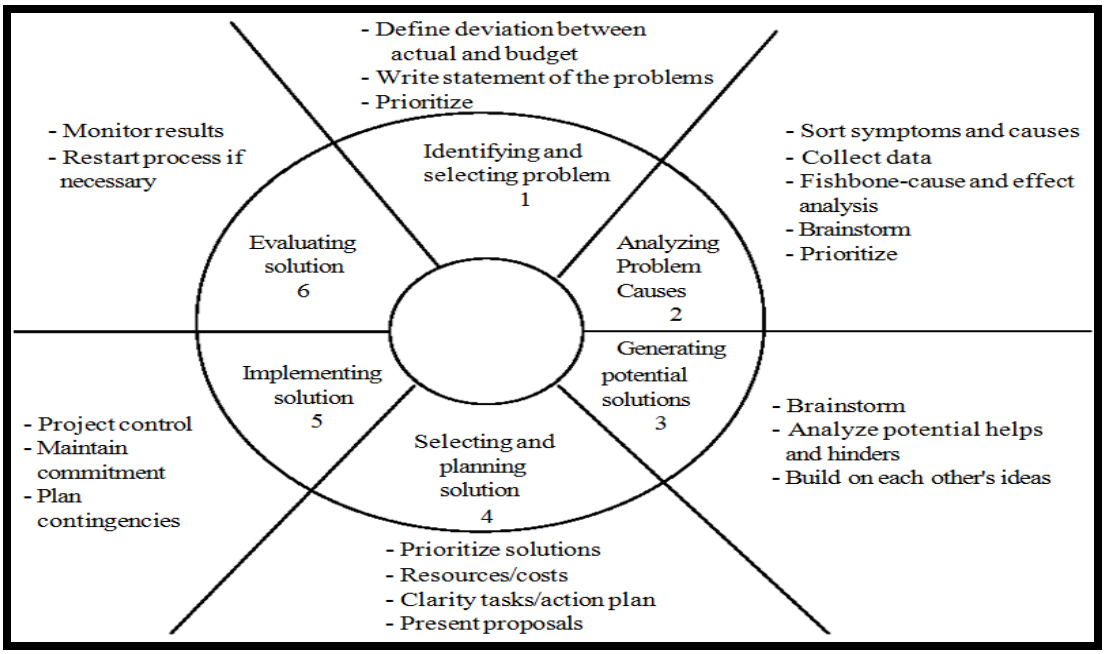

Figure 5. The Problem-Solving Process (Bank, 1992)

7. Create & Maintain a Healthy Organizational Structure

A healthy organizational structure allows its employees to focus on producing quality products and services. Effective organizations provide opportunities to its employees to develop new skills. This allows the staff to constantly improve business operations and ensures that the company maintains a competitive edge required to thrive in a dynamic global marketplace. Creating a healthy organizational structure begins by assessing the company's needs. Sustaining the structure involves running events and programs to maintain a productive workplace[20].

Step 1
Analyze the policies and procedures. Structure the management framework to support efficient production. For example, to create an effective organization, arrange The personnel into functional groups, such as Finance, Purchasing, Marketing, Sales and Human Resources. Align each group's performance goals with the company's strategic objectives. Create or revise the organization's mission, vision and goals. Account for social and economic changes.

Step 2
Document the company's hierarchical structure and publish it on the company's website, through email or in print form. This allows everyone in the company to see the reporting structure, associated roles and responsibilities.

Step 3
Use the resources provided by the Society of Human Resource Management website to learn about industry trends. For example, use the State and Local Resources website to get information about state law updates for the state. Ensure the business adheres to regulations, such as family leave laws or hours of rest required in the state. These contribute to maintaining a healthy organization.

Step 4
Conduct an annual survey using online questionnaires, such as Zoomerang, SurveyMonkey, Qualtrics or Google Docs forms. Invite employees to respond anonymously to the survey to gauge how well the environment supports employees. A comprehensive survey allows you to measure employee perceptions of company operations. By running the survey annually, you can compare results from year to year and determine the success of intervention programs you run.

Step 5
Identify areas that need improvement to maintain a healthy and safe workplace. Using tools available from websites, such as the Mind Tools Problem Solving Techniques website, create cause and effect diagrams to isolate problems.

Step 6

Help the employees adapt to change by communicating regularly with the staff. For example, publish a monthly newsletter that describes upcoming events, changes in personnel and new company directions. Ensure that all employees respect and support the people around them by facilitating sessions in valuing cultural diversity, handling workplace conflict and time management. Professional development enables employees to act appropriately in today's often turbulent world.

Step 7
Encourage employees to share their skills and knowledge using social media technology such as wikis, blogs and forums. In addition to providing meaningful connections to people who may not work in the same location, online communication documents knowledge attained, such as troubleshooting procedures and solutions.

Step 8
Provide opportunities for personnel to receive coaching and mentoring to further their careers. A healthy organization recognizes the value of individual achievements. By providing feedback and advice, executive leaders can groom new personnel to take on additional responsibilities. This helps the company's bottom line as well.

Step 9
Implement performance-based management. Evaluating employees on their ability to achieve their own goals establishes personal accountability. By retaining and developing motivated employees, the company can maintain its competitive edge.

Step 10
Establish professional skills development programs to help all employees at every level do their jobs better. Encourage employees to take and pass exams associated with professional credentials, such as the Project Management Professional, Microsoft Certified Professional or other certifications associated with the industry.

8. The arguments against using a structured problem solving

The structured problem solving methodology has developed several decades, it is natural that some arguments against using a structured problem solving.

8.1. The argument about the problem solving process
The structured problem solving process has long lead time. Firstly who need to use the statistical tools and powerful members from inside and outside the organization as well to study, identify the problem and analysis the root cause of problem, generate the potential solutions, then make out the action plan, to fix the problem[09].

8.2. The argument about the solving conflict of interest
A conflict of interest is a set of circumstances that creates a risk that professional judgment or actions regarding a primary interest will be unduly influenced by a secondary interest. Conflicts of interest are not always obvious. A conflict of interest is any situation that might cause an impartial observer to reasonably question whether your actions are influenced by considerations of private interest. "Private interest" can include financial interests, interests related to your personal relationships, or interests related to your other outside activities[14].

8.3. The argument about the cost of change
The cost-benefit analysis for change management is not unlike other cost-benefit analyses. we are attempting to show the relationship between what it costs to manage the people side of change and the benefits of applying a structured approach to enabling and encouraging employees to adopt a change[05].

Applying change management on a project is not free. It takes time, energy and resources. According to the necessary to apply change management[03].

9. Conclusion
By study, we found that the structure problem solving is most useful way to continuant improving the performance of organization.

To improve a company's performance by successfully solving problems that is causing dissatisfaction for internal or external customers. and to ensure that problem solvers do not jump to solutions before they have analyzed the cause(s) of the problems. then provide a process that can be used by project teams to maximize the contribution from each individual. finally implement solutions to problems that really does eliminate the problems through prevention processes.

Often it will be necessary to collect data, which will then be analysis. When all or most of the facts are known, the possible solutions can be considered; next the ideas must be sorted out. We need to choose the manner teams to solve the problem in the organization. we should setup the common structured problem solving process for the organization. And the teams also are the key fact to success implying the structured problem solving methodology.

Applies to all types of problems , creates a culture of strong problem solving , creates a culture where all are involved in continuous Improvement so appropriate people involved in solution provides a formal communications and follow-up tools

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Efficient Removal of Heavy Metals from Electroplating Wastewater using Electrocoagulation

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Abstract- Heavy metals are toxic to humans on consumption if disposed with inefficient treatment facilities in water bodies or on land. Such industrial wastewater needs effective treatment before disposal as they may mostly contain heavy metals in dissolved form, advance treatments are required for efficient, economical with low operational and maintenance systems for commercial utilisation. Electro-coagulation was experimented with electroplating wastewater using Fe and Al electrode as material at pH variation of 3.0, 5.0, 7.0 and 9.0 for 30 minutes of retention time. The influence of electrode material, pH and retention time was explored during experimentation also corresponding with electrode and energy consumption. Maximum removal efficiency on optimization was observed during pH 9.0 at 0.1 A current using electrode combination of Fe-Fe and Fe-Al 100.0% of nickel and chromium removal within 20 minutes at cost of INR 90.0/m^3 compared to Al-Al and Al-Fe removal efficiency and consumption cost

Index Terms- electrocoagulation, removal efficiency, operating parameters.

I. INTRODUCTION

Heavy metals in effluent are serious problem of concern during treatment process to be efficient. Electroplating wastewater contains heavy metals such as nickel, chromium, zinc and iron after discharged from treatment unit. These heavy metals above limits can cause adverse effect on the humans and environment. Chromium is carcinogenic [1]. Nickel can cause decreases in body weight, heart liver damage, dermatitis and suspected to cause cancer [2, 3]. Zinc above 5mg/l [4] gives astringent taste and opalescence in water, also health problems such as stomach cramps, skin irritations, vomiting, nausea and anaemia, while chronic exposure could lead to copper deficiency in man. [5, 6]. Iron above 0.3 mg/l can affect appearance affecting domestic water supplies, promotes iron bacteria, and staining of laundry cloths [4]. The ingestion of large quantities of iron salts may lead to severe necrotising gastritis with vomiting, haemorrhage and diarrhoea followed by circulatory shock, also diseases of aging such as Alzeihermer's disease, other neurodegenerative disease, arteriosclerosis, diabetes mellitus may all be contributed to by excess iron and copper [6]. Hence heavy metal treatment is important before disposal of effluent on land or in water bodies, with possibility of metals getting dissolved or formation of complex. Various treatments are employed to treat wastewater containing small or large concentration of heavy metals. Methods such as adsorptions [7], bio-sorption [8], ion exchange [9], zeolite [10], phytoremediation [11], nanomaterial [12] and chemical coagulation [13] are used for the efficient removal of heavy metals, still these methods have their own barriers during treatment. Electrocoagulation is considered as the effective treatment technique over methods listed above. The merits of the treatment which are considered over other techniques are less sludge generation, no chemicals used, less retention time, no problem on selectivity of contaminants and easy in operation, only disadvantage is changing sacrificial electrodes of the system [14,15,16,17,18] . Electrocoagulation has shown effective results on textile wastewater [14], pulp and paper wastewater [15], tannery wastewater [16], slaughterhouse wastewater [17], and dairy wastewater [18]. The aim of this study was to investigate electrocoagulation process efficiency to remove heavy metals using iron and aluminum electrodes determining pH and optimal current.

II. MATERIALS AND METHODS

A Characterization of wastewater:

The electroplating wastewater used in this study was collected within the Kolhapur city vicinity. The wastewater was characterized for pH, conductivity, and heavy metals present according to Table 1.

Table1: Characteristics of metal plating wastewater

Characteristics	Units	Values
pH	-	3.0
Conductivity	mS/cm	52
Nickel	mg/l	25
Chromium	mg/l	1.8
Zinc	mg/l	1.2
Iron	mg/l	0.25

B Electrocoagulation procedure:

The present study was performed in laboratory on collected samples of electroplating wastewater industry. Characteristics of wastewater are illustrated in Table-1. Fig-1 shows the set-up of electrocoagulation bench model at laboratory. Set-up includes DC power supply, iron and aluminum electrodes (150 mm height × 30 mm width × 3mm thickness), spacing of 10 mm between electrodes, glass jar (500 ml capacity), electrode connection (monopolar arrangement) and stirring speed 200 rpm.

Wastewater parameters like pH, conductivity were determined and heavy metal concentrations were analyses using atomic absorption spectrophotometer (AAS). Parameters of the sample was analysis at pH 3, 5, 7and 9 at current 0.5A, 1.0A and 1.5A for the duration of 10, 20 and 30 minutes using Iron and aluminum electrodes. pH of the sample was adjusted using sulphuric acid and normal sodium hydroxide. An aliquot of 10 ml from the middle of the EC cell was collected using pipette and filtered to remove flocs. Finally sample was analysis for heavy metal concentration for pH, electrode combination and reaction time.

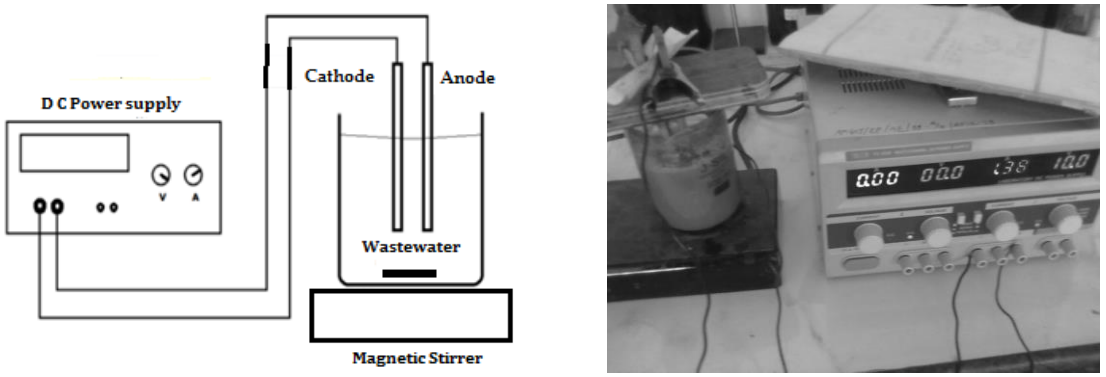


Fig-1: Bench-scale EC reactor with monopolar electrodes

C Calculation:

Energy Consumption

$$E = \frac{U \times I \times t}{V} \quad \text{..... eq-1}$$

Where E- is the energy consumption (kWh/m^3), U - is the applied voltage (V), I - is the current intensity (Amperes), t - is the electrocoagulation time (hr.), and V - is the volume of the treated wastewater (m^3).

Electrode consumption:

$$W = \frac{I \times t \times Mu}{Z \times F \times V} \quad \text{..... eq-2}$$

Where, I- is the current (Amperes), t- is the operation time (hr.), M_w - is molecular weight of the substance (g/mol), F- is Faraday's constant (96500 C/mol), Z- is the number of electrons involved in the reaction at anode (2 for Fe^{2+} and 3 for Fe^{3+} and Al^{3+}), V- volume of wastewater (m^3) and W- is the quantity of metal dissolved (gm) during electrochemical reaction.

Efficiency of Treatment:

$$n\,\% = \frac{C - Cx}{C} \times 100 \quad \text{..... eq-3}$$

C- Initial concentration of sample used for experiment; Cx – concentration in sample at time after treatment.

Figure 2: Graph for Nickel removal efficiency at varying current and time using different electrode combinations.

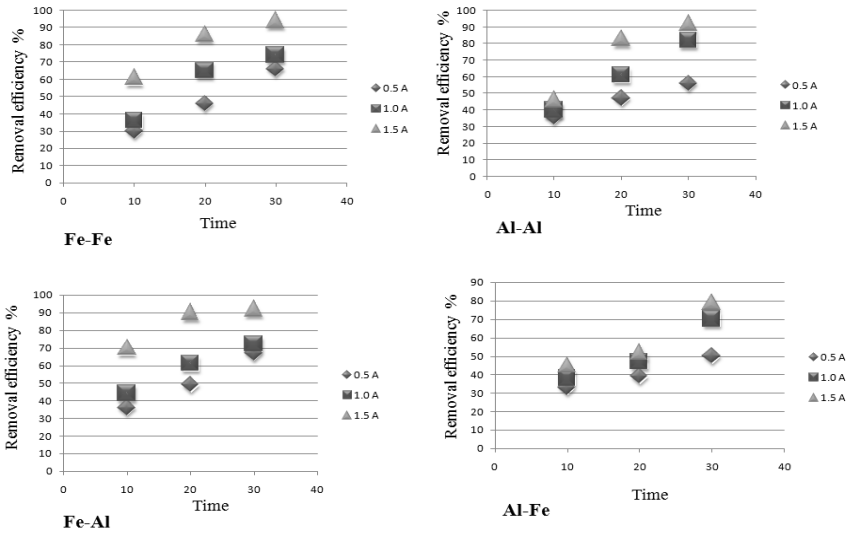


Figure 3: Graph for Chromium removal efficiency at varying current and time using different electrode combinations.

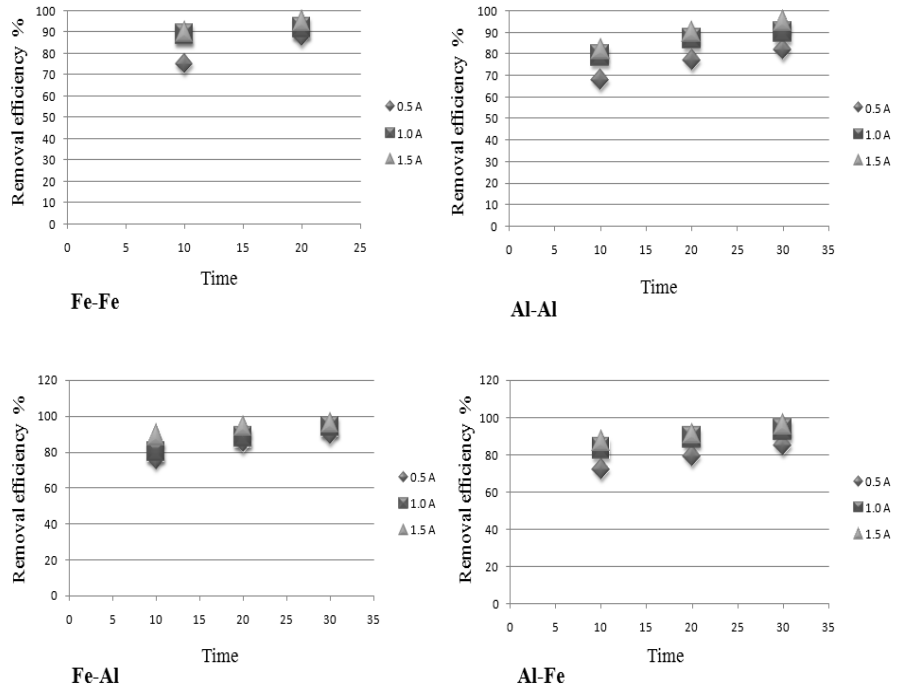


Figure 4: Graph for Chromium removal effeciency for optimized current 1.0A at varying electrode combination and pH values.

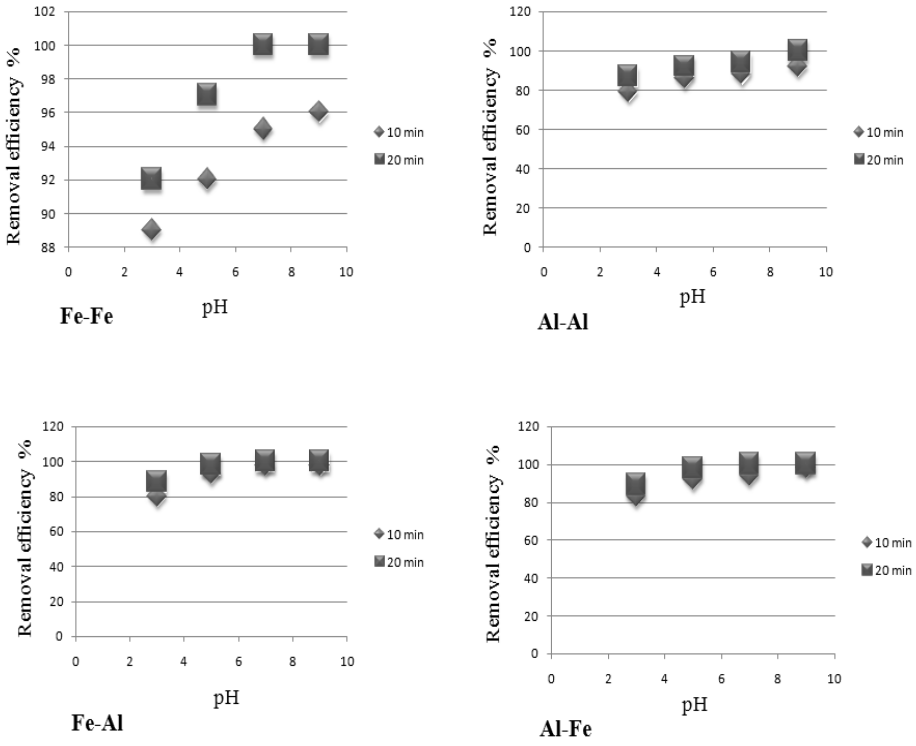
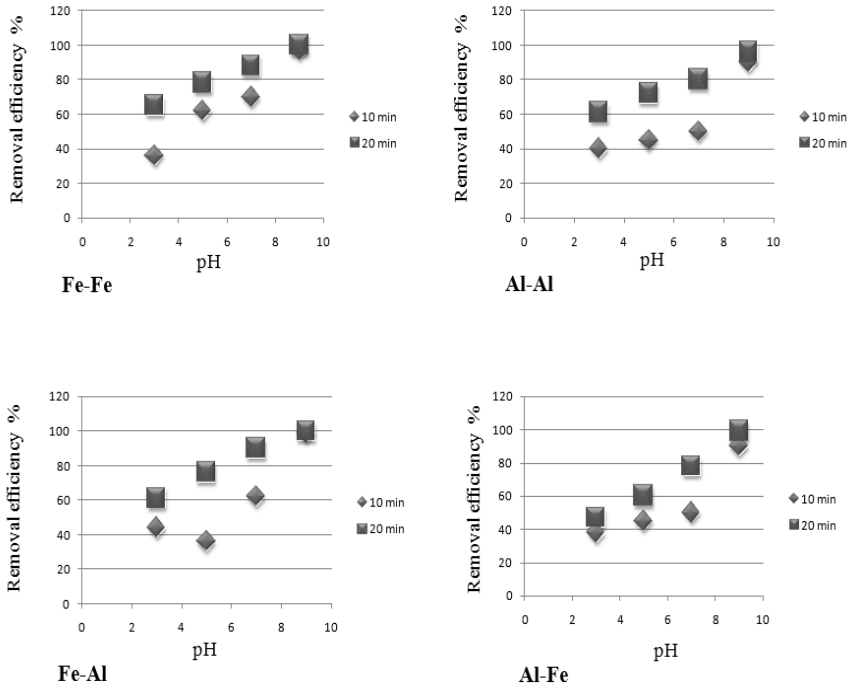


Figure 5: Graph for Nickel removal effeciency for optimized current 1.0A at varying electrode combination and pH values



III. RESULTS AND DISCUSSION

During analysis of electro-plating wastewater it was found that zinc and iron are well below limits of disposal standards and nickel and chromium having significant concentration in wastewater compared with IS: 10500, 1991. In results only treatment of nickel and chromium is considered as part of study. At pH 3.0, wastewater was treated for nickel and chromium removal by applying current in range from 0.5A, 1.0A and 1.5A with time interval of 10 minutes for retention time of 30 minutes, using different combinations such as Fe-Fe, Al-Al, Fe-Al and Al-Fe. Figure 2 shows, with 1.5A current maximum removal of 94.0% was achieved by Fe-Fe, Fe-Al and Al-Al gave 92.0% and 79.0% for Al-Fe removal efficiency for nickel. Figure 3 shows with 1.5A current maximum efficiency was obtained in 20 minutes, using Fe-Fe combination (95.0%); Fe-Al gave 96.0%, Al-Al as 95.0% and Al-Fe 96.0% in 30 minutes. These was achieved as the current increases from 0.5A to 1.5A dissolution of ions and formation of hydroxyl ions takes place, also as the retention time increases the efficiency increases which is application of Faradays Law. Hence at high current and long retention time, removal efficiency of contaminant increases. Material also plays an important role in treatment Fe at anode has proved efficient in heavy metal removal compared to Al at anode. The reasons might be Ferric ions have high affinity compared to aluminates. Therefore at high current 1.5A, long retention time 30 minutes and material anode iron yield efficient results. According to equation eq-1 & eq-2, as retention time and current increases, dissolution of ions from anode increases increasing the cost. Therefore optimisation is necessary for effective removal of contaminants and cost reduction. The current was optimised to 1.0A as the removal efficiency from then was less increased then to 1.5A. The effluent was now analysis for retention time and variation in pH in range 3.0, 5.0, 7.0 and 9.0 for nickel and chromium removal using Fe-Fe, Fe-Al, Al-Al, and Al-Fe electrode combination. Figure 4 & 5 shows, Maximum removal of nickel and chromium was achieved at pH 9.0, using electrode combination of Fe-Fe and Fe-Al, which was 100.0 % in 20 minutes, compared to 99.0% for Al at anode. At pH 5.0, maximum removal efficiency for Ni was 78.0 % for Fe-Fe, 72.0 % for AL-AL, 76.0 % for Fe-Al and 60.0 % for Al-Fe. Whereas for Chromium 97.0 % efficiency was achieved by Fe-Fe, 92.0 % by Al-Fe, 98.0 % by Fe-Al and 98.0% by Al-Fe combination. At pH 7.0, maximum removal efficiency for Ni was 88.0 % for Fe-Fe, 80.0 % for Al-Al, 90.0% for Fe-Al and 78.0% for Al-Fe, whereas for Chromium 100.0 % efficiency was achieved by Fe-Fe, 94.0 % by Al-Fe, 100.0 % by Fe-Al and 100.0 % by Al-Fe combination respectively. The efficiency was higher at pH 9.0 for Fe at anode because, Fe can have good reactivity over range of pH compared to Al which is effective below 6.0 pH. Secondly, iron was preferred over aluminum as the cost of aluminum was four times higher compared to iron. Spacing of the electrode was constructed at 1 cm apart, considering that distance between electrodes affects rate of dissolution of ions and increase in current rate affecting efficiency. The stirring speed also makes significant effect during experimentation; it was kept to be 200 rpm, as excess stirring may destroy flocs formation and Interrelation Bridge between contaminants. Operation cost is sum of eq-1 and eq-2 majorly, current cost of commercial electricity is 10 INR/kWh and material cost of iron is 46 INR/kg, for aluminium is 185 INR/kg which is 4 times higher compared to iron. Hence energy and electrode consumption are considered as major cost for study. Cost for energy and electrode varies from INR 22.6 to 204/m^3 for

Fe at anode in combination as electrode material and for Al at anode cost ranges from 28.5 to 256 INR/m^3 with efficiency less than 95.0 % for nickel and above 95.0 % for chromium. Whereas for optimised condition for pH and current achieves 100.0 % efficiency in less than 20 minutes with Fe-Fe and Fe-Al combination at pH 9.0 and current 1.0A with total cost less than 90.0 INR/m^3compared to Al-Al and Al-Fe more than 100.0 INR/m^3.

IV. CONCLUSION

Results after experimentation showed that electrocoagulation could be used for removal of heavy metals from electro-plating wastewater for effective disposal. Greater removal efficiency occurred at pH 9.0 with 1.0A current in 20 minutes for 100.0 % removal of nickel and chromium. Results also demonstrated the influence of pH, current, and reaction time on removal efficiency with selective iron material at anode.

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A comparative Experimental Analysis of Sea sand as an abrasive material using Silicon carbide and mild steel Nozzle in vibrating chamber of Abrasive Jet machining process

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Abstract- A number of investigations carried out in an abrasive jet machining process having a traditional material with traditional nozzle. In some publication are focusing on water jet cutting machining and some are focusing on sand bond grinding , some work are wear behavior of nozzle and some are on performance of material in water jet machining.

The present research work give an analysis of performance of sea sand in silicon carbide nozzle and mild steel nozzle (newly used) and their estimate life of nozzle diameter. In this experiment glass used as work piece. The approximate service life of silicon carbide nozzle is 300-400 hrs as it depend on the abrasive material hardness. The performance of the sand in vibration chamber , silicon carbide nozzle is used with variable and constant parameter. It is also noticed that the width of cut is increased with increasing of feed rate. The taper cutting has found to be more at greater stand of distance and work feed rate. Silicon carbide is hard as compared to mild steel but gives its characteristic. The performance characteristic of MRR (material removal rate),SOD (stand off distance) are similar in nature as used by traditional material in this process.

Index Terms- vibrating chamber, nozzle, Abrasive jet machine, particle size, stand off distance ,material removal rate , glass

I. INTRODUCTION

Abrasive jet machining is also called as abrasive micro blasting, which is manufacturing process utilized a high pressure stream carrying micro particle of an abrasive to impinges on glass work piece (surface for material removal as well as shape generation). The removal occurring due to the erosion action of particle striking on the glass surface or work piece surface.

Matthew w. chantangner (10) has emphasis limited material removal rate, capability and typically emphasis on finishing process. Recent studies by Dang Sam park (1) have focus on line type microgrooving of glass by using micro abrasive water jet machining process. The vibration chamber has number of aspect i.e. it has high degree of flexibility, the abrasive material carried out by flexible hose with tight nozzle attached at other end. The specific cylindrical vibrating chamber in this set has localized cam and follower. The DC motor is used for variable speed to avoid sudden impact on vibration chamber. The compressed air with pressure variable from 5 kg/cm^2 to 12 kg/cm^2 for mixing of abrasive material in mixing chamber.

In this research work the vibration chamber has cylindrical shape for better mixing and non striking of material at corner. This chamber has provided inlet and outlet at lower and upper of outer surface for compressed air. In some studies displacement chamber has used instead of vibrating chamber but results are not upto the mark due to less pressure stream.

The main objectives of this study to performed essential experiments required to machine hole on glass workpiece. To achieve the goals optimum condition for workpiece is fixed and masking along with the process of abrasive machining.

II. EXPERIMENTAL PROCEDURE AND MATERIAL

2.1 : fabrication of cylindrical vibration chamber

The M.S. cylindrical sheet of thickness 4 mm with the height of 30 cm is used. The lower and upper end is used for outlet and inlet of abrasive material and compressed air. The cylindrical chamber has so design for non sticking of sand at corner and proper mixing with comp air. The fundamentals of vibration analysis can be understood by studying the simple mass–spring–damper model. The mathematics used to describe its behavior is identical to other simple harmonic oscillators such as the RLC circuit.

The dimension 160 x 110 x 4 (mm). The high compressed air inside the chamber which the cylinder walls and cover plate have to withstands. It was design and selected in a such way that the cover plate and cylinder wall should not bend due to the internal pressure and total leakages were avoided.

The equation used for thickness

$T = a \times b \times c_3 [p / \{\sigma 1 (a^2 + b^2) \} ^{½}$

Where,

p = uniform pressure

a = length of the plate in mm

b = breadth of plate in mm

c_3 = co-efficient = 0.49

$T = 0.49 \times 230 \times 160 [0.8 / \{ (2302 + 1602) \}] ^{½}$

T = 4.85 mm

T = 4 mm

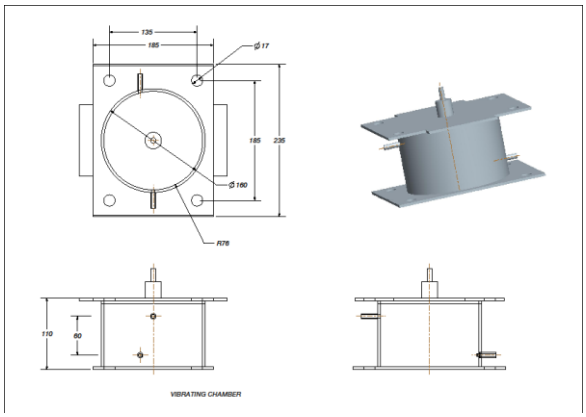

Fig no.1.cylidrical vibrating chamber

The difference in hardness between the two substances: a much harder abrasive will cut faster and deeper. Grain size (grit size): larger grains will cut faster as they also cut deeper. Adhesion between grains, between grains and backing, between grains and matrix: determines how quickly grains are lost from the abrasive and how soon fresh grains, if present, are exposed.

2.2: sea sand as abrasive material:

Usually traditionally abrasive are using after preparing grain size (100-150 microns)and testing hardness of the sand. The minerals are either crushed or are already of a sufficiently small size (anywhere from macroscopic grains as large as about 2 mm to microscopic grains about 0.001 mm in diameter) to permit their use as an abrasive. These grains, commonly called grit, have rough edges, often terminating in points which will decrease the surface area in contact and increase the localized contact pressure. The abrasive and the material to be worked are brought into contact while in relative motion to each other. Force applied through the grains causes fragments of the worked material to break away while simultaneously smoothing the abrasive grain and/or causing the grain to work loose from the rest of the abrasive. Heavy minerals (dark) in a quartz beach sand (Chennai, India). In terms of particle size as used by geologists, sand particles range in diameter from 0.0625 mm (or 1⁄16 mm) to 2 mm. An individual particle in this range size is termed a sand grain. Sand grains are between gravel (with particles ranging from 2 mm up to 64 mm) and silt (particles smaller than 0.0625 mm down to 0.004 mm). The size specification between sand and gravel has remained constant for more than a century, but particle diameters as small as 0.02 mm were considered sand under the Albert Atterberg standard in use during the early 20th century.

2.3 specification of sand
Physical specification - 20 mm - 2.5 mm
Uniform coefficient - 1.3 - 1.7
Specific gravity - 2.67
Mohs Hardness - 7
Density - 105 – 115 lbs / foot cubic

III. PARAMETERS AND OBSERVATIONS

The various parameter related to performance of sand as an abrasive in both cases

1) Operating Pressure (P) – 5 kg/cm. sq to12 kg/cm.sq
2) Carrier Gas - compressed air
3) Material Removal Rate(MRR) – gm/sec.sq
4) Standoff Distance (SOD) - mm (variable & constant)
5) Diameter of cut (DOC) – 4mm to 5 mm
6) Powder flow rate – gm per sec
7) Size of abrasive or Grain size - 100 to 150 micron

IV. OBSERVATION : DETAIL SPECIFICATION

1) Nozzle : a) Material = silicon carbide b) Diameter = 1.5 mm
2) Abrasive : a) Material = sand b) Grain Size = 100-150 µm
3) Workpiece: a) Material = Glass b) Thickness = 4 mm

Table no. 1: SOD & Pressure is variable

Sr. No	P Kg/cm²	SOD mm	MRR W/T = gm/sec)	PFR Wa/T = gm/sec	DOC Mm
1	5	5	0.04	1.40	4.5
2	5.5	6	0.042	1.45	4.7
3	6.5	7	0.058	1.47	5.0
4	7	8	0.066	1.527	5.1
5	7.5	9	0.072	1.56	4.4
6	8	9.5	0.081	1.62	5.2
7	8.5	10	0.097	1.70	5.4
8	9	11	0.102	1.81	5.6
9	9.5	12	0.102	1.82	5.4
10	10	12	0.1047	1.85	5.5

The polynomial Equation for third degree :
Performance of : MRR v/s PFR
F(x)=p1*x^3+p2*x^2+p3*x+p4

The value of coordinates p1 = -0.5277, p2 = 2.315, p3 = -3.179 and p4 = 1.39 the value R-square = 0.984 which is very closed to 1 for best fit of curve.

Fig No : 2 Curve fitting of MRR v/s Pressure

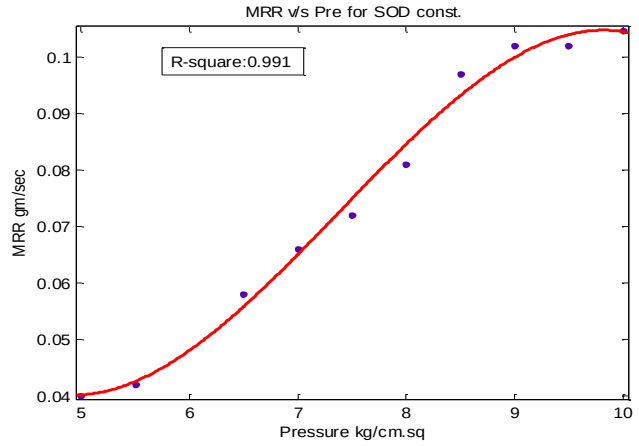

Fig No :3 Best curve fitting of MRR v/s PFR

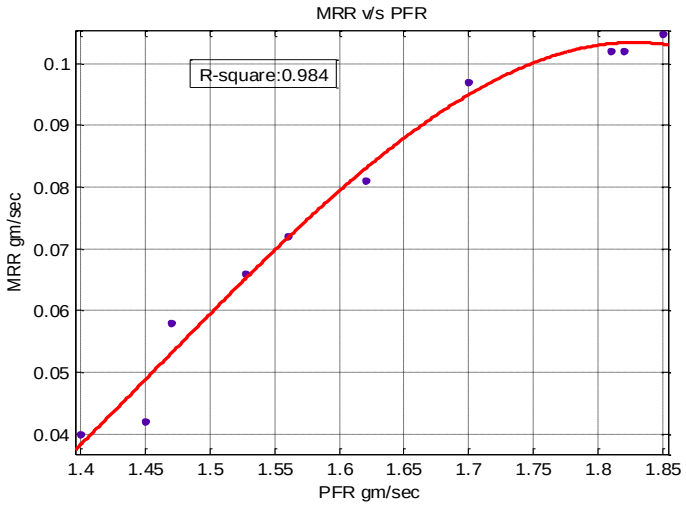

Table no.2 : SOD & pressure constant

Sr. No	P Kg/cm²	SOD mm	MRR W/T = gm/sec	PFR Wa/T = g/se	DOC mm
1	10	5	0.082	1.80	5.1
2	10	5	0.082	1.81	5.0
3	10	5	0.081	1.81	5.1
4	10	5	0.082	1.81	5.1
5	10	5	0.081	1.80	5.0

Observation :for M.S.Nozzle material
1) Nozzle : a) Material = **Mild steel** b) Dia = 2.5 mm
2) Abrasive: a) Material = **sand** b) Grain Size = 100-150 µm
3) Workpiece a) Material = Glass b) Thickness = 4 mm

Table No. 3 : SOD is constant for MS

Sr. No	P Kg/cm²	SOD mm	MRR W/T = gm/sec)/ 10^{-3}	PFR Wa/T = gm/sec	D mm
1	6.2	8	6.9	0.50	5.3
2	6.2	8	8.1	0.63	5.5
3	6.2	8	5.94	0.61	6.0
4	6.2	8	1.6	0.39	6.0
5	6.2	8	1.52	0.30	6.0

V. RESULT AND DISCUSSION

The material removal rate (MRR) is increasing with change in pressure and standoff distance is also variable. The operating hrs of nozzle is directly proportional to material of nozzle i.e. hardness of nozzle. The hardness of silicon material is more than mild steel nozzle and life is absolutely more than mild steel nozzle.

VI. CONCLUSION

In this experimental study silicon carbide nozzle and mild steel nozzle is used for sea sand abrasive material. 1) The hardness of material of nozzle play a key role with resp. to its erosion wear in the AJM process. The silicon nozzle being high hardness exhibited with lower erosion rate while the MS nozzle with relative low hardness having low erosion rate under same test condition and curve fitting for this is good fitting .2) the life of silicon nozzle is more than MS nozzle 3) A silicon nozzle exhibited a brittle facture induced removal process, while the MS nozzle showed mainly plowing type of removal rate.4) The erosion rate of material depend on grain size of erodent abrasive.

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Non-Linear RM-PRNG for the Design and Implementation of an Encryption and Decryption

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Abstract- Pseudo Random Number Generator (PRNG) is an algorithm for generating a sequence of numbers. Due to speed in number generation pseudorandom numbers are very important. The increasing application of cryptographic algorithms to ensure secure communications is widely used. So, Here we propose a new reseeding mixing method to extend the system period length and to enhance the statistical properties of pseudo random number generator (PRNG). The reseeding method removes the short periods which are occurred by CB-PRNG and the mixing method extends the system period length by Xoring with ALG. The output sequence of RM-PRNG is used as a key to the encryption and decryption modules. The simulation results are obtained by using Modelsim and Synthesis is observed by Xilinx ISE 10.1.

Index Terms- Encryption, Decryption, Reseeding, Mixing, PRNG, Period Extension.

I. INTRODUCTION

It is hard to imagine a well-designed cryptographic application that doesn't use random numbers. Session keys, initialization vectors, salts to be hashed with passwords, unique parameters in digital signature operations, and nonce's in protocols are all assumed to be random by system designers. Unfortunately, many cryptographic applications don't have a reliable source of real random bits, such as thermal noise in electrical circuits or precise timing of Geiger counter click [Agn88, Ric92]. Instead, they use a cryptographic mechanism, called a Pseudo-Random Number Generator (PRNG) to generate these values. The PRNG collects randomness from various low-entropy input streams, and tries to generate outputs that are in practice indistinguishable from truly random streams. Typical PRNG consists of unpredictable input called "seed" value and a secret state "S". Software approaches use machine state information like movement of the mouse, keystrokes, contents of memory registers, and hardware latency to create a seed value. Prngs operate by repeatedly scrambling the seed to generate random output. Typically, the seed is a short, random number that the PRNG expands into a longer, random-looking bit stream.

A PRNG often starts in a random state and must process many seeds to reach a secure state **S**. Upon request, it must generate outputs that are indistinguishable from random numbers to an attacker who doesn't know and cannot guess **S**. In this, it is very similar to a stream cipher. Additionally, however, a PRNG must be able to alter its secret state by repeatedly processing input values (seed). See Figure 1 for a high-level view of a PRNG.

Figure.1. Model of PRNG's

Prngs are produce long period random number sequence linear prngs are very useful, some of the linear prngs are linear feedback shift registers (lfsrs), linear congruential generators (lcgs), and multiple recursive generators (mrgs). These linear prngs are good in hardware cost and throughput rate. But due to their linear structure output random numbers of these generators are easily predictable. To overcome the predictability problem nonlinear chaos-based prngs (CB-prngs) [8] were proposed, it is efficient in hardware cost, but due to quantization error there exists short periods in such nonlinear prngs. They produce only one bit per iteration hence throughput rate is low. And then to produce long periods and high throughput rate reseeding-mixing PRNG (RM-PRNG) were proposed. The RM-PRNG consists of a CB-PRNG and MRG [1], [8]. The reseeding method removes the short periods in the CB-PRNG and by mixing MRG with CB-PRNG the overall system period length increases.

In this paper, we propose a encryption and decryption technology; in this technology has an encryption scheme the message or information is encrypted by using an encryption method, the plain text is converted into unreadable cipher text. An adversary that can see the cipher text should not able to determined anything about the original message. However the cipher text is converted to plain text (original message) by using decryption method. In this encryption and decryption methods are implementing an operation of the plain text and RM-PRNG key with "**Xoring"** operation.

II. RM-PRNG

Fig. 2 shows the schematic diagram of the RM-PRNG, which is composed of three modules: Nonlinear Module, Reseeding Module, and Vector Mixing Module. In a 32-b implementation, the Nonlinear Module has a controlled 32-b state register and a Next-State construction circuitry. The state

register stores the state value (Xt) which is set to seed1 by using the start command. The next state construction is used to produce the next state value (Xt+1) by using recursive formula Xt+1=F (Xt) [1].

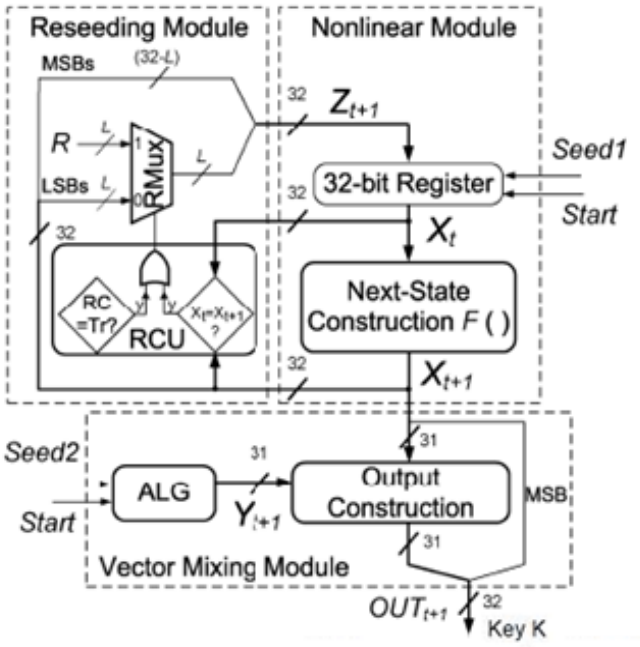


Figure.2. Structure of RM-PRNG

For each generated state value, the reseeding control unit (RCU) in the Reseeding Module compares the values for checking the fixed point condition and increases the reseeding counter (RC) at the same time. The RC will be reset and the reseeding operation will be activated when either the fixed point condition is detected or the RC reaches the reseeding period. When RC reaches the reseeding period Tr or the fixed point condition is detected then RC will be reset and the reseeding operation will be activated. The sate register will be loaded through the rmux, when reseeding is activated [1]. The value of Xt+1 is directly loaded into the state register if the reseeding is not activated. Vector Mixing Module is implemented by an auxiliary linear generator (ALG) and output construction. By mixing Xt+1 with the output Yt+1 from ALG in Vector Mixing Module, we obtain the output of the RM-PRNG (32-bit implementation).

A. Nonlinear Module: We use the LGM as the next-state construction function in the Nonlinear Module so that Xt+1 = F(Xt) = γxt (1- Xt), t ≥ 0..... (1) Choosing a value 4 for not only makes the LGM Chaotic but also simplifies the implementation of (1) to merely left-shifting the product by 2 b. However, the state size decreases from 32 to 31 b, because the dynamics (1) are the same. This is equivalent to a degradation of resolution by 1 b. In addition, fixed as well as short periods exist when the LGM is digitized. From exhaustive runs for all of the seeds, we obtain all other periods for the 32-b LGM without reseeding. They are given in Table I with the longest period (18 675) and the set of short listed separately along with their total occurrences. Clearly, the performance of a CB-PRNG using only the Nonlinear Module is unsatisfactory. To solve the fixed points and short-period problem, a Reseeding Module is in order.

B. Reseeding Module: The removal of the fixed points by the reseeding mechanism is obvious. When the fixed point condition is detected or the reseeding period is reached, the value loaded to the state register will be perturbed away from in the RCU by the fixed pattern according to the formula

$$Z_{t+1}=\begin{cases} X_{t+1}[j],\ 1\le j\le 32-L; \\ R[i],\quad 33-L\le j\le 32,\ i=j+L-32 \end{cases}$$

Where subscripts i, j are the bit-index, L is integer. In order to minimize the degradation of the statistical properties of chaos dynamics, the magnitude of the perturbation of the fixed pattern should be small compared Here, we set L=5 so that the maximum relative perturbation is only (25-1)/232 and the degradation can be ignored [15]. Clearly, the effectiveness of removing short-periods depends on the reseeding period as well as the reseeding pattern. However, choosing the optimal reseeding period and the reseeding pattern is nontrivial. Nevertheless, several guidelines to choose a suitable combination had been proposed and discussed in our previous work. First, the reseeding period should avoid being the values or the multiples of the short periods of the unperturbed digitized LGM. Otherwise if the 5 lsbs is equal to when the reseeding procedure is activated. Then no effective reseeding will be realized and the system will be trapped in the short-period cycle. Hence, prime numbers should be used as the reseeding period candidates. Although the average period of the reseeded PRNG has increased more than 100 times relative to that of the non reseeded counterpart, the period can in fact be extended tremendously in the Vector Mixing Module described below.

C. Vector Mixing Module: The Vector Mixing Module is constructed by using ALG and output construction. In this module an efficient MRG which is called as DX generator acts as the ALG. By using the following recurrence formula

$$Y_{t+1}=Y_t+B_{DX}.Y_{t-1} \bmod M, t\ge 7$$

In output construction unit, to obtain the lsbs of the output The lsbs of Yt+1 and that of Xt+1 are mixed by using XOR operation according to the following equation

$$OUT_{t+1}[1:31]=X_{t+1}[1:31]\oplus Y_{t+1}[1:31]$$

To form the full 32-b output vector outt+1 the MSB of Xt+1 is added to outt+1[1:31].

The DX generator is implemented described below the implementation [of the DX generator is (the ALG) done by using 8-word registers, circular-left-shift (CLS), circular 3-2 counter and End Around Carry- carry look ahead adder (EAC-CLA). By using flip-flops the eight-word register was implemented. For generating two partial products signal Yt-7 is circular-left-shifted 28 and 8 b using the modules CLS-28 and CLS-8 respectively. To combine these three 31-b operands into two 31-b operands a circular 3-2 counter is used, which Consumes 247 gates. To

evaluate Yt+1 31-b EAC-CLA is used with 348 gates. The schematic design of the 31-b EAC-CLA [4], [9] is shown in Figure 2(b). The schematic design of the 31-b EAC-CLA includes four modules they are propagation and generation (PG) generators, end-around-carry (EAC) generator, internal carry (IC) generator, and clas [5]. When EAC is generated by group of pgs, EAC is then fed to the IC generator and then to least-significant 8-b CLA. On clas, the final addition was performed.

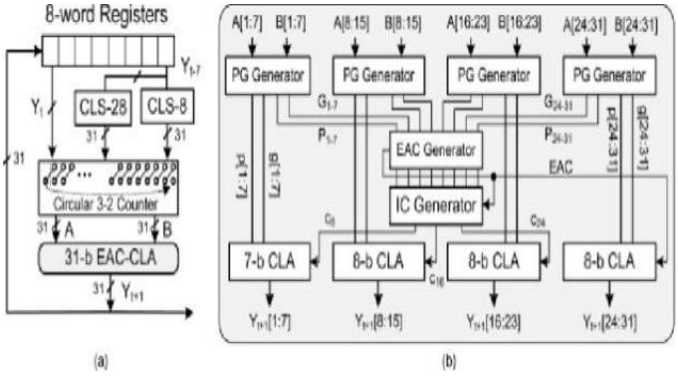


Figure.3: (a) Structure of the DX generator (b) Structure of the 31-b EAC-CLA.

III. PROPOSED ENCRYPTION AND DECRYPTION

In this proposed Encryption and decryption technology is where security engineering meets mathematics. It provides us with the tools that underlie most modern security protocols. It is probably the key enabling technology for protecting distributed systems, yet it is surprisingly hard to do right. Encryption and decryption technology is the practice and study of techniques for secure INFORMATION SHARING in the presence of ADVERSARYIES. In encryption and decryption technology, encryption is the process of encoding messages or information in such a way that hackers cannot read it. Encryption and decryption technology is designed around computational hardness assumptions, making such algorithms hard to break in practice by any adversary. Encryption is the process of converting plain text or information into unintelligible cipher text. Any adversary that can see the cipher text should not know anything about the original message. Decryption is the reverse, in other words, moving from the unintelligible cipher text back to plaintext. The statistical properties of cryptographic methods are the reason for the excellent pseudorandom testability of encryption and decryption technology processor cores. and finally the RM-PRNG key using an Encryption and decryption in as shown fig4.

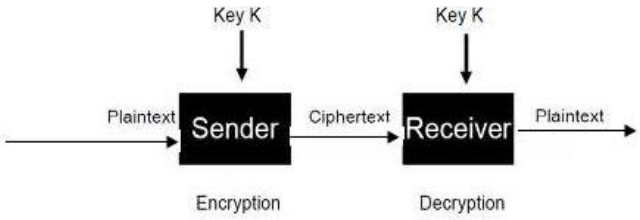


Figure.4: Encryption and Decryption technology

IV. RESULTS AND SIMULATION

Pseudo Random Number Generator, Encryption and Decryption were designed using Verilog language in modelsim 6.4. All the simulations are performed using modelsim 6.4 simulator. The simulated output of Pseudo Random Number Generator, Encryption and Decryption are shown in Figure 5&6 And also FPGA implementation of synthesis using Xilinx10.1 in fig7 and also FPGA result in fig8.

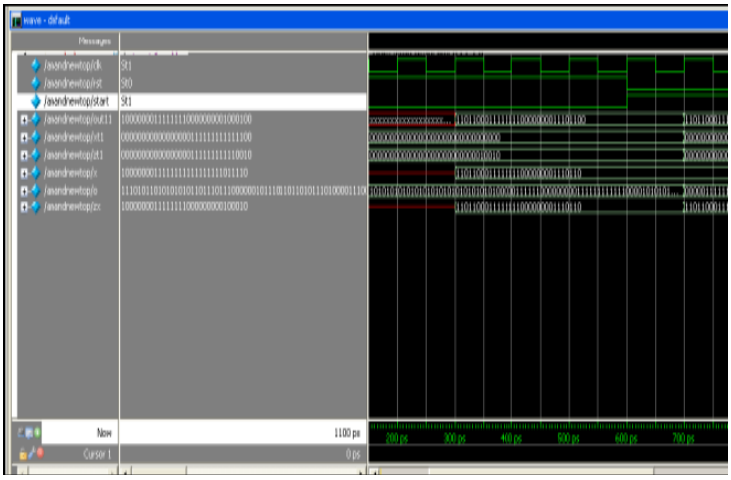


Figure.5: simulation results for RM-PRNG key

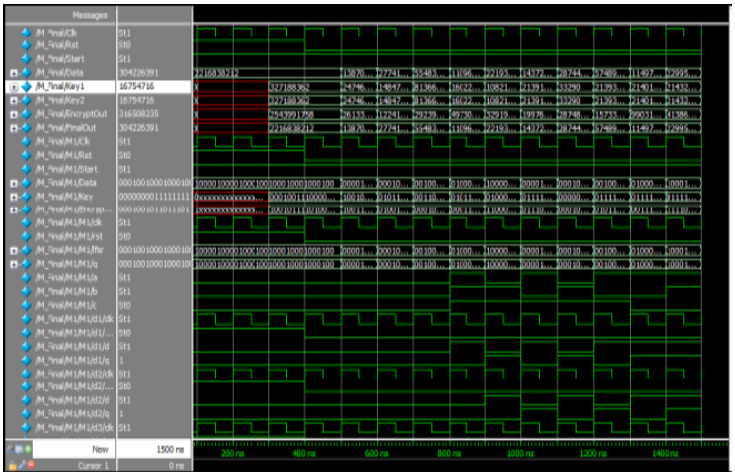


Figure.6: Simulation results of encryption and decryption

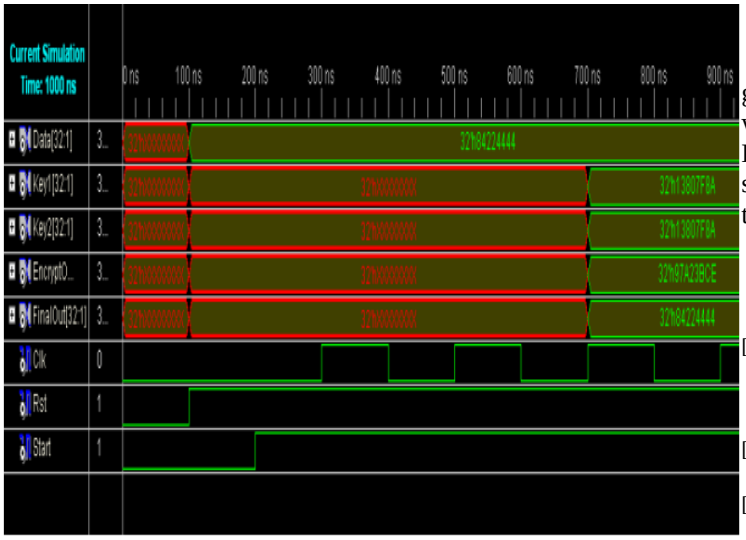
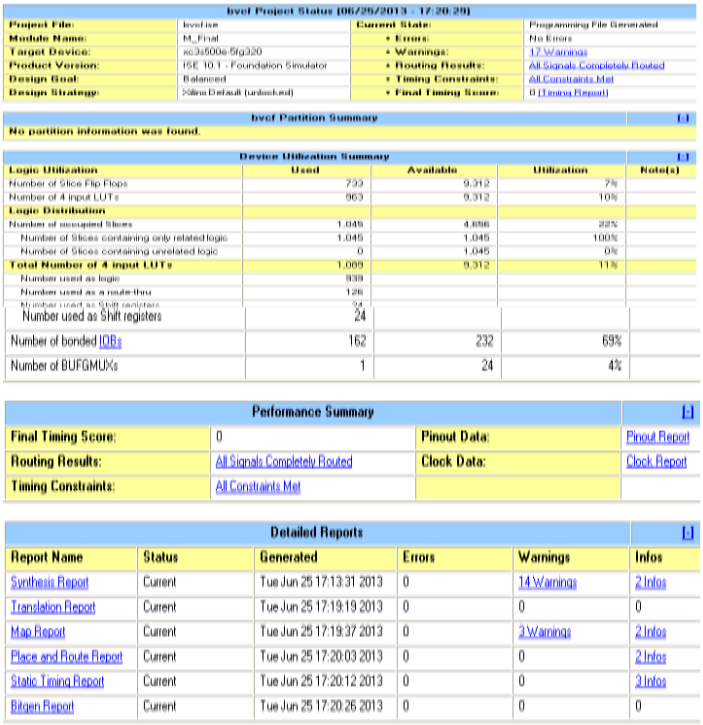


Figure.7: synthesis result



Project Status (06/25/2013 - 17:20:29)

Project File:		Current State:	Programming File Generated
Module Name:	M_Final	• Errors:	No Errors
Target Device:	xc3s500e-5fg320	• Warnings:	17 Warnings
Product Version:	ISE 10.1 - Foundation Simulator	• Routing Results:	All Signals Completely Routed
Design Goal:	Balanced	• Timing Constraints:	All Constraints Met
Design Strategy:	Xilinx Default (unlocked)	• Final Timing Score:	0 (Timing Report)

Partition Summary

No partition information was found.

Device Utilization Summary

Logic Utilization	Used	Available	Utilization	Note(s)
Number of Slice Flip Flops	733	9,312	7%	
Number of 4 input LUTs	963	9,312	10%	
Logic Distribution				
Number of occupied Slices	1,049	4,656	22%	
Number of Slices containing only related logic	1,049	1,049	100%	
Number of Slices containing unrelated logic	0	1,049	0%	
Total Number of 4 input LUTs	1,069	9,312	11%	
Number used as logic	939			
Number used as a route-thru	126			
Number used as Shift registers	24			
Number of bonded IOBs	162	232	69%	
Number of BUFGMUXs	1	24	4%	

Performance Summary

Final Timing Score:	0	Pinout Data:	Pinout Report
Routing Results:	All Signals Completely Routed	Clock Data:	Clock Report
Timing Constraints:	All Constraints Met		

Detailed Reports

Report Name	Status	Generated	Errors	Warnings	Infos
Synthesis Report	Current	Tue Jun 25 17:13:31 2013	0	14 Warnings	2 Infos
Translation Report	Current	Tue Jun 25 17:19:19 2013	0	0	0
Map Report	Current	Tue Jun 25 17:19:37 2013	0	3 Warnings	2 Infos
Place and Route Report	Current	Tue Jun 25 17:20:03 2013	0	0	2 Infos
Static Timing Report	Current	Tue Jun 25 17:20:12 2013	0	0	3 Infos
Bitgen Report	Current	Tue Jun 25 17:20:26 2013	0	0	0

Figure.8: FPGA Result

V. CONCLUSION

We proposed a Encryption and decryption using RM-PRNG to ensure secure communication. A hardware implementation of RM-PRNG is to offer long periods and high throughput rate to established statistical standards for PRNGs.

The reseeding mechanism solves the short-period problem, while mixing a CB-PRNG with a long-period DX generator extends the period length. Hence, Simulation and Synthesis is observed by ModelSim 6. 4b and Xilinx ISE 10.1

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Modeling and Simulation of PV Cell using One-diode model

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Abstract- The focus of this paper is on one diode photovoltaic cell model. The theory as well as the construction and working of photovoltaic cells using single diode method is also presented. Simulation studies are carried out with different temperatures. Based on this study a conclusion is drawn with comparison with ideal diode.

General Termss- In recent years, significant photovoltaic (PV) deployment has occurred, particularly in Germany, Spain and Japan [1]. Also, PV energy is going to become an important source in coming years in Portugal, as it has highest source of sunshine radiation in Europe.

Presently the tenth largest PV power plant in the world is in Moura, Portugal, which has an installed capacity of 46 MW and aims to reach 1500 MW of installed capacity by 2020, as stated by the Portuguese National Strategy ENE 2020, multiplying tenfold the existing capacity [2].

The solar cells are basically made of semiconductors which are manufactured using different process. These semiconductors [4].

The intrinsic properties and the incoming solar radiation are responsible for the type of electric energy produced [5].

The solar radiation is composed of photons of different energies, and some are absorbed at the *p-n* junction. Photons with energies lower than the bandgap of the solar cell are useless and generate no voltage or electric current. Photons with energy superior to the band gap generate electricity, but only the energy corresponding to the band gap is used. The remainder of energy is dissipated as heat in the body of the solar cell [6].

Keywordss- PV cell, solar cell, one diode model

I. INTRODUCTION

A PV system directly converts sunlight into electricity. Solar cell is the main device of a PV system which are grouped to form panels or arrays. To process electricity from PV devices power electronic converters. These converters may be used to regulate the voltage and current at the load, to control the power flow in grid-connected systems, and for the maximum power point tracking (MPPT) of the device [3].

In this paper we have considered one diode PV cell. The effect of the series resistance is also included in this. The equivalent circuit of a solar cell with its parameters as a tool to simulate in order to consider the irradiance and temperature change, the I-V characteristics of PV cell is also used in this paper.

II. MODELING AND SIMULATION

As mentioned above the solar cells are semiconductor with a p-n junction fabricated in a thin wafer or layer of semiconductors. When exposed to light a photo current proportional to the solar radiation is generated, if the photon energy is greater than the band gap. In the dark, the I-V characteristics of a solar cell have an exponential characteristic similar to that of a diode [7].

A detailed approach to PV cell modeling based on a mathematical description of the equivalent electrical circuit of a PV cell. Three models are used to modeling of the PV cell module or array. In comparison the most commonly used configuration is the one-diode model that represents the electrical behavior of the pn-junction.

The simplest model of a PV cell is shown as an equivalent circuit below that consists of an ideal current source in parallel with an ideal diode is known as ideal equivalent circuit of PV cell. The current source represents the current generated by photons and its output is constant under constant temperature and constant incident radiation of light

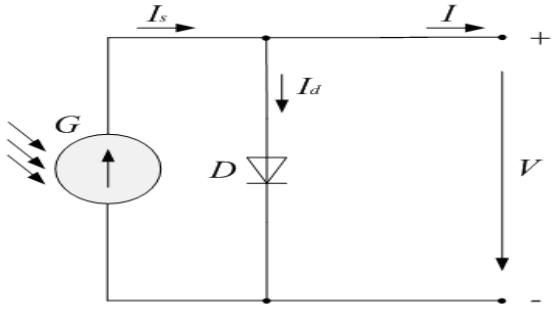

Fig.1 Ideal solar cell with one-diode.

Where G is the solar radiance, Is is the photo generated current, Id is the diode current, I is the output current, and V is the terminal voltage.

The I-V char. Of the ideal solar cell with one-diode are given by:-

$$I = I_s I_o \left(\frac{q^V}{e^{mtK}-1}\right) \quad \text{..... (1)}$$

where I0 is the diode reverse bias saturation current, q is the electron charge, m is the diode ideality factor, k is the Boltzmann's constant, and T is the cell temperature.

For the same irradiance and p-n junction temperature condition, the short circuit current ISC it is the greatest value of the current generated by the cell. The short circuit current ISC is given by:-

$I_{SC} =$ I - Is for V = 0 …….. (2)

For the same irradiance and p-n junction temperature condition, the open circuit voltage VOC is the greatest value of the voltage at the terminals. The open circuit voltage VOC is given by:-

$$V = V_{oc} = \frac{mkT}{q} ln \left(1 + \frac{I_{sc}}{I_0}\right)$$

For I = 0 …….. (3)

The output power is given by:-

$$P = V \left[I_{sc} - I_0 \left(\frac{q^V}{e^{mkT}} - 1\right)\right]$$ …….. (4)

2.1 Solar Cell with Series Resistance:-

For more accurate result the model adding a series resistance. The configuration of the simulated solar cell with one-diode and series resistance is shown in Figure 2

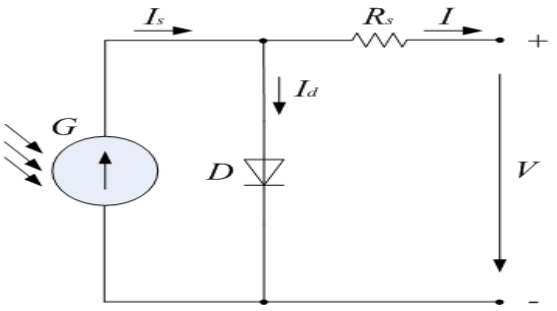

Fig. 2. Solar cell with single-diode and series resistance.

The I-V characteristics of the solar cell with one-diode and series resistance are given by:

$$I = I_s - I_0 \left[\frac{q\,(V+R_s\,I)}{e \quad mkT} - 1\right]$$ …… (5)

For the same irradiance and p-n junction temperature conditions, the effect of a series resistance in the PV model implies the use of a recurrent equation to determine the output current in function of the terminal voltage. The Newton-Raphson method converges more rapidly and for both positive and negative currents. The short circuit current I_{SC} is given by:-

$$I_{sc} = I = I_s - I_0 \left[\frac{q\,(R_s + I_{sc})}{e \quad mkT} - 1\right] \; for\, V = 0$$ …….. (6)

The series resistance is small and negligible, the open circuit voltage V_{OC} is given by:-

$$V = V_{oc} = \frac{mkT}{q} ln \left(1 + \frac{I_{sc}}{I_0}\right)$$

for $I = 0$ …….. (7)

The output power is given by:-

$$P = V \left[I_{sc} - I_0 \left(\frac{q\,(V+R_s\,I)}{e \quad mkT} - 1\right)\right]$$ …….. (8)

The diode saturation current at the operating-cell temperature is given by:-

$$I_0 = I_0^* \left(\frac{T_c}{T^*}\right)^3 e^{\frac{\varepsilon q}{mk}\left(\frac{1}{T^*} - \frac{1}{T_c}\right)}$$ …….. (9)

Where I^*_O is the diode saturation current at reference condition, T_C is the p-n junction cell temperature, T* is the cell p-n junction temperature at reference condition and ε is the band gap.

III. SIMULATION RESULTS

For simulation result the mathematical models for the ideal solar cell and the solar cell with series resistance were implemented in Matlab/Simulink. We use the BP SX 150S PV module. The electrical parameter for BP SX 150S PV module is given by:-

Electrical Characteristics data of PV module
Maximum Power (Pmax) = 150W
Voltage at Pmax (Vmp) = 34.5V
Current at Pmax (Imp) = 4.35A
Open-circuit voltage (Voc) = 43.5V
Short-circuit current (Isc) = 4.75A
Temperature coefficient of Isc = 0.065 ± 0.015 %/ oC
Temperature coefficient of Voc = -160 ± 20 mV/ oC
Temperature coefficient of power = -0.5 ± 0.05 %/ oC
NOCT = 47 ± 2oC

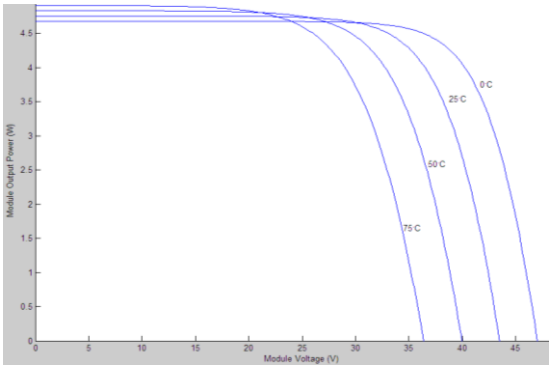

Fig:-(a) I-V characteristic for the temperature variation between 0 and 75^{0}C.

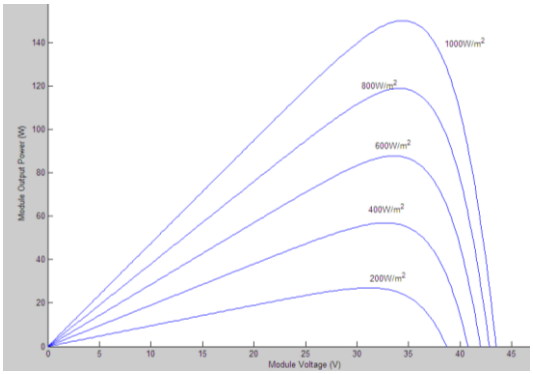

Fig:- (b) P-V characteristics for various condition of solar radiation

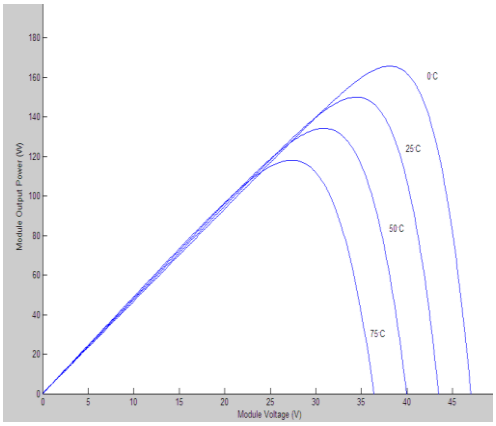

Fig:- (c) P-V characteristics for temperature between 0 and 750C

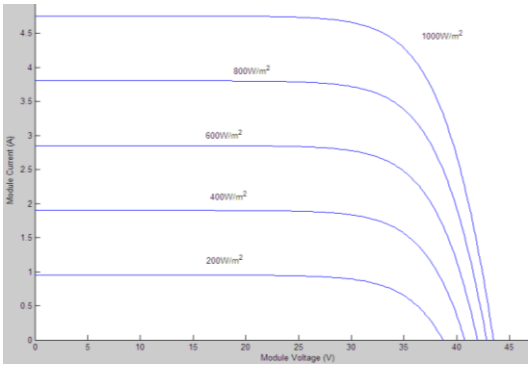

Fig:-(a) I-V characteristic for various variation conditions of solar radiation.

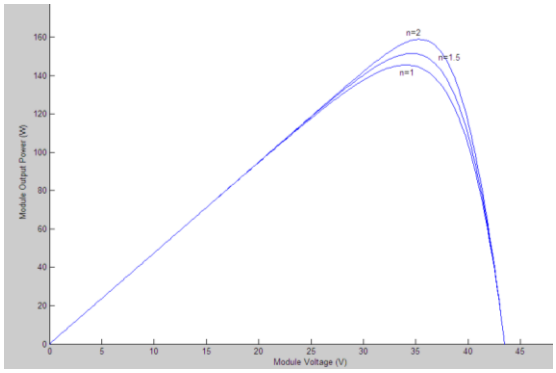

Fig:- (b) P-V characteristics for a diode ideality variation between 1 and 2.

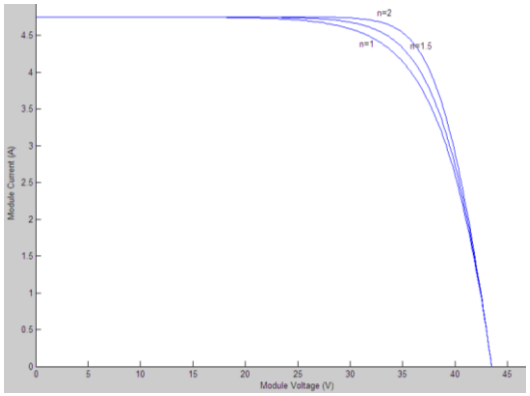

Fig:- (b) I-V characteristics for a diode ideality variation between 1 and 2.

IV. CONCLUSION

The behavior of ideal solar cell model and the behavior of the solar cell with series resistance model are studied in this paper. Included effects are: temperature dependence, solar radiation change, and diode ideality factor and series resistance influence. The solar cell with series resistance model offers a more realistic behavior for the photovoltaic systems. Particularly, this model is to be considered in panels with series cells, because the series resistance is proportional to the number of solar cells in the panel.

Modeling of photovoltaic modules are not difficult, of realize than when is known the model of photovoltaic cell. Also have been demonstrated that the temperature and the solar radiation influenced suggestive the system performance.

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Innovation and education systems: teachers experiencing Interactive Whiteboards

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Abstract- The article aims to provide a critical perspective on the ongoing Information and Communication Technologies' application in education, analyzing the development of technology-based school innovations and their effective implementation. It presents an evaluation case study referred to an Italian government program for teachers' professional development aimed to develop and to improve the educational practices innovation through the diffusion and the use of Interactive Whiteboards in Italian primary and secondary schools. The aim is to identify some improvements factors towards different types of technology-based school innovations, taking into account the translation process from the starting of innovation to its implementation. The article provides some reflections to better understand the concept of innovation in education sector, mainly focusing on technological innovations trough the use of new technological tools in teaching and learning processes. It identifies critical success and failure factors for school technology-based innovation, deepening, in particular, teachers' point of view, investigating their experience in experimenting the use of interactive whiteboard in classroom. The case study provides some empirical findings that underline the crucial role of teachers to ensure the promotion of education systems' innovation through the use of new technologies in educational practices, as well as the need to provide them adequate professional development opportunities to reduce the still existing digital divide in school systems. This means wonder about what this implies for education and training policies and how policy makers could promote technology-based school innovations, trough suitable institutional and government initiatives aimed to innovate educational methods and practices in order to improve both the services provided to studentsand teachers' professional competences.

Index Terms- Educational innovation, Technological innovation, School systems, Teachers, Interactive Whiteboard

I. INTRODUCTION

Education systems are crucial to ensure the competitiveness of the European economy and EU Member States have recognized the potential of ICTs (Information and Communication Technologies) as main tool to fulfill the objective of wider diffusion of 21st century skills (Brinkley et al., 2010). Among these, the development of technology-related competences is increasingly becoming an integral part of the goals of compulsory education since, in a knowledge economy driven by technology, people who do not acquire and master such competencies may suffer from a new form of digital divide that may affect their capacity to fully integrate into the knowledge economy and society (OECD,2010a). Thus, European Commission has emphasized the promotion of education systems' creativity and innovation, including through the use of new ICT tools and teacher training, as one of the priority areas for the first cycle of the Strategic Framework for Education and Training (ET 2020) (Eurydice, 2011). On this point, already in 2001 the OECD' report "Learning to change: ICT in Schools" (OECD, 2001) has indicated the key role of ICTs' introduction in schools not just for teaching and learning processes' improvement, but also for Countries' full development. Recently, this has been confirmed by "Europe 2020 strategy", in which five of the seven flagship initiatives aimed at promoting economic and social growth in the European Union encourage the use of ICTs, stressing the need of developing technology-related competences for improving life chances for all (European Commission, 2012). During the last decades it has emerged the important role of new technologies in facilitating the process of globalization of economies and societies and technological learning (Carayannis, 2001) and knowledge have become crucial factors of economic, social and entrepreneurial development, which empower people across the world in taking advantage of opportunities and changes unknown and unexplored until recently (Carayannis et al., 2006). So, the role of ICTs in the creation, diffusion, absorption and use of knowledge for development has been shown to be instrumental and with increasingly substantial and emerging potential (Carayannis & Sipp, 2005; World Bank, 2010).

Innovation in education sector

Specifically referring to the education sector, policymakers are increasingly interested in best solutions to promote innovation, focusing, in particular, on how to create more innovative environments for teaching and learning, as recently confirmed by CERI's Innovation Strategy for Education and Training (OECD, 2010b). More in detail, we can define educational innovation as "any dynamic change intended to add value to the educational processes and resulting in measurable outcomes, be that in terms of stakeholder satisfaction or educational performance" (Pedrò, 2010:12).

The Oslo Manual for measuring innovation (OECD, 2005) provides a definition of "technological product and process (TPP) innovations", that implies new technologically implemented products (referred to both goods and services) and processes. More in detail, "technological product innovation" can take two broad forms: 1. "technologically new product", that is a product whose technological characteristics or intended uses differ significantly from those of previously produced products. Such innovations can involve radically new technologies, can be based on combining existing technologies in new uses, or can be derived from the use of new knowledge; 2. "technologically

improved product", that is an existing product whose performance has been significantly enhanced or upgraded. A simple product may be improved (in terms of better performance or lower cost) through use of higher-performance components or materials, or a complex product which consists of a number of integrated technical sub-systems may be improved by partial changes to one of the sub-systems. On the other hand, "technological process innovation" is the implementation/adoption of technologically new or significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or production organization, or a combination of these changes, and may be derived from the use of new knowledge. The methods may be intended to produce or deliver technologically new or improved products, which cannot be produced or delivered using conventional production methods, or essentially to increase the production or delivery efficiency of existing products. In education sector, TPP innovations typically occur at the classroom level, involving teaching and learning: for example, a product innovation can be a new or significantly improved curriculum, a new educational software, etc., while a process innovation could be referred to a new or significantly improved pedagogy (OECD, 2008).

Other types of innovations are "organizational" and "marketing" innovations. The former ones include the introduction of significantly changed organizational structures and new organizational methods in workplace organization or external relations. The latter ones include new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. In education sector, organizational innovations can for example be a new way organization of work between teachers, or organizational changes in the administrative area, while marketing innovations can for example be a new way of pricing the education service or a new admission strategy (OECD, 2008).

The Oslo Manual also emphasizes the contextual dimension of innovation, so that, if something is well established in one context, this does not preclude it from representing an innovation in another. This largely depends on the scope or scale of perspective adopted in considering the innovative nature of a product or practice, so that it is important to consider if the new product or practice in a particular context is invented or imported or duplicated (Lubienski, 2003, 2009). Thus, in order to better understand technology-based school innovations it is important to consider not just internal school characteristics, but also external environment in which each school is embedded.

Since school has to be considered as a "complex organization" (Gasparini, 1974), it seems to be useful to refer to the "3P" construct of innovation measurement, that simultaneously considers three critical firm-level factors related to a firm's innovation capabilities: *Posture*, *Propensity* and *Performance* (Carayannis & Provance, 2008:92-93). *Posture* refers to an organization's position within the greater innovation system of its environment (i.e. region, industry, technological domain) and it is exogenous to the innovation process being measured. Specifically, *posture* comprises a firm's state along three dimensions: the organizational, technological and market life cycles, reflecting its readiness to both engage in and benefit from innovation (Damanpour, 1991; Hauser et al., 2006). *Propensity* is a firm's ability to capitalize on its posture based on cultural acceptance of innovation. In this way, propensity is an intangible reflection of processes, routines and capabilities established within a firm. A firm may possess adequate resources and consequently higher externalized innovation stature, yet have an underdeveloped capacity for innovation due to cultural or other constraints. *Performance* is the lasting result of innovation. This part of the framework comprises three levels: output, outcome and impact. Outputs occur as the immediate, internalized results of innovation (for example, new product introductions). Outcomes include mid-range results such as revenues contributed by new products. Finally, impacts represent more lasting, long-range benefits that accrue to the firm from its innovative competence and are transformed into results for the firm's environment too. On this last point, and specifically referring to technological innovation, the question to be carefully considered concerns how and to what extent it determines an increase in economic development.According to the neo-Schumpeterian approach to change, Information and Communication Technologies introduce to a new age (Freeman, 1987), which at the beginning may seem inconvenient due to the necessary adjustments required during the starting stages, but is surely foreboding advantages (also from an economic point of view) in the long run. This leads to the broader concept of e-development, that can be defined as "a set of tools, methodologies, and practices that leverage ICT to catalyze and accelerate social, political and economic development" (Carayannis & Provance, 2008:422).

Basing on such assumptions and specifically referring to education systems, the complexity related to technology-based school innovations and the ways trough which realize them emerge clearly analyzing the experiences occurred in most countries and education systems around the world. Since many years, policy makers have supported the adoption and diffusion of new technologies in schools through their budget allocations (i.e. significant investments in ICTs) and by supporting professional development programs for educators aimed at using ICTs in the classroom. However, these two levers of support do not appear to be enough to compel the widespread educational change and innovation needed to transform the majority of schools and teachers. In most countries and education systems around the world, real change in education is still happening in only a very few cases, driven by heroic individuals who innovate their teaching practices and their schools in relative isolation (Langworthy et al., 2010:105).

II. Teachers' professional development and ICT: the Italian Plan for diffusion of interactive whiteboard

Since the integration of digital media and technologies in education has become a policy priority throughout Europe, in the majority of Countries it has been observed a deeper embedding of ICTs in teacher training at several steps, both during initial teacher education, both in continuing professional development (OECD, 2010a). In fact, as showed by several studies and empirical researchers (European Commission, 2010; UNESCO,2011), teachers play a key role to start and develop innovative educational practices trough the successful integration

of ICTs into the classroom. Thus, professional development initiatives seem to be crucial both to provide them with a broader different skills set, including the ability to develop innovative ways of using technology to enhance the learning environment as well to encourage technology literacy, knowledge deepening and knowledge creation, both to encourage them to experiment with the use of new technologies and to reflect on the impact on teaching and learning processes. Recently, the debate on teachers' professional development and training in the use of ICTs (Polly et al., 2010) has been enriched by the so called TPACK model (Technological Pedagogical Content Knowledge, Koehler &Mishra, 2008), which emphasizes the importance to consider the complex interaction among three types of knowledge: Content, Pedagogical and Technological. The model stresses the opportunity to jointly develop each of these teachers' knowledge, keeping them constantly linked, since this is the best way to promote a gradual and effective acquisition of the necessary skills to teach in a new and innovative way (Koehler et al., 2007).

Such framework sets the background for the Italian Plan for the diffusion of Interactive Whiteboard (IWB), a government program for teachers' professional development aimed to develop and to improve the educational practices innovation through the diffusion and the use of Interactive Whiteboards in Italian primary and secondary schools (MIUR-ANSAS, 2010). The Plan is a part of the wider "Digital School" Project and it aims "to ensure schools the opportunity to adopt innovative teaching and learning methods", as well as to "develop and strengthen educational innovation through the use of information technology". To reach such objectives, the Plan has realized specific teachers' training initiatives aimed to promote the integration of IWBs in innovative educational practices; since 2009, the Plan has involved over 30.000 teachers of primary and secondary schools in all Italian regions. The assumption underlying the Project is that teachers' professional development is an essential condition to favor the shift from the mere adoption of IWB in the schools to its significant integration in educational practices (Wood & Ashfield, 2008; Biondi, 2009).

In the last decade, in European and International contexts, have taken place a growing number of specific initiatives aimed to promote the diffusion of IWBs in schools, as a consequence of the positive impacts of the use of this technology on students, teachers and teaching and learning processes as observed by several studies and empirical researchers (see Becta, 2003, 2006; Balanskat at al., 2006; Thomas & Schmid, 2010). Generally, Interactive Whiteboard appears as an effective educational tool to increase the levels of attention, motivation and engagement of pupils in classroom, as well as to rise teachers' level of job satisfaction improving the educational practices and the relationship between teachers and pupils, in particular due to an increasing level of interactivity (Higgins et al., 2007; Moss et al., 2007; Gentile & Pisanu, 2012).

III. RESEARCH OBJECTIVES AND METHODOLOGY

The article focuses on the last edition of training course addressed to early secondary school teachers (over 18.000 enrolled) presenting the main results of monitoring and evaluation activities related to the Italian "Plan for the diffusion of Interactive Whiteboard". The research has aimed to verify the Plan's effectiveness in promoting IWB's adoption by teachers in educational practices and to analyze whether its use has implied significant changes in teaching and learning processes. The objective was to investigatethe main modalities in which teachers have used IWB in classroom and their perception of the impact on students, analyzing if, and at what extend, the Plan has lead to a transformation in their professional behaviors. The aim was to provide empirical evidence to identify some weak points towards the development of innovative educational practices and improvement factors to remove or, at least, to reduce them.

The article reports teachers and e-tutors evaluation and consideration on training course experience, basing on data collected trough focus groups. Particularly, e-tutors have played a core role in training path, by evaluating teachers' educational needs and supporting them in carrying out innovative teaching practices. Thus, their point of view allows to understand if, and at what extend, teachers involved in the course experienced greater impacts on their professional development, becoming able to enhance ICTs skills reflecting on teaching methods and practices. Considering that course's participants were dislocated in different Italian regions, the research has used in a complementary way in presence and online focus group. This has allowed to involve a more extended sample, since the online setting has guaranteed a wide geographical covering, moreover implying significant time and resources (economic and human) saving. Teachers have been interviewed trough in presence focus groups, realized inside the schools, while e-tutors have been interviewed online. More in detail, in both cases, the subjects invited to participate in focus groups have been selected taking into account three selection criteria in the sampling design. The first one refers to the representativeness of all geographical Italian areas, so that two in presence focus groups are realized in the North (Turin and Genoa), two in the Centre (Massa Carrara and Rome), and two in the South (Foggia e Naples) of Italy. According to the same criterion, e-tutors selected for online focus groups have played their role in schools of different regions all around Italy. The other criteria refer to gender and teaching discipline: on this last point, the selected participants have been equitably teachers of Humanistic and Scientifics disciplines, as well as e-tutors of respective areas. Subjects selected in such way have been invited to participate to focus groups trough e-mail, communicating location (just in presence focus group case), date and time. The six in presence focus group have involved 40 teachers (on the average, six participants for each focus group), the four online focus groups 25 e-tutors (on the average, six participants for each focus group). In particular, online focus groups (Fielding et al. 2008) have been realized trough videoconference system provided by Breeze platform, a web meeting application that allows video and voice recording. They have been conducted in synchronous modality, allowing participants, under the researcher "moderator" guide, to take part to the discussion in real time, integrating oral and written communication by microphones and chat. The platform's previous knowledge by e-tutors, gained in the same training course to manage online meetings with teachers, has avoided problems connected to its use and has favored a profitable exchanging ideas among participants.

IV. RESULTS AND DISCUSSION

IWB's innovative aspects in educational methods and practices

A specific research's focus has been set on the innovative elements associated to the use of IWB in the classroom and the related resulting changes in teaching and learning processes. On this point, the opinions expressed by teachers and by e-tutors seem to be very similar.

First of all, the use of Interactive Whiteboard has implied a radical change in teaching methods and strategies, leading to the shift from "traditional" frontal lesson, where teacher exposes contents and themes while students listen and take notes, towards lectures where students are more involved in classroom activities. This has been related, mainly, to the IWB interactivity feature: the opportunity to physically interact with the surface of the board, trough hands, pens and highlighter tools, moving and dragging an object from one place to another around the screen, as well as the ability to use photos, sounds or videos and interactive simulations into a lesson, are all aspects that could radically change the dynamic of how teachers lecture and students learn. In particular, the IWB multimedia features allow to use different functions that could make lesson more interactive. Among the several opportunities, interviewed teachers have referred the following: the contextual and immediate surfing the net to deepen specific topics, the screen personalization, the use of e-books, clouds and conceptual maps, interactive exercises, as well as of tools like pen, rubber and colors to modify contents. All such features have attracted students and the main method assumed by the majority of teachers has been to invite them to the IWB, in order to physically interact with it. This has implied higher degree of attention, motivation and involvement, representing added values in terms of skills' acquisition and socialization processes, confirming Interactive Whiteboard as "an authentic knowledge assembling table, where teacher and students act and interact to generate new knowledge" (Biondi, 2009). Although such positive impacts of the use of IWB' use have been observed on all students, a lot of teachers highlighted particular advantages for difficult students, like those with learning disabilities or special educational needs. Such positive impacts have represented an important incentive for teachers to continue to experiment new teaching methodologies and practices.

On the other hand, it has been noticed a significant change in the way teachers organize lectures' materials: the use of IWB, due, in particular, to the opportunity to save contents, has allowed them to keep track of the done work, modifying it successively or sharing it online with all students. This has implied teaching materials' managing time saving, providing the opportunity to collect all the materials in specific repository and "database" that can be consulted everywhere and anywhere.

It has to be noted, however, that a lot of e-tutors have reported some doubts related to the fact that the introduction of IWB in the classroom has leaded to a real innovation in teaching methods and practices. Some of them have affirmed that a lot of teachers have just tried to improve their ability to use IWB, without, however, calling their "traditional" lessons in question, i.e. without really chancing the organization of their teaching activities. Thus, a lot of e-tutors recognized that the introduction of IWB in the classrooms has represented a potential dawn for innovative processes development in schools, but they don't consider them fully completed. In particular this could be connected to two different aspects that have influenced IWB's adoption and use by teachers involved in the "Plan". These two aspects will be analyzed in the following pages.

Teachers and IWB: between digital competences and "cultural" issues

A belief shared by teacher and e-tutors is that individual predisposition and behavior, as well as the previous digital competences influence in a significant way the use of technological instruments. Thus, the Plan seems to have promoted the IWBs' adoption towards really innovative teaching practices just in those teachers particularly oriented to use ICTs in the classroom, recognizing them effective educational tools. The Interactive Whiteboard has been welcomed with great enthusiasm by such teachers, defined by their e-tutors as "mind 2.0 teachers", but has created skepticisms and doubts in others, generally expressing perplexities on the potentialities of the use of ICTs in teaching and learning processes. Such differences among teachers could be connected to two main aspects. The first one refers to a dimension that we could define "cultural", which marks the dividing line between "traditionalists" and "innovators": the latter ones are teachers well disposed to welcome new tools or methods potentially changing their professional activities, while the former ones are less opened to innovation and changes in their teaching processes and routines. In other words, this refers, at an individual level, to what in the first paragraph we have defined as *Propensity* at a firm level. It is clear that, in education contexts, the teachers' "cultural" acceptance or rejection of innovation plays a key role, highly influencing the positive or negative results of innovative initiatives.

On the other hand, we have to remind a second important element differentiating teachers involved in the Plan, i.e. their different technological competences. Even if all teachers were novices in using IWB, being for them the first approach to the tool, those with more familiarity with the use of new technologies have felt themselves more loose, more inclined to experiment IWB's teaching potentialities. The others have expressed a feeling of incompetence in front of the tool, feeling clumsy and experiencing a lot of difficulties in using it. Most of them have indicated, as one of the main weaknesses of the Plan, the choice to address the same training course to teachers with different digital competences. They have instead highlighted the need to differentiate training paths taking into account previous participants' technological skills and competences, so that the opportunity to distinguish between teachers needing "computer literacy", i.e. "digital ABCs", and those at higher knowledge and competences' levels. Teachers and e-tutors have agreed the acquisition of technological skills, connected to tool's use, is the required prerequisite to proceed in the teaching deepening, optimizing all the tool's potentialities in educational settings.

As pointed out by Tosi (2010:17-18) "...needed time to become familiar with the new technology, to master it in the social context of the classroom as well as to explore and to experiment

its potentialities is quite long (1-2 years). Thus, a training path introducing in the first phase innovative methodological approaches when teacher is unable to master the technology is ineffective…during the first steps teacher will appropriate the new functions by adapting the technology to his/her previous methodological approach, till to then develop their potential in a creative sense when obstacles and barriers to the use are at least partly overcome".

Interactive Whiteboard in the classroom: different use and competency levels of teachers

The aforesaid considerations on individual predisposition and behavior in front of technological instruments and on digital competences and skills introduce a detailed analysis of how Interactive Whiteboard has been used by teachers in classroom. In the majority of the cases, interviewed teachers and e-tutors have reported some difficulties to fully optimize the potentialities provided by tool, i.e. to apply them into teaching practices. Often, teachers tend to reproduce the "traditional" frontal lesson: the IWB' s interactivity features are used very rarely, since just teachers use the Interactive Whiteboard, touching its screen and working on it, while students stay seated. Generally, IWB is used as a video/slide/PowerPoint projector and active engagement by students is lacking. On the other side, multimedia opportunities seem to be more used but, again, just by teachers and not by students, nor in shared ways: the activities more frequently acted are moving objects, graphs and figures on the screen, surf the web to search information, watching videos and listening songs.
Thus, such very basic IWB's use leads generally to replicate traditional teaching practices, showing the difficulties in developing innovative educational processes through technology that involves, instead, a thorough renewal of the way we use and produce information and knowledge (Kampylis et al., 2012).
In other words, the majority of teachers involved in the Plan has used the Interactive Whiteboard in a way that could be connected to the first level of performance identified by Haldane and Somekh (2005), i.e. "Foundation" level: "at this level teachers are using the interactive whiteboard primarily as a presentation/projection tool for presentations, videos etc. They are most frequently positioned next to the computer itself, using the mouse and keystrokes to manipulate what is seen. They may make forays to the board to write with the electronic pen but if an old whiteboard is still in situ, or a flipchart is available, they are likely to utilize these". The higher levels identified by the authors imply growing confidence with IWB's use and greater frequency and facility in mastering its interactive functionalities, till to reach high levels of creativity and to become "true virtuoso performers", exploring new educational potentialities. From the description provided by teachers and e-tutors of our samples of the actual IWBS' use in the classroom, very few cases in which IWBs were used with high confidence and competenceshave emerged. Even if some teachers were used to invite students to utilize the board directly (level 2, *Formative*, in Haldane and Somekh's framework), and others to use specific software tools (level 3,*Facility*) to reach particular educational goals (especially in disciplines like Math, Science and Geography), we have observed a very scarce propensity to explore "new horizons", becoming "hunter-gatherers, actively seeking out and harvesting new ideas, new content, new useful Internet sites" (level 4, *Fluency*), nor to "demonstrate the confidence and ability to adapt and improvise in response to students' signs of interest or difficulty" (level 5, *Flying*). A strong interconnection between IWB's use and teachers' technological skills has clearly emerged, as well as the influence of their predisposition and belief on tool's educational effectiveness. So, from one hand, as just noted, low technological skilled teachers have encountered significant difficulties in reaching a good level of confidence with tool's use that have compromised their opportunities to optimize the IWB's additional functionalities, limiting their use to the basic functions. From the other hand, skeptical teachers have often showed what we've called "cultural resistance" to innovation: not conceiving IWB as an educational tool potentially improving teaching and learning processes, they have appeared "reluctant" to use frequently it in the classroom, as well as to experiment its functionalities, preferring, instead, to continue to use "traditional" teaching methods and practices.

V. TOWARD THE DEVELOPMENT OF TECHNOLOGY-BASED SCHOOL INNOVATION: WEAK POINTS AND IMPROVEMENT FACTORS

At the end of focus groups with teachers and e-tutors we've asked them to indicate the main experience's weak points regarding the opportunities to develop innovative educational practices in their schools and to suggest improvement factors to remove or, at least, to reduce them. The collected weak points could be categorized into three categories.
The first one refers, in a broad meaning, to teachers and it implies two just mentioned dimensions, i.e. the low technological competences owned by a lot of teachers and the "cultural" resistance of "traditionalist" teachers. In relation to the first aspect, interviewed have underlined two opportunities that would be taken into account in planning and realizing future training activities in order to address them to a specific and appropriate target: a) verify that the needed technological skills and competences are actually owned by all teachers involved and, if not, plan the opportunity to realize *ad hoc* courses to provide teachers with them; b) address training initiatives as the Plan just to already high technological skilled teachers. Even if the latter opportunity could imply a serious risk to sharpen the existing digital divide in school, increasing the gap between low and high technological skilled teachers, it could represent a reasonable suggestion, considering the lacking of education systems' financial resources, especially within the present economic crisis, that makes impossible to plan and realize a more large-scale ICT's familiarization initiatives. Regarding the "cultural" resistance issue, interviewed subjects have highlighted, first of all, the lacking of an "innovation culture" in education sector, that should be more encouraged and diffused mainly at political level in order to make clear the opportunities associated to it, making educational innovation practice the norm, not the exception. Secondly, it has been underlined the potential positive effects of planning collaborative activities where higher technological skilled teachers and more open to ICT innovation could clearly demonstrate to others "more reluctant" the advantages of new educational technological solutions and practices.

The second weak point's category refers to what could be defined "school level barriers" (Eurydice, 2011), including, in particular, inadequate technological infrastructure and the lack of technical support inside the schools. Regarding the first aspect, interviewed have agreed in considering inadequate the ICTs equipment in schools, from both quantitative and qualitative point of view. The number of available IWBs has shown insufficient to cover all classes' demand, so that each school have been compelled to decide where to collocate the Interactive Whiteboard in the building. Some have chosen to put it just in the first year class, excluding from its use students attending the second and third years classes. Others have decided to provide each school's section with an IWB, planning an in rotation use, with fixed scheduled days, moving students from their classes to the IWB equipped class. Finally, others have opted to put IWB in laboratories or in special rooms, as libraries or reading rooms, whose fruition was dependent on previous booking. The different solutions adopted due to the insufficient IWBs availability have lead to some broader reflections connected to the start and development of actual educational innovative processes. The impossibility to put the Interactive Whiteboard in each school's classroom and the "forced choice" to put it in special rooms, especially in the "traditional" technological laboratories, have tended to replicate an "old school" logistic organization, spreading the ICT image as tools that have to be used *ad hoc*, just for specific and contextualized activities. This seems to be exactly what the Plan, and more generally the latest European directives, would have avoided, promoting, instead, an "ICTs naturalization", i.e. their gradual but constant use within daily educational activities performed in the classroom. To this, it has to be added the frequent tool's technological problems and malfunctioning, as well as difficulties in Internet connectivity: often, teachers, especially the less technical skilled, have panicked if something was wrong, with evident negative consequences in terms of teaching practices effectiveness. This leads to underline another weak point indicated by teachers and e-tutors, confirmed also by other researches (Korte & Husing, 2007), i.e. the absence or ineffectiveness of technical assistance provided by specific available professional profiles working in schools. The frequent technological equipment-related problems and their inability to solve them often have discouraged teachers from using IWB in their teaching.

The last weak points category includes elements referred to teacher professional development training course. In particular, interviewed have focused on two aspects. First of all, they have underlined the opportunity that teachers involved in professional development activities should be more "valued" within schools, trough economic or other forms of incentives (some of them, for example, have complained a scarce acknowledgement by headmaster). This has been understood as a degradation and flattening of their professionalism: the majority of interviewed have stressed the need to receive more acknowledgement for teachers' great deal of effort towards the innovation of their teaching methods and practices, as well as for their workload needed by IWB. Secondly, one of the main obstacles to the diffusion of innovative educational practices refers to the occasional/sporadic frequency of ICTs-based teacher's professional development initiatives. With specific reference to the Plan, interviewed subjects have complained the lack of a continuous support and coaching path for teachers ending the training course. Often, as noted by some of them, the starting of the innovation process has been registered during the ending months of training experience, but this has also lead to an abrupt stop at the end of the course: in other words, teachers have perceived of having been left alone with themselves, without any kind of support. For a lot of them, this has compromised training experience's quality and, of course, this has represented a serious obstacle to a potential evolution in terms of educational innovation.

VI. CONCLUSION

The article, starting with a review of the different ways in which the concept of innovation could be conceived in education sector, has focused on technology-based school innovations and the potential role of ICTs for economic and social development in the actual knowledge economy. The proposed evaluation case study has focused on an Italian early secondary school teachers' experience in using Interactive Whiteboard in classroom in order to identify factors facilitating the arise and development of educational innovation, as well as barriers to an effective IWB adoption in schools. First of all, it has to be emphasized the crucial role of teachers to ensure the promotion of education systems' innovation through the use of new ICT tools. As any other professional profiles, teachers have different behaviors towards new technologies, so that their personal "propensity" and "cultural" acceptance or rejection of ICTs innovation plays a key role in producing positive or negative results of innovative initiatives. Thus, even if IWB could potentially have great opportunities to innovate educational methods and practices, there is the risk to assist to its underuse, from a quantitative and a qualitative point of view, that is regarding both its frequency use, both the employ just of its very basic functionalities. This leads to conclude that to equip classroom with an IWB (equally to any other ICTs) is not enough to innovate teaching and learning practices, nor to "revolutionize" schools. In order to optimize all the IWBs potentialities it is necessary an active teachers' engagement (Celik, 2012) and we agreed with Higgins et al. (2007:217) saying "good teaching remains good teaching with or without the technology; the technology might enhance the pedagogy only if the teachers and pupils engaged with it and understood its potential in such a way that the technology is not seen as an end in itself but as another pedagogical means to achieve teaching and learning goals".

It has to be underlined, however, that teachers involved in our case study were at their first experience in using Interactive Whiteboard, so this could explain the registered generally low IWB's competence level. As emerged by focus groups, suitable further training is needed to make them able to exploit all educational potentialities an Interactive Whiteboard has to offer, as well as adequate ICT-based professional development opportunities, including continuous coaching in IWB's use in the classroom, also after the end of training activities.

Besides, this case study has showed again how innovation is extremely context-dependent, considering both internal school characteristics, both external environment in which each school

is embedded. Regarding the first aspect, the research has highlighted how inadequate technological school infrastructure features could represent serious obstacles to innovative processes development. With respect to the second aspect, a growing institutional effort in term of educational policies is needed, trough focused initiatives, in order to fill what interviewed called "the lack of an innovation culture" in education sector, as well as to make ICTs not just annex tools to "traditional" educational practices, but to attribute them a more specific and time constant role in educational settings (Bottani et al., 2011).

In order to capture a more comprehensive investigation of technology-based school innovations, we would like to stress the opportunity to jointly consider different education systems levels, since just their combined analysis may lead to better analyze the innovative potentialities of ICTs diffusion, distinguishing the influences of new technologies from other possible influences associated with context and individual variables (Cox & Marshall, 2007; CERI, 2010). Thus, the levels to consider should include: the social, political and educational context, including the educational policies promoting the adoption and the diffusion of ICTs in schools trough effective initiatives; teachers, for example, competence in using technology, training background in using technology, methods of teaching and class management, aims in using technology; technology, i.e. devices and tools, as well types of technology; school, focusing on technological infrastructure, organization of learning environments, available space and rooms. Other two dimensions, less analyzed in the article, have to be added. One is referred to "student level", considering, for example, competence, frequency in using technology, gender, social-economic status or family background, psycho-social constructs like motivation or self-efficacy (Gentile & Pisanu, 2012). The other refers to "external relations", concerning the engagement of different stakeholder (such as students, parents, labor market representatives and community) in student learning, decision making participation as well as marketing practices (OECD, 2010b).

To conclude, more researches are needed to deepen how the structure of school systems as well as the different education systems levels could promotes or inhibits different types of innovation, in order to identify further improvements factors in educational policies, optimizing, especially in the light of the actual financial crisis, the use of funds to improve technology-based school innovation (Pedrò, 2010). Indeed, a careful attention has to be paidto the translation process from the starting of innovation to its implementation, since "change in education is easy to propose, hard to implement and extraordinarily difficult to sustain" (Hargreaves & Fink, 2006).

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Pedigree Analysis in Congenital Hemoglobinopathies

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Abstract- Hemoglobinopathies are a heterogeneous group of hereditary hemolytic anemias. Thalassemia and sickle cell anemia are the commonest hemoglobinopathies seen in our region. Aim ; to analyse the family members of hemiglibinopathies for carrier status. Material and methods ;Patients visiting our hospital with features of anemia, recurrent attacks of jaundice, splenomegaly were screened for evidence of hemolysis. Their siblings, parents, first cousins,grand parents are also screened for carrier status. Conclusion ;Thirty two people belonging to five families were screened over a period of one year. Of which three cases were sickle cell anemia, one case was thalassemia major, three cases were sickle thaslassemia, twelve cases were carriers, thirteen cases were normal.

Index Terms- hemoglobinopathies, hemolytic anemia, splenomegaly, sickle cell anemia, thalassemia.

I. INTRODUCTION

The frequency of total hemoglobinopathies in India was reported to be 4.2% [1,2] . Sickle cell anemia is due to replacement of glutamic acid by valine at the 6th position of globin chain. Thalassemia is due deficient synthesis of globin chains.Both sickle cell anemia and thalassemia are autosomal recessive conditions. If patients carry only one copy of the defective gene, they are carriers (heterozygous) and asymptomatic. If they carry two defective genes (homozygous), they manifest the disease. Few patients carry both sickle and thalassemia genes , they are called as double heterozygous cases.

II. MATERIAL AND METHODS

Thirty two cases were studied. Prior consent was taken from every individual before conducting the study.

Complete hemogram was done. Serum bilirubin levels were estimated.

Sickling test and osmotic fragility test were done wherever necessary.

After coming to a conclusion from these tests, samples were sent for High performance liquid chromatography(HPLC).

Reference ranges for HPLC were HbA 96-98%
HbA2 2.8-3.7%
HbF <2%
HbS 0%

III. RESULTS

Table ; depicting the values of various hematological parameters.

s.no	Age sex	MCV fl	MCH pg	Bilirubin	Rt %	sickling	Osmotic fragility	hplc				results
								HbA%	HbF %	HbA2 %	HbS %	
1	30F	86	29	N	0.5	+ve	N	50.3	0.9	3.7	40.4	Carrier
2	35M	85	28	N	1	_ve	N	80.3	2.2	4.8	-	Carrier
3	8M	83	26	raised	5	+ve	N	7.5	30.1	4.8	57.6	Disease
4	10M	85	28	raised	8	+ve	N	1.3	23.6	2.2	74.6	Disease
5	42F	85	28	N	1	+ve	Inconclusive	50	0.8	3.6	39.6	Carrier
6	48M	85	28	N	0.5	- ve	N	84.8	0	3.1	-	Normal
7	17M	86	28	N	0.2	- ve	N	71.5	1.1	2.8	-	Normal
8	33F	85	28	N	1	- ve	N	82.9	0	3.3	-	Normal
9	13M	88	29	N	1	- ve	N	82.7	-	3.2	-	Normal
10	40F	85	28	N	5	+ve	Inconclusive	52.1	0.4	4.1	37.8	Carrier
11	45MM	85	28	N	0.5	_ve	N	85.3	-	2.7	-	Normal
12	22F	86	29	N	0.2	_ve	N	87.5	-	2.5	-	Normal
13	17M	88	29	N	1	_ve	N	82.7	-	3.1	-	Normal
14	40M	85	28	N	0.5	_ve	N	84.8	-	2.2	-	Normal

15	15M	85	28	raised	8	+ve	N	4.2	22.5	6.7	63.1	Disease
16	30F	85	28	N	0.5	+ve	Inconclusive	60.3	0.8	3.1	38.2	Carrier
17	40M	85	28	N	2	+ve	N	50.4	1.1	3.5	38.9	Carrier
18	30F	85	28	N	0.5	+ve	N	49.4	1.2	3.6	38.9	Carrier
19	10M	85	28	raised	8	+ve	N	1.6	14.6	2.7	81.2	Disease
20	8F	85	28	raised	7	+ve	N	1.1	23.8	2.5	72.6	Disease
21	5F	85	28	raised	3	+ve	N	1.8	21.8	2.7	73.2	Disease
22	57F	85	28	N	0.5	_ve	Inconclusive	84.6	0.2	5.1	-	Carrier
23	72M	86	28	N	0	_ve	N	81.4	-	3	-	Normal
24	32M	88	28	N	0	_ve	N	87.7	-	2.8	-	Normal
25	47M	85	28	N	0.8	_ve	N	83.6	0.4	4.6	-	Carrier
26	37F	85	28	N	1.2	_ve	N	83.8	0.9	4.1	-	Carrier
27	14F	87	29	N	0	_ve	N	84.2	0.2	4.6	-	Carrier
28	10F	85	28	raised	7	_ve	Inconclusive	1.8	46.8	4.8	-	Disease
29	32F	85	28	N	0	_ve	N	83.8	0.9	4.1	-	Carrier
30	38M	89	30	N	0	_ve	Inconclusive	89.7	-	2.2	-	Normal
31	7M	85	28	N	1	_ve	N	81.4	0.4	3	-	Normal
32	5M	85	28	N	0.2	_ve	N	81.2	0.2	2.8	-	Normal

According to table three cases were sickle cell anemia with Hbs values from57% to 81%. Sickle carriers were showing HbS values from 37% to 40%. In thalassemia cases HbF was 22.5% to 46.8%. in thalassemia carriers Hb À was raised more than 3.7%.

IV. Discussion

The sequence of events that lead to the discovery of sickle cell anemia are quiet fascinating. In one Ghanian family, symptoms of sickle cell anemia were noted in 1670 itself but later in 1910 one Chicago cardiologist observed sickle cells in a west Indian student. Emmel in 1917, demonstrated sickle cells in vitro [3]. In India the first case of sickle hemoglobin was reported in the year 1952, by Dunlop and Muzunder in the garden labourers of Assam. At the same time by Lehman and Cutbush from the tribals of south India , [2] in 1925 , Cooley and Lee observed a peculiar syndrome with progressive anemia, jaundice, splenomegaly and pronounced erythroblastosis. These patients were from Mediterranean background, this syndrome was named as ‘ thalassemia” derived from the greek word for sea. In the previous days thalassemia was also called as cooley’s anemia after the founder.[4] According to the literature Thalassemia was brought to Asia by the Alexander the Great and his army.[5]

The cumulative frequency of total hemoglobinopathies in India was reported to be 4.2%. The frequency of beta thalassemia trait was reportedto be varying from 1-17%. In India 30 million carriers and 15,000 infants with major hemoglobinopathies have been reported.[1.6]

In the present study, out of 32 cases, 3 cases were sickle cell anemia,6 cases were sickle carriers,6 cases were thalassemia carriers. 1 case was thalassemia major,3 cases were sickle-thalassemia double heterozygotes. 13 cases were normal

Sickle cell anemia, thalassemia, sickle thalassemia were clinically very severe with gross anemia, recurrent attacks of jaundice and gross splenomegaly. All the patients succumbed to the disease before 17 years of age. Hemolytic facies like frontal bossing,malar prominence were seen in only 2 cases.All the carriers were asymptomatic.

In the present study patients hailed from Prakasam,Guntur and Krishna districts. Sickle cell anemia patients belonged to tribal community hailing from Kothapullareddy gudem near Macherla Town. All three children in one family died due to sickle cell anemia. Thalassemia and sickle thalassemia were seen in general population also. In the peripheral smear all the cases showed the classical findings but the MCV,MCH values were not correlating with the degree of anemia. Thalassemia carriers osmotic fragility was either within normal limits or inconclusive and peripheral smear showed no abnormality except for mild microcytic anemia in few cases. So, to detect a carrier status, HPLC or electrophoresis is a must.

Criteria for diagnosis by HPLC HbA>HbS – sickle carrier
HbS> HbA---- sickle cell anemia
HbA2----- >3.7% thalassemia carrier
HbA2 and HbF are raised--------thalassemia major HbA2, HbF,HbS are raised------sickle thalassemia disease.

In a pedigree chart square denotes male, circle female.single line joining denotes marriage.double line consanguinous marriage. Indicates death.

Half filled circle or squa  carrier state, completely filled circle-diseased state.

V. Conclusion

In a developing country like India ,where healthcare facilities in rural areas are far from adequate, hemoglobinopathies can compound the burden on the families and also on the government as the treatment is very expensive. Implementation of mass screening programmes particularly in

tribal areas will help in preventing the spread of the disease. Counseling for screening before marriage needs to be encouraged in order to avoid the psychological trauma and financial burden on the affected families. Though the present study, is restricted to few families due to financial constraints, this is a small attempt to highlight the problem.

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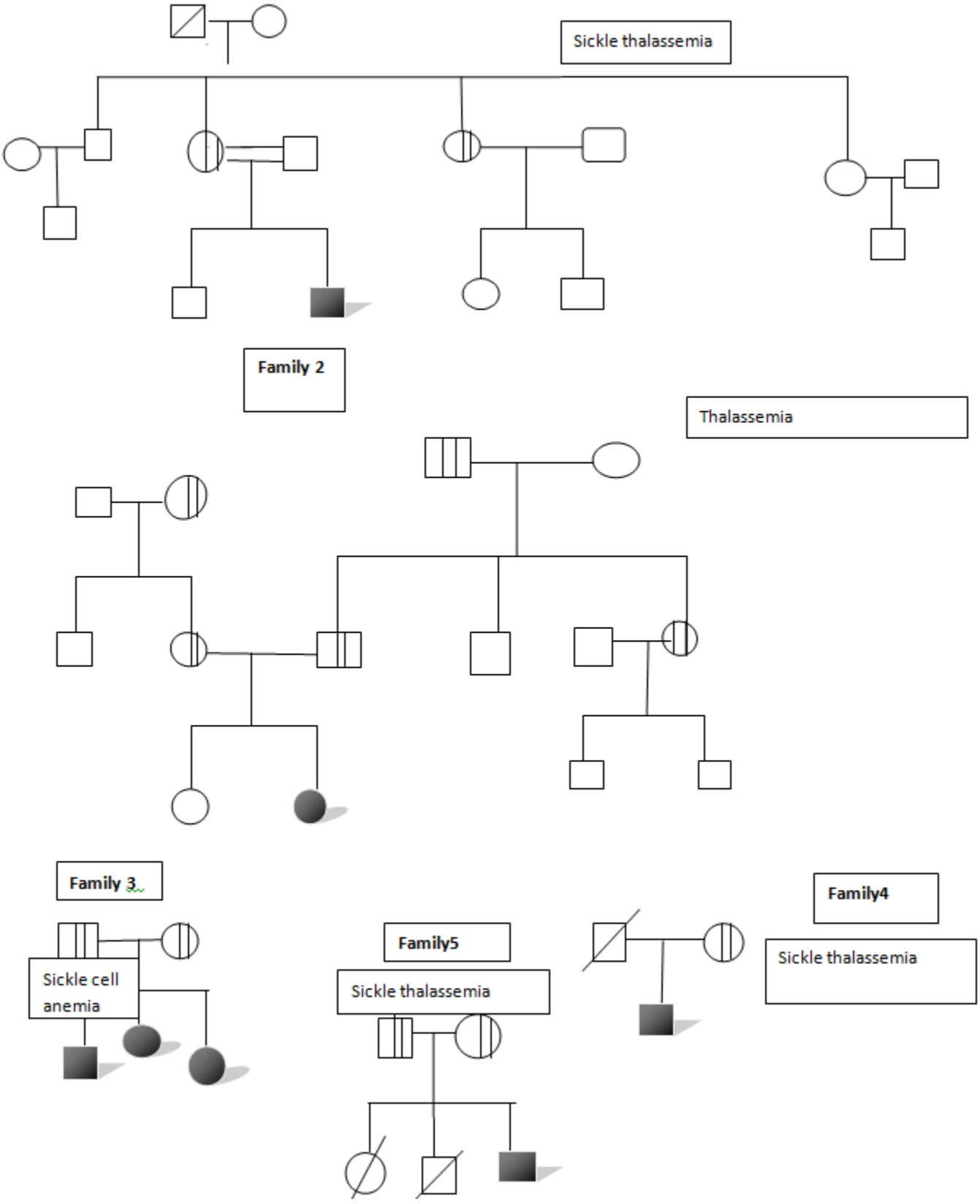
Pedigree charts family1


Sickle thalassemia
Family 2
Thalassemia
Family 3
Sickle cell anemia
Family5
Sickle thalassemia
Family4
Sickle thalassemia

Improved High Utility Mining Algorithm

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Abstract- Temporal data have importance in a variety of fields, such as biomedicine, geographical data processing, financial data forecasting and Internet site usage monitoring. Temporal data mining deals with the extracting of useful information from temporal data, where the definition of useful depends on the application. The most common type of temporal data is time series data, which consist of real values sampled at regular time intervals. Temporal Data Mining is a rapidly evolving area of research that is at the intersection of several disciplines, including statistics, temporal pattern recognition, temporal databases, optimization, and visualization, high performance computing, and parallel computing. This paper is first intended to serve as an overview of the temporal data mining and provide an algorithm to achieve privacy in temporal mining.

Index Terms- Data Mining, Utility, Sensitive data items, Temporal Data mining etc

I. INTRODUCTION

Data mining is a process to extracts some knowledge full information contained in large databases. The goal is to discover hidden patterns, unexpected trends or other subtle relationships in the data using a combination of techniques from machine learning, statistics and database technologies. This new discipline today finds application in a wide and diverse range of business, scientific and engineering scenarios. For example, large databases of loan applications are available which record different kinds of personal and financial information about the applicants (along with their repayment histories). These databases can be mined for typical patterns leading to defaults which can help determine whether a future loan application must be accepted or rejected. Several terabytes of remote-sensing image data are gathered from satellites around the globe.

Due to rapid increase in storage of data, the interest in the discovery of hidden information in databases has exploded in the last decade. This discovery has mainly been focused on association rule mining, data classification and data clustering. One major problem that arises during the mining process is treating data with temporal feature i.e. the attributes related with the temporal information present in the database. This temporal attribute require a different procedure from other kinds of attributes. However, most of the data mining techniques tend to treat temporal data as an unordered collection of events, ignoring its temporal information.

1.1 Temporal data mining:

Temporal Data Mining (TDM) is defined as the activity of looking for interesting correlations or patterns in large temporal datasets. TDM has evolved from data mining and was highly influenced by the areas of temporal databases and temporal reasoning. Several surveys on temporal knowledge discovery exist [5].

Most temporal data mining techniques convert the temporal data into static representations and exploit existing 'static' machine learning techniques, thus potentially missing some of the temporal semantics. Recently there is a growing interest in the development of temporal data mining techniques in which the temporal dimension is considered more explicitly. Console et al. proposed an extension of the known Decision Trees induction algorithm to the temporal dimension [1]. One advantage of temporal decision trees is that the output of the induction algorithm is a tree that can immediately be used for pattern recognition purposes. However, the method can only be applied to time points, not to time intervals.

II. RELATED WORK

In association with rules mining, Apriori (Agrawal and Srikant, 1995), DHP (Park et al., 1997) and partition-based ones (Lin and Dunham, 1998; Savasere et al., 1995) were proposed to find frequent itemsets. Many important applications have called for the need of incremental mining due to the increasing use of record-based databases to which data are being added continuously. Many algorithms like FUP (Cheung et al., 1996), FUP2 (Cheung et al., 1997) and UWEP (Ayn et al., 1999;Ayn et al., 1999) have been proposed to find frequent itemsets in incremental databases. The FUP algorithm updates the association rules in a database when new transactions are added to the database. Algorithm FUP is based on the framework of Apriori and is designed to discover the new frequent itemsets iteratively. The idea is to store the counts of all the frequent itemsets found in a previous mining operation. Using these stored counts and examining the newly added transactions, the overall count of these candidate itemsets are then obtained by scanning the original database. An extension to the work in Cheung et al. (1996) was reported in Cheung et al. (1997) where the authors propose an algorithm FUP2 for updating the existing association rules when transactions are added to and deleted from the database. UWEP (Update with Early Pruning) is an efficient incremental algorithm, that counts the original database at most once, and the increment exactly once. In addition, the number of candidates generated and counted is minimized.

In recent years, processing data from data streams becomes a popular topic in data mining. A number of algorithms like Lossy Counting (Manku and Motwani, 2002), FTP-DS (Teng et al., 2003) and RAM-DS (Teng et al.,2004) have been proposed to process data in data streams. Lossy Counting divided incoming stream conceptually into buckets. It uses bucket boundaries and maximal possibleerror to update or delete the itemsets with frequency for mining frequent itemsets. FTP-DS is a regression-

based algorithm for mining frequent temporal patterns from data streams.

ITEM	PROFIT($)
A	3
B	10
C	1

Table2.1: External Utility Table

TID	A	B	C
T1	0	0	18
T2	0	6	0
T3	2	0	1
T4	1	0	0
T5	0	0	4
T6	1	1	0
T7	0	10	0
T8	3	0	25
T9	1	1	0
T10	0	6	2

Table 2.2 Transaction table

ITEM	Quantity value
A	2
B	6
C	3

Table 2.3 transaction Quantity utility

C.-J. Chu et al. / pattern mining tasks for data streams by exploring both temporal and support count granularities.

Some algorithms like SWF (Lee et al., 2001) and Moment (Chi et al., 2004) were proposed to find frequent item sets over a stream sliding window. By partitioning a transaction database into several partitions, algorithm SWF employs a filtering threshold in each partition to deal With the candidate item set generation. The Moment algorithm uses a closed enumeration tree (CET) to maintain a dynamically selected set of item sets over a sliding window.

A formal definition of utility mining and theoretical model was proposed in Yao et al. (2004), namely MEU, where the utility is defined as the combination of utility information in each transaction and additional resources. Since this model cannot rely on downward closure property of Apriori to restrict the number of itemsets to be examined, a heuristic is used to predict whether an itemset should be added to the candidate set. However, the prediction usually overestimates, especially at the beginning stages, where the number of candidates approaches the number of all the combinations of items. The examination of all the combinations is impractical, either in computation cost or in memory space cost, whenever the number of items is large or the utility threshold is low. Although this algorithm is not efficient or scalable, it is by far the best one to solve this specific problem. Another algorithm named Two-Phase was proposed in Liu et al. (2005), which is based on the definition in Yao et al. (2004) and achieves the finding of high utility itemsets. The Two-Phase algorithm is used to prune down the number of candidates and can obtain the complete set of high utility itemsets. In the first phase, a model that applies the ‘‘transaction-weighted downward closure property’’ on the search space is used to expedite the identification of candidates. In the second phase, one extra database scan is performed to identify the high utility itemsets. However, this algorithm must rescan the whole database when new transactions are added from data streams. It incurs more cost on I/O and CPU time for finding high utility itemsets. Hence, the Two-Phase algorithm is focused on traditional databases and is not suited for mining data streams.

Although there existed numerous studies on high utility itemsets mining and data stream analysis as described above, there is no algorithm proposed for finding temporal high utility itemsets in data streams. This motivates our exploration of the issue of efficiently mining high utility itemsets in temporal databases like data streams in this research.

III. PROPOSED METHOD

Hiding sensitive data items using temporal data mining proposed new algorithm:

In the proposed method each itemset having two major factors Quantiy and profit. Based on these factor calculate total utility of itemset. An itemset is called highly utility itemset if total utility of itemset is greator than user specific threshold(€). To compute the profit utility each itemset is belong I$p \in$ DB and Profit utility =$\sum_{ip \in DB}^{n} T(ip,tq) * eu(ip)$ and compute Quantity utility =$\sum_{ip \in DB}^{n} T(ip,tq) * Q(ip)$ and compute total utility = profit utility + Quantity utility

3.1 Improved High Utility Mining Algorithm (IHUM): In this algorithm collected original Database DB that's equals sanitized database DB'
Input: collected original database DB
Output: produces sanitized database DB'
Algorithm: for each database DB contains the following data items DB ={*I1,I2,I3,I4……In*}
1.For each data item ip having utility on transaction Tq *T(ip,tq).*
2. for each itemset ip having external utility eu_{ip}
3. Compute utility factor of each item set ip
$U(ip,tq) = \sum_{i \in ip} eu\ ip * T(ip,tq)$
4. for each item set there associated Quantity of each itemset *Qip*.
5 .compute Quantity factor of each item such that
$Q(ip,tq) = T(ip,tq) * Qip$
6. Summation of both factors associated with each itemset called total utility of each itemset.
$Total\ Utility\ (Tu) = \sum_{i \in ip} \{Q(ip,tq) + U(ip,tq)\}$
7. Assume a user threshold £ which specifies itemset is to be sensitive itemset.
8. Compute a difference of total Utility of each itemset and user specify threshold.
$diff = Total\ utility(TU) - threshold(€)$
9. Now modify each itemset such that
$O(ip,tq) = arg\ max(i \in ip\ T(ip,tq))$
10. While (diff>0)
11. Modify each item set such that O(ip,tq)

$$= \begin{Bmatrix} 0, & if TU(ip,tq) > diff \\ O(ip,tq) - \lceil \frac{diff}{S(ip)} \rceil & \text{if } TU(ip,tq) < diff \end{Bmatrix}$$

12.

$$diff = \begin{Bmatrix} 0, & if\ TU(ip,tq) > diff \\ diff - TU(ip,tq), & if\ TU(ip,tq) < diff \end{Bmatrix}$$

13. Return the result sanitized database DB'

3.2 Implementation of Algorithm: for implementation of PPTDM algorithm following strategies is estimated
Totalutility(TU)A=[{Q(A,T3)+Q(A,T4)+Q(A,T6)+Q(A,T8)+Q(A,T9)}*Q(A)+{U(A,T3)+U(A,T4)+U(A,T6)+U(A,T8)+U(A,T9)}*eu(A)]
= [{2+1+1+3+1}*2 + {2+1+1+3+1}*3]
= 16+24
= 40

Totalutility(TU)B=[{Q(B,T2)+Q(B,T6)+Q(B,T7)+Q(B,T9)+Q(B,T10)}*Q(B)+{U(B,T2)+U(B,T6)+U(B,T7)+U(B,T9)+U(B,T20)}*eu(B)]
= [{6+1+10+1+6}*10+{6+1+10+1+6}*6]
= 240+144 =384

the same way we calculate total utility of each item set {C}, {AB},{AC} and {BC}

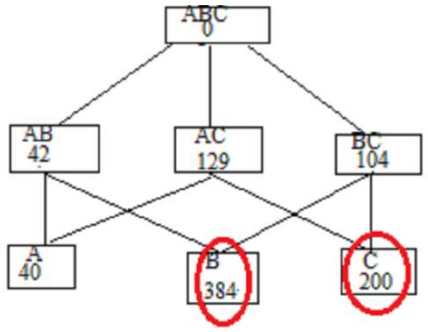

Fig 3.2.1 shows toatal utility of various dataitems

Now user specific threshold is 150 so {B} and {c} data items called sensitive data items. Now we reduce total utility factor of itemset {B} and {C}.

High utility item	Total Utility
{B}	384
{c}	200

Table 3.2.1 Sensitive (high utility item set)

ITEM / Tid	B
T2	6
T6	1
T7	10
T9	1
T10	6

Table 3. 2.2 shows itemset {B}Transaction table

Modify O(ip,tq) such that calculate diff such that
=384-150(user specified threshold)
=234

Now modify each itemset such that O(B,T7) value 10 to 0 because TU(B,T7)> diff ,such that so new specified value of each itemset{B} 384 to modified

TU(B)=[{6+1+0+1+6}*10+{6+1+0+1+6}*6]
=140+84 =224

Now this value is greater than user threshold which is 150

ITEM / Tid	B
T2	6
T6	1
T7	0
T9	1
T10	6

Table 3. 2.3 shows modified itemset {B}Transaction table

So now modify next high maximum utility item which is O(B,T2) that is 6,modify it calculate its max average
=O(B,T2)*eu(B)*Q(B) =6*10*6
=360 which greater then diff(224-150) so (B,T2) is zero.
So modified table is

ITEM / Tid	B
T2	0
T6	1
T7	0
T9	1
T10	6

Table 3. 2.4 shows Modified item set {B}Transaction table

So newly computed value of {B} is
TU(B) =[{0+1+0+1+6}*10+{0+1+0+1+6}*6]
= 80+48
=128

High utility item	Total Utility
{B}	128
{c}	200

Table 3. 2.5 modified total utility Sensitive (high utility item set)

Now same way modified value of {C} which is 200 to 128.

High utility item	Total Utility
{B}	128
{c}	128

Table 3. 2.6 modified total utility Sensitive (high utility item set)

IV. Simulation Analysis And Result

Weka is a collection of machine learning algorithms for data mining tasks. The algorithms can either be applied directly to a dataset or called from your own Java code.

Weka contains tools for data pre-processing, classification, regression, clustering, association rules, and visualization. It is also well-suited for developing new machine learning schemes.

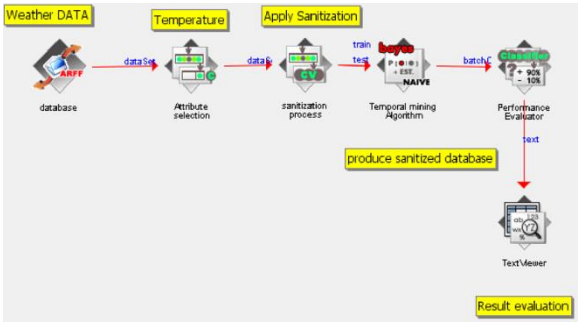

Fig 4.1 knowledge flow of IHUM mining process

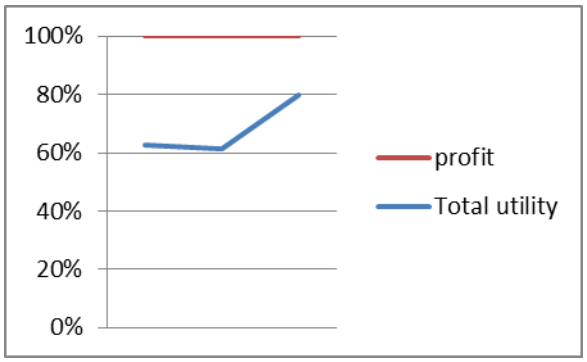

Fig 3.2.2 shows total utility of various data items

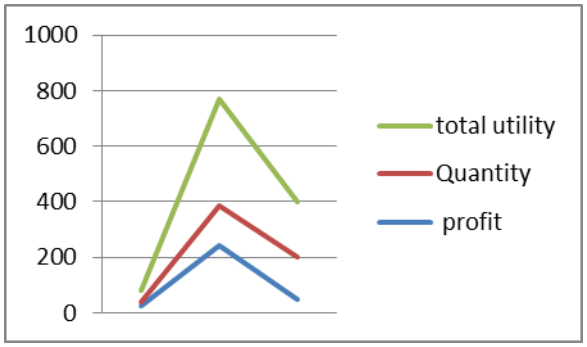

Fig 3.2.3 shows toatal utility of various dataitems

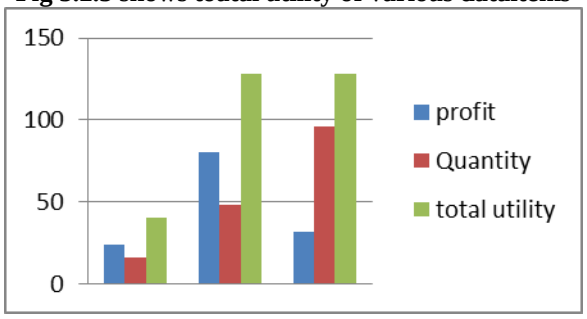

Fig 3.2.4 shows total utility of various data items after applying sanitization

V. Effective Measurement

(a)Hiding failure (HF): the ratio of sensitive item sets that are disclosed before and after the sanitizing process. The hiding failure is calculated as follows:

$$HF = \frac{|U(DB')|}{|U(DB)|}$$

denote the sensitive itemsets discovered from the original database DB and the sanitized database DB' respectively. The cardinality of a set S is denoted as $|S|$.

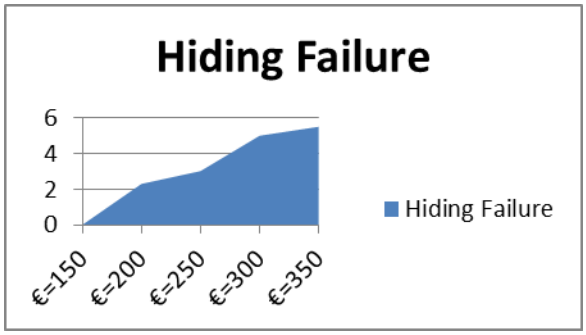

Fig 3.2.4 shows Hiding failure of various data items after applying sanitization

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FPGA Based Standalone Solar Tracking System

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Abstract- MPPT and solar Tracking system are two systems to improve the efficiency of solar panel. The sun tracker is a automated solar panel that follows the position of the sun throughout the day to harness the output power. Sun tracking increases the output power production by keeping the panel parallel to the sun so that sun radiation makes 90° angle with panel. This paper presents sun tracking system implemented in real time. Sun tracking system composed of fuzzy logic controller implemented on FPGA, sensors, PV panel, stepper motor, input-output interface

Index Terms- Fuzzy **Controller, FPGA, Sun Tracker**

I. INTRODUCTION

Increasing population demands more energy therefore energy cost have increased tremendously in recent year. During the process of energy production, nature gets damaged and global worming type generated. Reservoirs of conventional energy sources are limited. Because of all these aspects solar energy which is the clean source of energy becomes more important.

Solar cell convert solar energy into electrical energy. The amount of energy obtain from PV panel is directly proportional to the amount of sun light acquired by that solar panel. As domestic and industrial application of solar energy is increased, that needs to extract maximum power from solar panel. Three factors that affect the efficiency of collection process are; solar cell efficiency, intensity of sun radiation and storage technique. But as because of material used for the manufacturing of solar cell, it is difficult to improve the efficiency of the solar cell, hence it is necessary to improve efficiency of collection process.

A solar tracker is the device that is used to align a single photovoltaic panel or an array of PV modules with the sun, so the tracker can improve the systems power output by keeping the sun in focus for whole day and thus increase the effectiveness of the equipment over the fixed position system. Sun position is mainly depending on two things that are time of the day and season. Output power of the PV panel is high when sun radiations are perpendicular to the PV panel. Solar tracker tracks the position of the sun and rotates the PV panel according to sun position so that PV panel become parallel to sun and sun radiation makes 90° angle with PV panel. So sun tracking system help to improve efficiency of the collection process.

Sun tracking is mainly of two types depending on the manner in which path of the sun is determined and that are: Dynamic sun tracking and fixed control tracking. Dynamic tracking system actively searches for sun position at any time of the day. Fixed control tracking does not actively searches for sun position. In dynamic tracking method light sensors are mounted on tracker at various positions. If sun is not facing the PV panel directly means panel is not parallel to the sun then there will be a difference between the outputs of a light sensor compare to another. This principle is used in dynamic tracking .Whereas in the fixed control tracking pre-recorded data of sun position for different time and different season for particular site is used. In this method for given current time, current day and year position of the sun is calculated.

II. SUN TRACKING SYSTEM

Sun tracking system is composed of stepper motor to rotate the solar panel, sensors controller as shown in Figure 1. It is composed of sensor, PV module, stepper motor, controller. Light sensors are mounted on the edge of the solar panel. That sensor determines sun intensity then sensors readings are given to the controller. Controller determine sun position and
rotate the stepper motor to align solar panel with sun orientation.

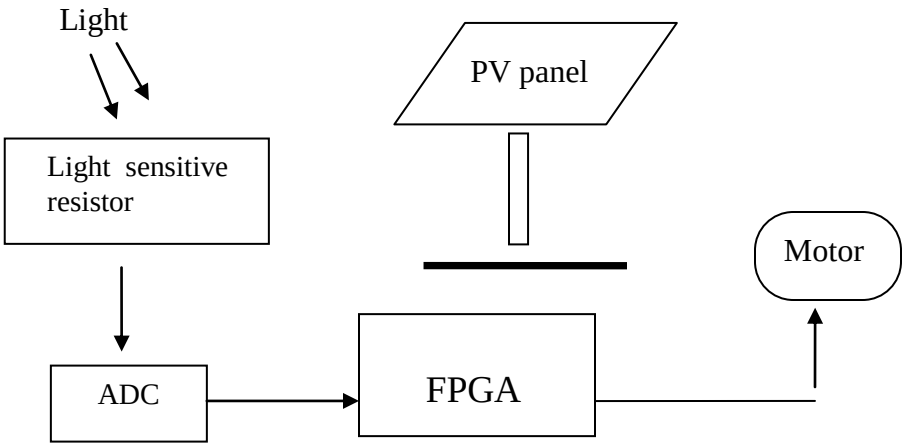

Figure 1.:Block diagram of sun tracking system.

H. SENSOR

Sun tracking system mainly consist of two type of sensor photo sensor and position sensor

1. Photo Sensor

LDR is used as photo sensor. LDR means Light Dependent Resistor and here it is used for light sensing. Resistance of LDR
varies with the intensity of light. Intensity of light and resistance of LDR having inverse relation means when intensity of light is high, resistance of LDR is low. LDR are available in different sizes (as shown in figure 2.) but mostly bigger size LDRs are used because bigger size LDR having more sensitivity and required less time to change output when input change.

2. Position Sensor

Position sensor is used to prevent the PV panel from the impact when it reaches to the edges and move the panel to the starting position in night.
CW: Clockwise rotation.

CCW: Counter clockwise rotation

When PV panel reaches at its edge value, then controller stops the motor and prevents it from rotating in same direction to avoid it breakage problem. At night sensor are in very dark night so the outputs of the sensors are very big, then controller goes in night subroutine and rotate panel in starting position

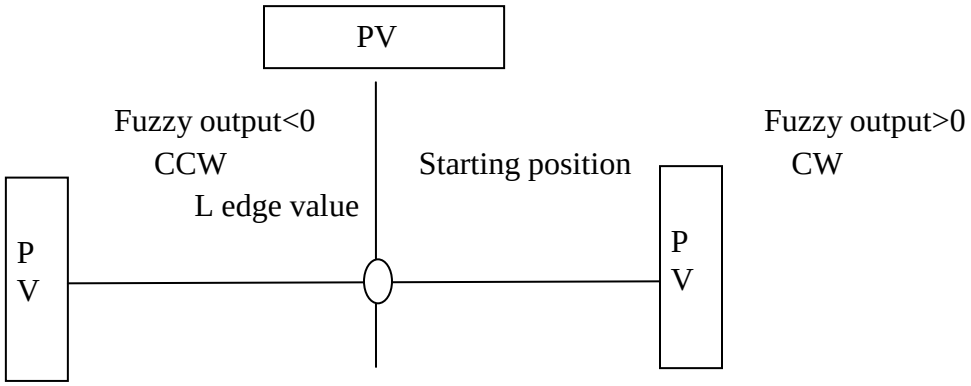

Figure 2. Working of tracking sensor

III. FUZZY LOGIC CONTROLLER

In sun tracking system, to rotate the PV panel according to the sensors output intelligent controller is needed. Hence in sun tracking intelligent controller like PID controller or fuzzy logic controller can be used. Fuzzy logic controller is having advantages over PID controller and these are:

- Mathematical model of the control system is not required.
- Totally depend upon operators experience.
- It deals with nonlinearities of the system.
- Linguistic system definitions can be converted into control rule base or control algorithm.

3.1 FLC for Sun Tracking System

Every FLC has three basic parts that are: fuzzification, rule base, difuzzyfication. Error and change in the error are the inputs to the fuzzy logic controller. Output of the fuzzy logic controller is fed to the stepper motor driver. FLC for sun tracking system is shown in figure 3, it mainly consist of three basic part and these are discussed as follow:

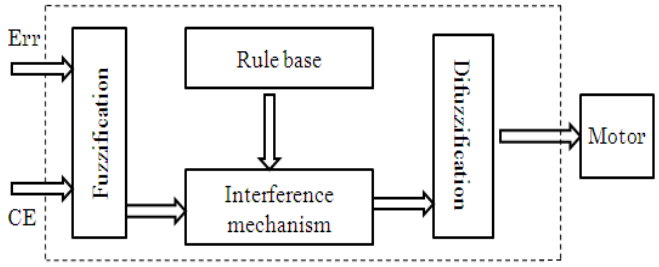

Figure3. Block diagram of fuzzy logic controller for sun tracking system

Here the inputs Error (Err) and change in the error (CE) come from the sensor. This inputs converted into the fuzzified input and output will get after fuzzification. This output is then fed to the motor to control it. As shown in above figure 3, every fuzzy logic controller have three basic part as mentioned above and these are discussed as follow

3.1.a Fuzzification

Fuzzification is the process that converts numerical values into grades of membership of fuzzy set members. There is a degree of membership function for each linguistic term that applies to that input variables. Membership functions is of different type like triangular membership function, trapezoidal membership function. For example same triangular membership function used for error, change in the error and it is shown in fig 4. Membership function for output is shown in the figure 5.

3.1.b Control rule base

Control rule base depends on the operators experiences. Depending on that experience knowledge base is developed which establish relationship between input and output variables in term of membership function. Structure of the control rule base is as follow:

If ERROR is ..... AND CHANGE IN ERROR is.....then OUTPUT will.....

For example:

If ERROR is NB and CHANGE IN ERROR is NM then OUTPUT will be NB.

Er/CE	NB	NM	NS	ZE	PS	PM	PB
NB	NB	NB	NB	NB	NM	NS	ZE
NM	NB	NB	NM	NM	NS	ZE	PS
NS	NB	NM	NS	NS	ZE	PS	PM
ZE	NB	NM	NS	ZE	PS	PM	PB
PS	NM	NS	ZE	PS	PS	PB	PB
PM	NS	ZE	PS	PM	PM	PB	PB
PB	ZE	PS	PM	PB	PB	PB	PB

Table 1: Control rule-base for fuzzy logic controller.

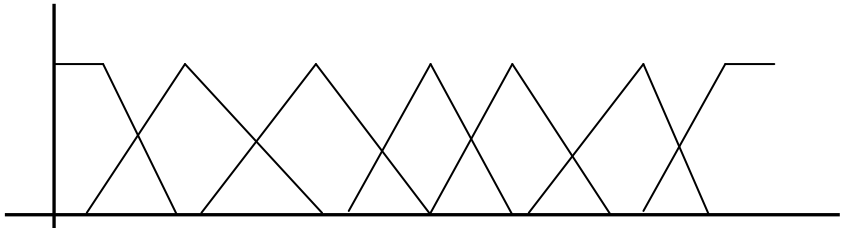

Figure 4: Same fuzzy set used for error and change in the error

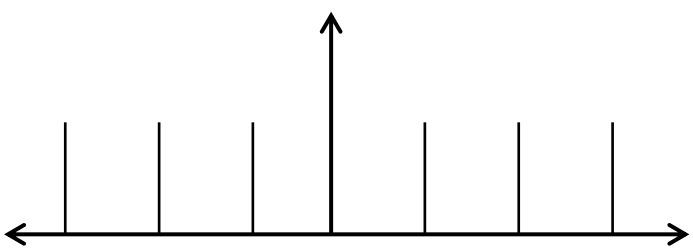

Figure 6:Fuzzy set of the output of the FLC

3.1. c Difuzzyfication

Reverse of fuzzification is difuzzyfication. Difuzzyfication converts fuzzified output into the normal crisp output.

IV. IMPLEMENTATION AND RESULTS

4.1 Hardware part:

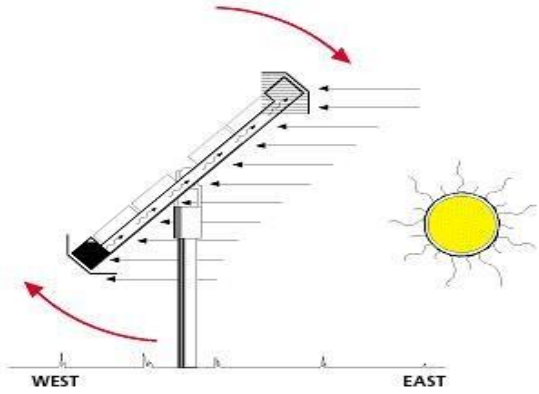

Fig 7: Rotation of solar panel according to the sun

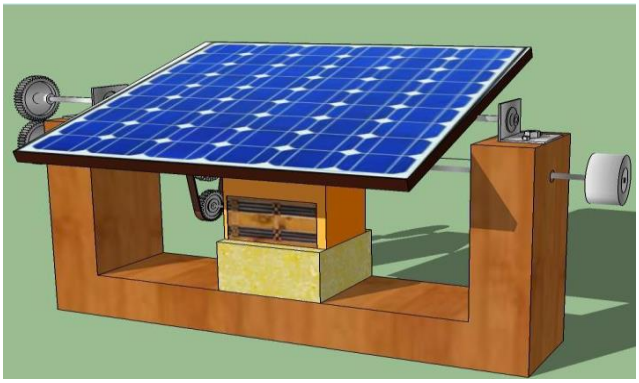

Fig 8: Sun Tracking panel prototype

4.2 Software part:

Xilinx_ISE software is used fore coding of FLC for Sun tracking. Spartan 3 kit is used to implement that code on hardware platform. Then we obtain following result while comparing output power generated by fixed position solar panel and sun tracking panel

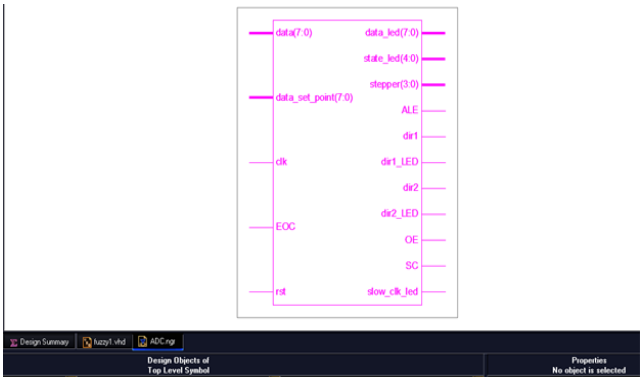

Fig 8: RTL schematic for FLC for sun tracking controller

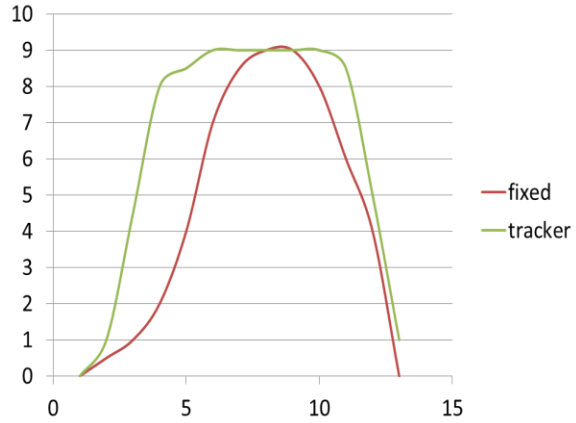

Fig 9: Comparison graph of output power of fixed and tracker panel

V. CONCLUSION

Here the main aim behind this project is improvement in efficiency of PV panel. Efficiency can be increased by developing automatic sun tracking panel. FPGA based sun tracking system tracks the sun all day and rotates the motor to the sun orientation hence acquires maximum sun radiation throughout the day. Hence sun tracking system is having maximum efficiency than fixed position PV panel.

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Evaluation of Cultural Methods for Insect Pest Complex of Soybean (*Glycine max (L)Merrill*) in District Rewa (M.P.) India

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ABSTRACT: The field studies were carried out for evaluation of cultural methods for insect pest complex of soybean in rewa region. Study of insect pest complex was done from September 2008 to December 2008. Seed damage caused by the bugs fell by 33.50% in the trap plat and 55.80% in the without trap crop.

Key words – Soybean, Trap crop, Insect pest complex, *Sesbania rostrata*.

INTRODUCTION

Soybean [*Glycine max* (L.) Mirrill] is a unique crop with high nutritional value, providing 40% protein and 20% edible oil, besides minerals and vitamins. It is playing an important role in augmenting both the production of edible oil and protein simultaneously under the circumstances in which the shortage of these commodities are being experienced by people. It also supports many industries; soybean oil is used as raw material in manufacturing of antibiotics, paints, varnishes, adhesives, lubricants etc. Soybean meal is used as protein supplement in human diet, cattle and poultry feed.[1]

But there are many problems in cultivation of soybean in India as all stages of this crop are prone to heavy infestation by pest complexes [2].Some common insect pest complex infecting soybean crops are Green Semilooper, TobaccoCaterpillar, White fly, Girdle beetle etc. [3]

The present study was compared the insect infestation in soybean as solo crop and with the trap crop condition.

MATERIALS AND METHOD

The present study was done in several areas of District Rewa of Madhya Pradesh. The study was conducted between the months September to December 2008.*Sesbania rostrata* was selected as the most suitable trap crop. It possesses the characteristics of a good trap crop. It is taller than soybean and since it takes longer to mature, it can also attract sting bugs over a longer period.*S. rostrata was planted* two weeks before soybean was sown. It is usually planted on two opposite sides of soybean field. This is because the concentration of sting bugs in soybean fields is conspicuously higher around the edges of the field.

The surveys were carried out one in September 2008, the second in October 2008 and the third in December 2008. Damage to pods by the pest was assessed at sites in 2008.

RESULTS AND DISCUSSION

Soybean is an important oil seed crop, it provides highly quality edible oil. At present soybean provides 20% world supply of oils, more than any other single vegetable or animal source. Soybean is not only the prime source of vegetable oils and proteins, but is also enriching the soil fixing atmospheric nitrogen. It is also used for ensilage. [4]

In the present investigation we studied insect population and comparison of damage caused by stink bugs on soybean with and without trap crop. The results showed that the bug population was lower in plot with a trap crop than in those without one (Table 1). The bugs emigrated into the trap crop from surrounding areas when *S. rostrata* had passed the flowering stages. Their main population remained on the trap crop, although some of them moved onto the soybean plants from time to time.

Seed damage caused by bugs fell by 33.50 % in the trap plot and 55.80 % of seed in the plot without the trap crop (Table 2). This is because adult bugs had direct access to the soybean plants.

Singh and Patel 2013 [5] studied chemical control of pest of soybean in satna region. It was concluded that monocrotophos showed best result in the control of sucking insect pests.

Khanzada et al. 2013 [1] described relative resistance of soybean cultivars against sucking insect pests.

Table -1: Insect population on soybean with and without Trap crop and on trap crop

Plot	Number of Adults	Number of Nymphs
With Trap crop	29	97
Without Trap crop	160	923
On the Trap crop	303	103

Table -2: Comparison of Damage caused by stink bugs on soybeans planted with and without Trap Crops

Plot	No. of grains tested	No. of grains infected	Damage (%)
With Trap crop	400	134	33.50
Without Trap crop	500	279	55.80

CONCLUSION

In the present course of investigation, we have to explore the culture method like the use of trap crops in combating the pest attacks. Although there are rich resources of natural enemies (parasites, predators and pathogens), but their use as a method of controlling soybean pests has not yet been adopted extensively in the region.

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SQL Support over MongoDB using Metadata

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***Abstract*-** New requirements are arising in environments where we have higher volumes of data with high operation rates, agile development and cloud computing. In recent years, a growing number of companies have adopted various types of non-relational database, commonly referred to as NoSQL database. This reflects the growing interactivity of applications which are becoming more networked and social, driving more requests to the database where high-performance NoSQL database such as MongoDB becomes favorable. This paper attempts to use NoSQL database to replace the relational database. It mainly focuses on one of the boosting technology of NoSQL database i.e. MongoDB, and makes a comparison with MySQL and thus justifies why MongoDB is preferred over MySQL. Lastly, a method is proposed to integrate these two types of database by adding a middleware (Metadata) between application layer and database layer.

Index Terms- ACID, BASE, MySQL, MongoDB, Metadata, NoSQL, RDBMs

I. INTRODUCTION

Relational database is widely used in most of the application to store and retrieve data. They work best when they handle a limited amount of data. Handling a huge volume of data like internet was inefficient in RDBMS. To overcome this problem "NO SQL" came into existence. The term NOSQL is short for "Not Only SQL" and was introduced in 2009, when it was chosen a title of a conference "for folks interested in distributed structured data storage" [8].The name attempted to label the emergence of a growing number of non-relational, distributed data stores that often did not attempt to provide ACID.NO SQL, is not a tool, but a methodology composed of several complementary and competing tool.

The primary advantage of NOSQL database is that, unlike relational database they handle unstructured data such as documents, e-mail, multimedia and social media efficiently. Most of the common features of NOSQL database can be summarized as schema is not fixed, does not support join operations, high scalability and reliability, very simple data model, very simple query language, high availability at the price of loosing the ACID trait of the traditional database in exchange with keeping a weaker BASE (Basic Availability, Soft State, Eventual Consistency) feature, uses cheap commodity server to manage exploding data and thus leads to low cost, efficient use of distributed indexes and RAM for data storage, ability to dynamically add new attributes to data records, ability to replicate and to distribute data over many servers [1] [4]. Therefore, NoSQL database systems rose alongside major internet companies, such as Google, Amazon, Twitter, and Facebook which had significantly different challenges in dealing with data that the RDBMs solutions could not cope with. There are many advantage of NoSQL as compared to RDBMs, but also there are many obstacles to overcome before they can appeal to mainstream enterprises. Few of the challenges are Maturity which means RDBMs systems are stable and richly functional whereas NoSQL are in pre-production versions with many key features are yet to be implemented, Support , Administration and NoSQL database is still in learning mode.

There are three core categories of NoSQL data model, a) Key- Value stores; in this a value corresponds to a key and data is stored as a key-value pairs. E.g. Redis, flare; b) Column-Oriented stores; in this database contain one extendable column of closely related data and uses table as the data model but do not support table association. E.g. Cassandra, HBase; c) Document Based stores; in this data is stored and organized as a collection of document but the value of document database is stored in JSON or XML format. E.g. MongoDB, CouchDB. MongoDB is a document database developed by 10gen. It manages collection of JSON-like documents. Many applications can thus model data in a more natural way, as data can be nested in complex hierarchies and still be query-able and index-able.

With the rapid development of social web as well as cloud computing, the traditional database cannot cope with the basic demands of availability, scalability, storage of huge data and fast data backup and recovery. Thus numerous internal portals and the emerging WEB 2.0 website make use of open source technology of NoSQL. But we all know that use of relational database will never come to an end, because it provides us with an unparalleled feature set, by maintaining data integrity and scalability. Practically, it is the developers' job to decide which database should be used to meet the application requirement. Nowadays, mostly NoSQL database is used by developer for storing large amount of database. However, most NoSQL systems employ a distributed architecture, with the data held in a redundant manner on several servers, and partitioning scheme relies on consistent hashing to distribute the load across multiple storage hosts [1].Therefore, relational database can be combined with NoSQL, so that it can handle relational structure efficiently.

This paper proposes a method which provides SQL Query language support to the non-relational database MongoDB by appending an interface (Metadata), between the application layer and database layer. Application does not have to consider about the storage location, data model and memory requirement. In order to communicate with the database layer, the Metadata contains all the routing information as the conversion rules to convert from one format to another. This model will fulfill the scalability of the massive data without affecting the logical implementation.

Depending on the requirement of the application, we can use different type of NoSQL database in combination with the relational database and the Metadata. Each NoSQL database has

its own features, data model and architecture choice of the database depends on the application. We have used MongoDB for our proposed system as it has gain more popularity in recent years.

The rest of the paper is structured as follows. Section II gives a brief overview of MongoDB functionality. Section III gives a performance comparison between the most popular relational database (MySQL) and MongoDB by using reference paper [2].Section IV gives a descriptive theory and flowchart of our proposed method. Section V concludes this paper.

II. OVERVIEW OF MONGODB

A. MONGODB

MongoDB [4] is a schema less document-oriented database. The name MongoDB comes from "humongous". The database is intended to be scalable and is written in C++. The primary reason for moving away from relational model is to make scaling easier. The basic idea is to replace the concept of a "row" with a more flexible model, the "document". By making use of embedded documents and arrays, this approach makes it possible to represent complex hierarchical relationship with a single record. MongoDB is also schema free: a document's keys are not predefined or fixed [12] [13].

1) *Features* MongoDB support Bson data structures to store complex data types; supports powerful and complex query language; high speed access to mass data; stores and distribute large binary files like images and videos; instead of stored procedures, developers can store and use JavaScript functions and values on the server side; supports an easy-to-use protocol for storing large files and file metadata [13]; it gives fast serial performance for single clients; uses memory mapped files for faster performance. Because of these characteristics of MongoDB, many projects with increasing data are considering using MongoDB instead of relational database.

2) *Data Design* MongoDB database holds a set of collections. A collection has no pre-defined schema like tables, and stores data as documents. BSON (binary encoded JSON like objects) are used to store documents. A document is a set of fields and can be thought of as a row in a collection. It can contain complex structures such as lists, or even document. Each document has an ID field, which is used as a primary key and each collection can contain any kind of document, but queries and indexes can only be made against one collection [7] [12].MongoDB supports indexing over embedded objects and arrays thus has a special feature for arrays called "multikeys". This feature allows using an array as index, which can then be used to search documents by their associated tags.Figure1 shows the structure of MongoDB.

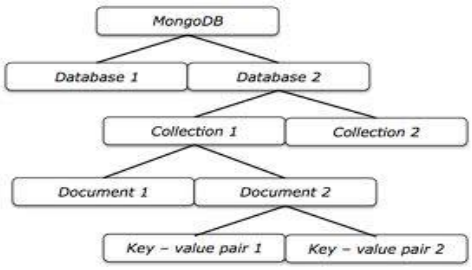

Figure 1: STRUCTURE OF MONGODB

3) *API* MongoDB [15] has its own query language named Mongo Query Language. To retrieve certain documents from a db collection, a query document is created containing the fields that the desired documents should match. For example,

- Insert Command

db.users.insert ({ user id:"abc123", age: 55, status:"A"})

- Drop Command

db.users.drop ()

- Select Command

db.users.find ({ status:"A", age: 55})

- Delete Command

db.users.remove ({ status:"A"})

MongoDB uses a RESTful (Representational State Transfer) API. It is an architecture style for designing networked applications. It relies on a stateless, client-server, cacheable communications protocol (e.g., the HTTP protocol). RESTful applications use HTTP requests to post, read data and delete data.

4) *Architecture* MongoDB cluster is built up using three main components namely Shard nodes, Configuration servers and Routing services or mongos as shown in Figure 2.

Shard nodes: A MongoDB cluster is made of one or more shards, where each shard node is responsible for storing the actual data. Each shard consists of either one node or a replicated node which just holds data for that shard. Read and write queries are routed to the appropriate shards. A replicated node consists of one or more servers, where one server acts as a primary server and others are secondary servers. If the primary server fails one of the secondary servers automatically takes over as primary. All writes and consistent reads go to the primary server and all eventually consistent reads are distributed amongst all the secondary servers.

Configuration servers: A group of servers in the cluster are called configuration servers. This server are used to store metadata and routing information of the MongoDB cluster indicating which data is present on which shard.

Routing services or mongos: These servers are responsible for performing tasks requested by the client. Clients issue different types of queries and depending on the type of queries, mongos send the requests to the necessary shards and merge the result before it is send back to the client. Mongos for themselves are stateless and therefore they can run in parallel [7].

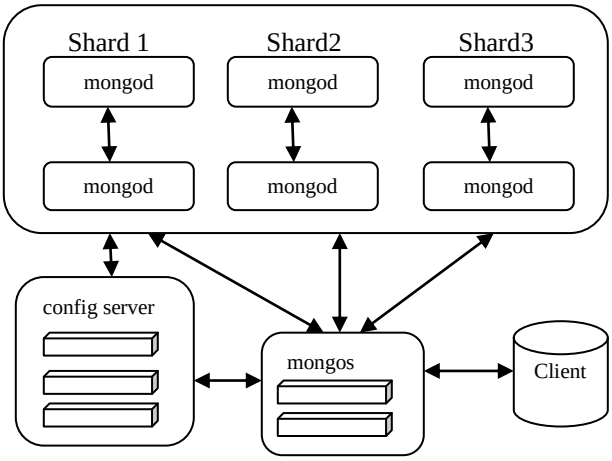

Figure 2: MONGODB ARCHITECTURE

MongoDB uses memory-mapped files, in order to use as much of available memory as possible and thus increase the performance. B-trees are used to index the MongoDB database. A user specified shard key is used to partition their owning collection in a MongoDB cluster [15]. MongoDB supports auto-sharding enabling horizontal scaling across multiple nodes. Sharding is used to partition data across multiple servers by maintaining the order using the shard key. Thus, maintaining automatic rebalancing of shards.

III. COMPARISON OF MONGODB AND MYSQL

As per the detailed review of several papers, a comparative study is made between MongoDB and MySQL based on their concept and commands used for different operations.

A. Based on Terms/Concept

Table I: TERMS/CONCEPT

SQL terms/concept	MongoDB terms/concept
Table	Collection
Row, Column	document or BSON document, field
Index	index
table joins	embedded documents and linking
primary key (explicitly)	primary key (implicitly)
fixed schema	schema less

B. Based on Schema Statements

Table II: SCHEMA STATEMENT

SQL schema	MongoDB schema
A. Create Command **CREATE TABLE** teachers (t_id Varchar(30), age Number, status char(1), **PRIMARY KEY**(id))	**db.teachers.insert**({ t_id: "abc123",age:55,status : "A"})
B.DROP Command **DROP TABLE teachers**	**db.teachers.drop**()
C.INSERT Command **INSERT INTO** teachers(t_id, age, status) **VALUES** ("a123",45,"A")	**db.teachers.insert**({t_id: "a123", age: 45,status: "A"})
D.SELECT Command **SELECT** t_id, status, age **FROM** teachers	**db.teachers.find**({ },{t_id:1, status: "B",age:45 })
E.DELETE Command **DELETE FROM** teachers **WHERE** status = "D"	**db.teachers.remove**({ status: "D" })

C. Based on Performance

In [2], the authors have performed testing and thus have compared MongoDB with MySQL database. They have performed testing by using the textbook management system. The given graph shows the result of testing. In performance testing, the authors have inserted 100 to 50,000 textbooks information into database. The cost time of MongoDB and MySQL were recorded as shown in figure [14]. Two important factors for which MongoDB was preferred over MySQL are [14]:

- Insertion Speed

From the graph, we notice that MongoDB spends less time than MySQL, for a large amount of information as shown in figure 2. It leaves MongoDB 30×-50× faster than MySQL as sown in figure3.

Number of Parallel Clients 5 Time in seconds

Basic Insert	Total Rows	Rows / client	SQL Time	Mongo Time	Sql Ops/sec	Mongo Ops/sec
several columns	100	20	0.19	0.011	526	9,091
600 bytes per row	1,000	200	1.8	0.02	556	50,000
	5,000	1,000	9	0.25	556	20,000
	25,000	5,000	100	1.5	250	16,667
	50,000	10,000	270	2.5	185	20,000

Figure 2: INSERTION SPEED COMPARISONS [14]

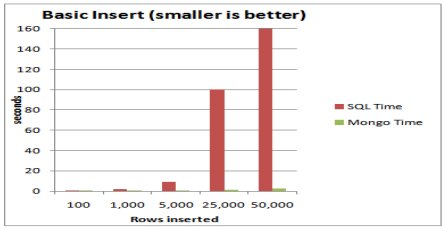

Figure 3: INSERTION TIME FOR MYSQL AND MONGODB [14]

- Query Speed

In the figure 4, it calculates the time to get the data out of the database.

Number of Parallel Clients 5 Time in seconds

	Total Rows	Rows / client	SQL Time	Mongo Time	Sql Ops/sec	Mongo Ops/sec
Basic Query	50	10	0.1	0.08	500	625
with index	500	100	0.38	0.1	1,316	5,000
	5,000	1,000	2.8	1.2	1,786	4,167
	25,000	5,000	14	4	1,786	6,250
	50,000	10,000	28	10.4	1,786	4,808

Figure 4: QUERY SPEED COMPARISONS [14]

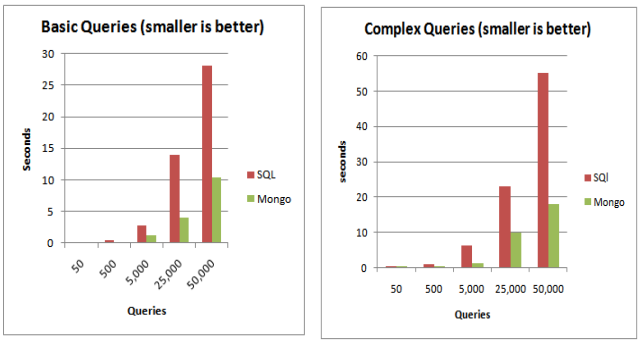

Figure 5: BASIC AND COMPLEX QUERY TIME FOR MYSQL AND MONGODB [14]

MongoDB leads MySQL with almost 3× performance as shown in figure 5. But MongoDB spends much more time on problem solving as well as the post maintenance issues and is not easier than MySQL. Thus from above comparison, it proves that for large amount of data MongoDB is preferred over MySQL.

IV. PROPOSED METHOD

A. SYSTEM DESCRIPTION THEORY

In this system, a method is proposed to integrate these two types of database by adding an interface between the Application layer and Database layer. The middleware between the two consist of **Metadata** which consist of different types of packages. This system needs to implement a package which acts as an interface between java application layer and NoSQL database (MongoDB).The system makes use of MongoDB and the reason for using this has been discussed above in detail. The system is primarily designed for embedded java based application which requires database access. The database command fired from java based application is given as input to the interface acting as a middleware(Metadata).The interface parses the input and reformats the code in the format that is been required by the back-end database (MongoDB).The reformatted code consists of functions that directs back-end database to implement and maintain the database. In form of result, the back-end databases will response to the middleware with the results. As a result, the middleware responses to the java application in terms of success or an exception in case of failure. Hence to act as middleware the system has to perform conversion from one form to another. Thus, the system has to store some information about the format conversion rules and the data structure format. In turn, the system has to store the metadata for supporting the working of the system. Figure 6 depicts the architecture of our proposed system.

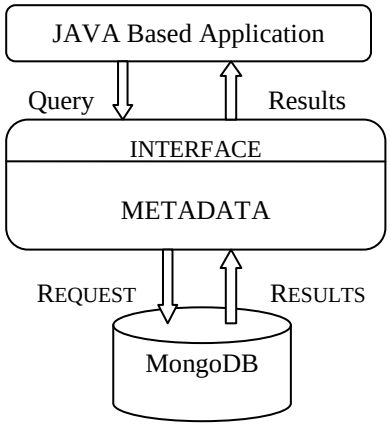

Figure 6: DATABASE INTEGRATION ARCHITECTURE

C. SYSTEM FLOWCHART

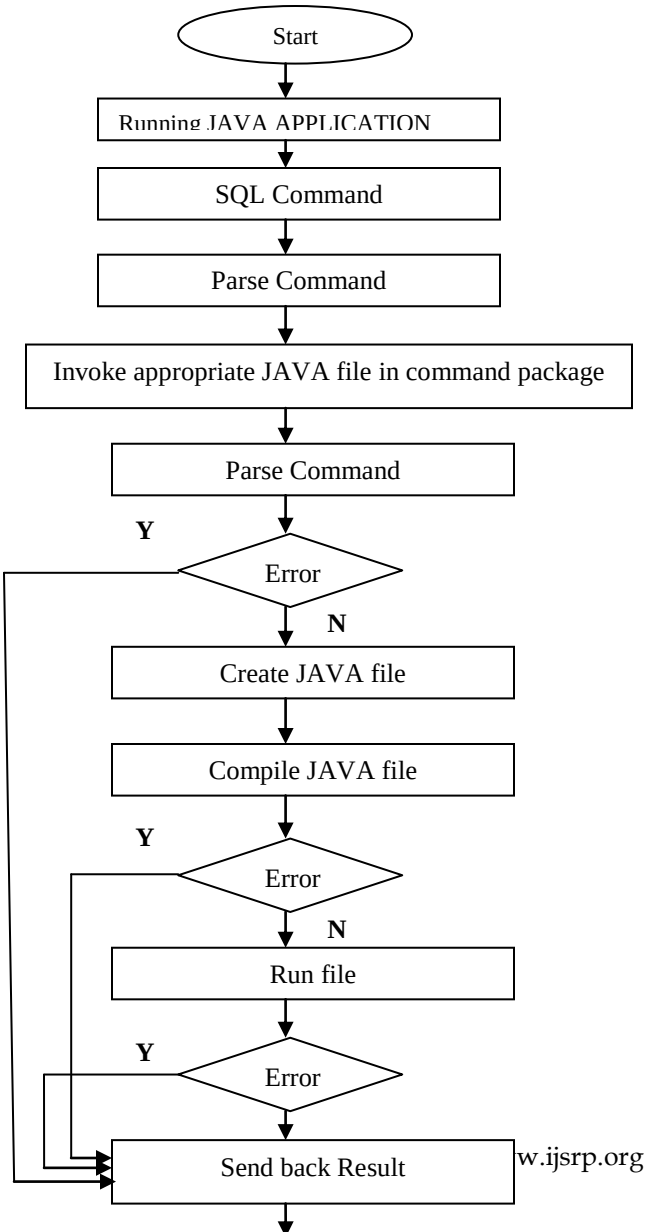

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Figure 7: SYSTEM FLOWCHART

In our proposed, we make use of standard SQL query language to invoke commands to the database. Due to the need, of huge amount of data storage we make use of one of the boosting technology of NoSQL database i.e. MongoDB. MongoDB stores data in BSON structure. So in order to get result from this database we make use of Metadata structure which stores all the conversion rules as well as the data format required for the application layer and database layer to communicate. The reason for using SQL query language is that it is a most popular and standard database as well many developers throughout the world are expert in programming using SQL. Figure 9 shows the detailed flow of our proposed method.

V. CONCLUSION

RDBMS won't go away, they're still definitely needed. But the storage requirement for the new generation of applications are huge different from legacy applications. We can choose MongoDB instead of MySQL because of two factors, ease of use and performance. We conclude that if your application is data intensive and stores lots of data, queries lots of data, and generally lives and breathes by its data, then you'd better do that efficiently or have resources (i.e. money) to burn. Lastly, the report concludes by proposing a database integration method by using a middleware between the two layers. In this method, application does not have to consider about the complexity of underlying database layer there data distribution and storage. They have to use the basic SQL query language to get result from the database and all the format conversion rules will be done by the Metadata. The system was proposed because MongoDB has newly come into existence, whereas the standard SQL language has been over years and, therefore if we merge the two we can use the features of both the database. Although, NoSQL has the advantage of horizontal expansion, but for complex SQL requests, it cannot support them very well. For the Query based on KEY/VALUE and massive data storage requirements, NOSQL is a good choice.

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NEW IDEA FOR PREVENTING WAX DEPOSITION IN PRODUCTION TUBING STRINGS

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Main Body **-** The techniques used in the design of gas lift equipment have faced many challenges over the years. Designs of production wells for lifting oil using low casing pressure lead to cold flow of the extracted fluid. This is because the wells need lower rates of gas lift. It is recommended to use gas lifting pressure in the range of 1120 to 1200 Psi [1]. Producers, who produce lower volumes of oil, require small amounts of gas in order to lift the fluid. They fit gas chokes for controlling the volume of gas lift in gas lift wells. Lower oil production gas volume is small and this leads to a falling in pressure which eventually lowers the temperature of the injected gas that flows down the casing.

The reduction in temperature of the casing surfaces results in the cooling of the temperature of the gases in the casing lower than the deeper depths. The low gas temperatures on the surface casing also cool down the temperature of the lifted oil, sometimes to temperatures below the pour point temperature of the surface. This low temperature of the produced crude oil leads to the formation of wax in the production string. The condition is worse in the winter season when the country experiences extreme weather conditions. The condition may exceedingly limit the flow of oil or even plug the oil tubing entirely [2]. As a remedy to this problem, high pressure gas with the potential of raising the temperature in the well need to be introduced. This can be done through the design of wells whereby the oils are lifted at pressures higher than the pour point pressures to prevent wax formation. Chemical treatment may also be adopted. In the chemical treatment procedure, wax inhibitors are injected down the casing together with gas to keep the tubing clean. Another method that can be used as a remedy is the wire line tools. They are used to break the formed plug along the outlet to improve production when the low production system is adopted according to the reported researches [3].

1.LITERATURE REVIEW

1.1GAS LIFT SYSTEMS

In conventional oil production methods employ the injection of gas continuously or sporadically at specially chosen areas in order to lift the fluids produced in the interior of the earth's surface to the surface of the earth. The hydrostatic load of the tubing is lowered when the gas is added. The process is followed by the lowering of the pressure of the bottom hole. Well fluids are lifted by two processes. In the continuous-continuous injection flow technique, gas is continuously injected into the tubing in order to lower the pressure that opposes the production of the fluid. In the intermittent flow technique, gas is injected at high pressure into the tubes of the fluid. The gas is injected at the right volume and pressure which can help in lifting the fluid through the valve at the highest possible velocity.

The gas lift technology has many advantages some of which are listed in the following paragraphs.

Installing and operating gas lift techniques require little initial and running costs which can be afforded by many firms. The method is highly flexible with the capability of producing at both low rates and high rates. It is possible to produce deep and deviated wells of both high GOR and WOR wells while achieving high effectiveness. Completed wells can be dual purpose with the ability of using wire-line techniques.

However, the gas lift techniques are limited by the sour gas produced, presence of kerosene and the subjectivity of the wet gas produced to freezing.

2.METHODOLOGY:

In order to come up with the optimum oil production, four gas lifts techniques were considered for efficiency and effectiveness. The four categories of gas lift techniques considered include:

- High PI- High BHP continuous
- High PI – Low BHP intermittent
- Low PI – High BHP continuous
- Low PI – Low BHP intermittent

In this case, high BHP means BHP values that are able to support fluids up to a depth of 70%. Low BHP means BHP values that support fluids to a depth of 40% while low PI values are for less than 0.5 BOPD/psi.

3.DESIGN FACTORS

The following design factors are considered in the design of the new model of the gas lift system:

- The depth to which the gas is injected, the gas pressure and its GLR for the specified production path.
- The principles applied in the operation of unloading
- The gradient of the well
- The type of gas lift valves that should be employed
- The spacing considerations of the gas lift valves
- The operating principle, kinetics and mechanics of the valves in the gas lift operation
- Efficiency and effectiveness determination factors of operation of the gas lift system.

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An Efficient Method of Solving Lexicographic Linear Goal Programming Problem

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Abstract- Lexicographic Linear Goal programming within a pre-emptive priority structure has been one of the most widely used techniques considered in solving multiple objective problems. In the past several years, the modified simplex algorithm has been shown to be widely used and very accurate in computational formulation. Orumie and Ebong recently developed a generalized linear goal programming algorithm that is efficient. A new approach for solving lexicographic linear Goal programming problem is developed, together with an illustrative example. The method is efficient in reaching solution.

Index Terms- Lexicographic Goal programming, multi objective, simplex method.

I. Introduction

Multiple Objective optimizations technique is a type of optimization that handles problems with a set of objectives to be maximized or minimized. This problem has at least two conflicting criteria/objectives. They cannot reach their optimal values simultaneously or satisfaction of one will result in damaging or degrading the full satisfaction of the other(s). There is no single optimal solution in this type of optimization; rather an interaction among different objectives gives rise to a set of compromised solutions, largely known as the trade-off or non dominated or non inferior or Pareto-optimal solutions. Multiple Objective optimization consists of different problem situations, such as multiple objective linear programming (MOLP), Multiple Objective Integer Linear Programming (MOILP), and Nonlinear Multiple Objective Optimization (NMOO).

Wang et.al (1980) and Evans (1984) categorised multiple objective optimization into three as shown in Aouni and Kettani (2001). The categories are as follows;

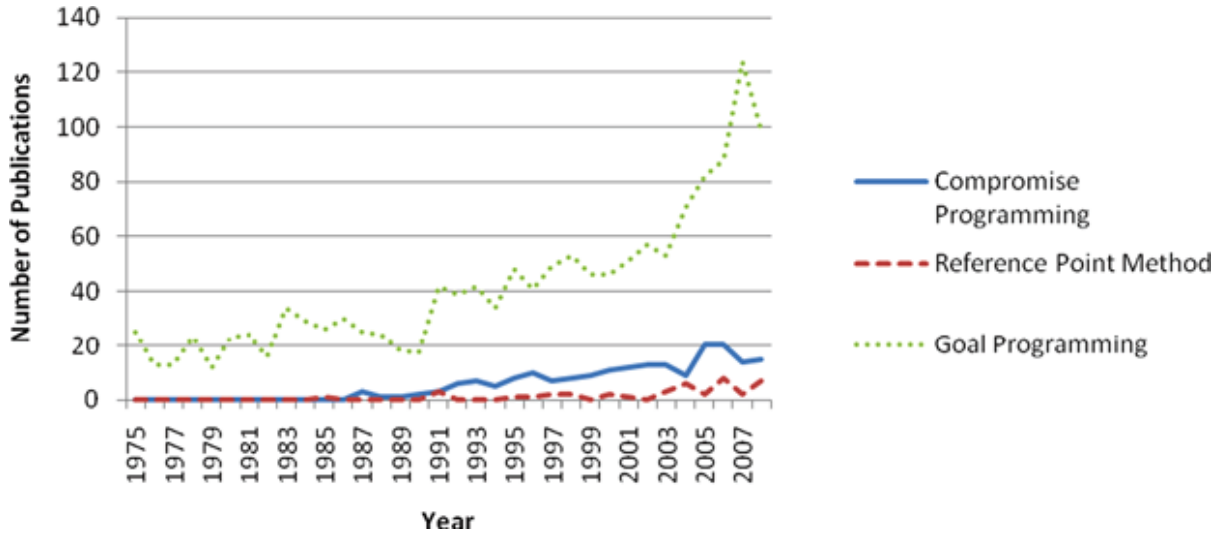
• A priori techniques in which all decision maker preferences are specified before the solution process.

• Interactive techniques in which the decision maker preferences are elicited during the solution technique, mainly in response to their opinion of solutions generated to that point.

• A posteriori techniques where the solution process takes place first and the decision maker preferences are then elicited from the generated set of solution.

Goal programming is one of the posteriori techniques, and most commonly method for solving multiple objective decision problems. (See Sunar and Kahraman (2001)). Goal programming popularity from amongst the distance-based MCDM techniques as described by Tamize and Jones (2010) demonstrates its continuous growth in recent years as represented below;

Goal Programming as a Multi-criteria Decision Analysis Tool



Source: Tamiz M, &D. F Jones (2010) Practical Goal Programming. *International Series in Operations Research & Management Science.* Springer New York http://www.springer.com/series/6161.

Goal programming is used in optimization of multiple objective goals by minimizing the deviation for each of the

objectives from the desired target. In fact the basic concept of goal programming is whether goals are attainable or not, an objective may be stated in which optimization gives a result which come as close as possible to the desired goals. Schniederjans and Kwaks (1982) referred to the most commonly minimize:

$$\mathbf{Z} = \sum_{i}^{m} w_i p_i (d_i^- + d_i^+) \quad (1.1)$$

s.t

$$\sum_{j}^{n} a_{ij} x_{ij} + d_i^- - d_i^+ = b_i \qquad (i = 1,2,...,m), \quad (1.2)$$

$$x_{ij}, d_i^-, d_i^+ \geq 0, \; w_i > 0, \; (i = 1,2,...,m: \quad j = 1,2,3...,n) \quad (1.3)$$

In many situations, however, a decision maker may rank his or her goals from the most important (goal 1) to least important (goal m). This is called Preemptive goal programming and its procedure starts by concentrating on meeting the most important goal as closely as possible, before proceeding to the next higher goal, and so on to the least goal i.e. the objective functions are prioritized such that attainment of first goal is far more important than attainment of second goal which is far more important than attainment of third goal, etc, such that lower order goals are only achieved as long as they do not degrade the solution attained by higher priority goal**.** When this is the case, pre emptive goal programming may prove to be a useful tool. The objective function coefficient for the variable representing goal i will be p_i. In problem with more than one goal, the decision maker must rank the goals in order of importance.

However, a major limitation in applying GP as recorded in Schniederjans, M. J. & N. K. Kwak (1982) has been the lack of an algorithm capable of reaching optimum solution in a reasonable time. Hwang and Yoo (1981) cited a number of limitations found in existing algorithms. The purpose of this research is to present an efficient method for solving lexicographic linear goal programming problems.

The paper is organized as follows: Introduction to Preemptive Linear Goal Programming is provided in section two. The new algorithm for lexicographic goal programming and the applied type of goal programming as "pre-emptive weighted priority goal programming" and a generalized model for this type of programming is as follows:

$$lexi \min \; z = (p_1(d_1^-, d_1^+), \; p_2(d_2^-, d^+_2), \; ..., \; p_k(d^-_k, d_k^+) \quad (2.1)$$

S.t

$$\sum_{j}^{n} a_{ij} x_{ij} + d_i^- - d_i^+ = b_i \qquad (i = 1,2,...,m), \quad (2.2)$$

$$x_{ij}, d_i^-, d_i^+ \geq 0, \; w_i > 0, \; (i = 1,2,...,m: \quad j = 1,2,3...,n) \quad (2.3)$$

The model has k priorities, m objectives and n decision variables. p_i is the ordered i^{th} priority levels of the deviational variables in the achievement function. The priority structure for the model is established by assigning each goal or a set of goals to a priority level, thereby ranking the goals lexicographically in order of importance to the decision maker. This is known as lexicographic GP (LGP), as introduced by Ijiri (1965), and developed by Lee (1972) , and Ignizio (1976). This was modified by [11], [12], [13], [14], and [15].Priorities do not take numerical value, but simply a suitable way of indicating that one goal is more important than another.

solution description are the focus of Section three and four respectively, whereas the summary and conclusion will be presented in section five and six respectively.

II. LEXICOGRAPHIC (PREEMPTIVE) LINEAR GOAL PROGRAMMING (LLGP)

The basic purpose of LLGP is to simultaneously satisfy several goals relevant to the decision-making situation. To this end, a set of attributes to be considered in the problem situation is established. Then, for each attribute, a target value (i.e., appraisal level) is determined. Next, the deviation variables are introduced. These deviation variables may be negative or positive (represented by d_i^- *and* d_i^+ respectively). The negative deviation variable, d_i^-, represents the quantification of the under-achievement of the *i*th goal. Similarly, d_i^+ represents the quantification of the over-achievement of the *i*th goal. Finally for each attribute, the desire to overachieve (minimize d_i^-) or underachieve (minimize d_i^+), or satisfy the target value exactly (minimize $d_i^- + d_i^+$) is articulated. And finally, the deviational variables prioritized in order of importance.

The general algebraic representation of lexicographic linear goal programming is given as

III. THE NEW ALGORITHM FOR LEXICOGRAPHIC GOAL PROGRAMMING (LGP)

The procedure utilizes Orumie and Ebong (2011) initial table with modifications as shown below, together with the inclusion of hard constraints. The procedure considers goal constraints as both the objective function and constraints. The objective function becomes the prioritized deviational variables and solves sequentially starting from the highest priority level to the lowest. It starts by not including the deviational variable columns that did not appear in the basis on the table, but developed when necessary since $d_i^+ = -d_i^-$.

TABLE 1.1 INNITIAL TABLE OF THE NEW ALGORITM

Variable in basis with p_i . C_B	X_1 X_2 … X_n S $d_1^{(v)}$ $d_2^{(v)}$ . . .$d_t^{(v)}$	Solution value b_i. R.H.S
	a_{11} $a_{12.}$ … a_{1n} s_1 $c_{11}^{(v)}$ $c_{11}^{(v)}$. . . $c_{1t}^{(v)}$	b_1
	a_{21} a_{22} … a_{2n} s_2 $c_{21}^{(v)}$ $c_{22}^{(v)}$ . . .$c_{2t}^{(v)}$	b_2
	. . . .	. . .
	a_{m1} a_{m2} … a_{mn} s_m $c_{m1}^{(v)}$ $c_{m2}^{(v)}$. . . $c_{mt}^{(v)}$	b_m

Consider the Preemptive Linear Goal programming model. The formulation for n variables, m goal constraints, t deviational variables in z and L preemptive priority factors is defined below.

$$lex\min\ z = \sum_{k}^{l} p_k (d_{i_t}^-, d_{i_t}^+) \qquad for\ k \subset i_t \subset \{1,2,...,m\} \qquad (3.1)$$

(3.1)

such that

$$\sum_{i}^{m} a_{ij} x_j + d_i^- - d_i^+ = b_i \qquad (3.2)$$

$$\sum_{j}^{n} a_{ij} x_j \le b_i \qquad (3.3)$$

$$x_{ij}, d_i^-, d_i^+ \ge 0 \qquad (3.4)$$

for $(i = 1,2,...,m: \quad j = 1,2,3...,n)$

where p_k= k^{th} priority factor k= 1,2, . . .L,

$p_k(d_{i_k}^+, d_{i_k}^-)$ are set of deviational variables in z with the priorities attached to them.

$x_j, d_i^+, d_i^- \ge 0\ i = 1,...,m, \quad j = 1,...n$,

Let p_k be the k^{th} priority level, then; the algorithm;

Step 1. Initialization:

Set k $\leftarrow$ 1 i.e set the first priority k=1

Step 2. Feasibility:

If b_i = 0 for i=1,2,. .., m, go to Step 8. i.e if all the rhs=0 {solution optimal}

Set $b_i \leftarrow |b_i|$ for I =1,2,..., m. i.e take absolute value of the rhs {ensure feasibility}

Step 3. Optimality test:

If $g_{hj} \le 0$ for all j $\neq$ *pivot column* , $h \in i_k$ go to Step 7.

{all coefficients of priority row h non positive ,so p_k is satisfied}.

Step 4. Entering variable:

Entering variable is the variable with highest positive coefficient in the row $g_{h.}, h \in \{1,2, L\}$ for the $p_k(d_{i_t}^-, d_{i_t}^+)$ rows of the objective function which does not violate priority condition. i.e if $g_{h.}, h \in \{1,2, L\}$ is the highest coefficient, but has been previously satisfied or more important than the leaving variable under consideration, then consider the next higher value on the same row, otherwise go to step 7. (The priority attached to the entering variable should be placed alongside with it into the basis).

In case of ties $\{g_{hj_1}, \ldots, g_{hj_s}\}$, then the entering variable is the variable for which $\min_h \left\{ b_i / g_{hj_q} : g_{hj_q} > 0 \right\}$ is maximum $j_q : q = 1,\ldots, s$

{ties in the priority rows }

Step 5. **Leaving variable**:

If y_0 is the column corresponding to the entering variable in Step 4, then the leaving variable is the basic variable with minimum $\left\{ b_i / g_{.y_0} : g_{.y_0} > 0, i = 1,2,\ldots m \right\}$ { $g_{.y_0}$ is the pivot column}.

In case of ties, the variable with the smallest right hand side leaves the basis.

Step 6. Interchange basic variable and non basic variable:

Perform Gauss Jordan row operations to update the table. If p_k is still in the basis (C_B), go to Step 3.

Step 7. Increment process:

Set k $\leftarrow$ k +1.If k ≤ L, go to Step 3. Satisfied priority will not reenter for the lesser one to leave, instead variable with the next higher coefficient enters the basis.

Step 8. Solution is optimal when:

i.) The coefficient of the priority rows are all negative or zero
ii.) The right hand sides of the priority rows are all zero
iii.) The priority rows are satisfied.

The optimal solution is the value $p_k(d_i^+, d_i^-)$ in the objective function as appeared in the last iteration table. i.e. The value of the achievement function becomes a vector of priority levels in the optimal values in the final tableau.

Note : Just as in the method of artificial variables, a variable of higher or equal priority that has been satisfied should not be allowed to re-enter the table. In this case the next higher coefficient of g_{hj} will be considered.

IV. SOLUTION OF ILLUSTRATIVE EXAMPLE

Given an example i below, the solution procedure is thus;

(i) $\min z = p_1 d_1^- + P_2 d_2^- + P_4 d_3^+ + p_4 d_4^+$

$s.t$

$7x_1 + 6x_2 + d_1^- - d_1^+ = 30$

$2x_1 + 3x_2 + d_2^- - d_2^+ = 12$

$6x_1 + 5x_2 + d_3^- - d_3^+ = 30$

$x_2 + d_4^- - d_4^+ = 7$

$x_i \geq 0, d_i^+, d_i^- \geq 0, d_i^+ \bullet d_i^- = 0$

TABLE 1: INNITIAL TABLE FOR PROBLEM (I)

	x_1	x_2	d_1^-	d_2^-	d_4^-	d_3^+	RHS
$^{p}{}_1\, d_1^-$	7	6	1	0	0	0	30
$^{p}{}_2 d_2^-$	2	3	0	1	0	0	12
$^{p}{}_4 d_3^+$	6	5	0	0	0	-1	30
$^{p}{}_3 d_4^-$	0	1	0	0	1	0	7

x_1 enter
d_1^{--} leaves

The above table (1) is the initial table of problem (i). Column one represents the variables in z with priorities assigned to each of them which forms the bases. Columns two and three represent the coefficients of the decision variables (a_{ij}) in the goal constraints equation. Columns four to seven represent coefficient of deviational variables (c_{it}^{v}) in the goal constraint equations that appeared in the achievement function. Column eight is the right hand side values of the constraints equations. Applying the algorithm,
step 1. set k=1.

Step 2. $\exists\ b_i = 0$ *for i=1,2,. . ., 4,* {So solution feasible.}

Step 3. $\exists\ g_{1j} > 0$ for some j. {So solution not optimal}. Since there is positive coefficient in the priority row, then the solution is not optimal.

Step4. Max $\{g_i\}$=max{7, 6, 1, 0,0,0,}=7 at g_{11} i.e. x_1=7 enters the bases since it is the highest in the row.

step 5 Min $\left\{\frac{b_i}{g_{i1}} : g_{i1} > 0\right\}$ = min{30/7, 6, 5,}= 30/7 at $\left[\frac{b_1}{g_{11}}\right]$. So d_1^- leaves the bases. i.e the minimum ratio of the right hand side to the entrying column.

Step6. Perform the normal gauss Jordan's simplex operation to update the new

Tableau (see Tableau 2) and check if p_1 is still in the basis (C_B) to test for optimality.

TABLE 2: 1st ITERATION FOR PROBLEM(i)

	x_1	x_2	d_1^-	d_2^-	d_4^-	d_3^+	RHS
x_1	1	6/7	1/7	0	0	0	30/7
$^{p}{}_2 d_2^-$	0	9/7	-2/7	1	0	0	24/7
$^{p}{}_4 d_3^-$	0	-1/7	-6/7	0	0	-1	30/7
$^{p}{}_3 d_4^-$	0	1	0	0	1	0	7

x_2 enter
d_2^- leaves

Table (2), shows that p_1 is satisfied since it is no longer in the bases.
Step7. Set k=2. Since 2 < L=4, go to step 3.

Step3. $\exists\ g_{2j} > 0$ for some j. i.e 2nd priority row. {So solution not optimal}

Step4. $\max\{g_{2j}\}$ =max {0,9/7,-2/7,1,0,0}=9/7 at g_{22}. So, x_2 enters the basis.

Step5. Min $\frac{b_i}{g_{i2}} : g_{i2} > 0$ =min {5, 8/3,7}= 8/3 at $\frac{b_2}{g_{22}}$. d_2^- leave since it has the smallest minimum ratio.

Step 6 Perform the same operation to update the new tableau Table 3 and check if p_2 is still in the basis (C_B) to test for optimality.

Table 3: 2ND ITERATION FOR PROBLEM (i)

	x_1	x_2	d_1^-	d_2^-	d_4^-	d_3^+	RHS
x_1	1	0	1/3	-2/3	0	0	2
x_2	0	1	-2/9	7/9	0	0	8/3
$^{p}{}_4d_3^+$	0	0	-8/9	1/9	0	-1	14/3
$^{p}{}_3d_4^-$	0	0	2/9	-7/9	1	0	13/3

d_2^+ enter
x_1 Leaves

Table (3), shows that p_2 is satisfied since it is no longer in the bases.
Step7. Set k=3. Since 3 < L=4, go to step 3.

Step3. ∃ g_{4j} >0 for some j. i.e 3th priority row. {So solution not optimal}

Step4. $\{\max g_{4j}\}$ =max {0,0, 2/9,-7/9,1,0}= $\left|\frac{-7}{9}\right|$ at g_{44}. So, d_2^+ enters the basis.

Step5. Min $\frac{b_i}{|g_{i4}|}$: $|g_{i4}| > 0$ =min {3, 39/7}= 3 at $\frac{b_1}{g_{14}}$. So x_1 leave since it has the smallest minimum ratio.

Step 6. Perform the same operation to update the new tableau Table 4 and check if p_3 is still in the basis (C_B) to test for optimality.

Table 4: 3RD ITERATION FOR PROBLEM (i)

	x_1	x_2	d_1^-	d_2^-	d_4^-	d_2^+	d_3^+	RHS
d_2^+	3/2	0	1/2	-1	0	1	0	3
x_2	7/6	1	1/6	0	0	0	0	5
$^{p}{}_4d_3^+$	1/6	0	-5/6	0	0	0	-1	5
$^{p}{}_3d_4^-$	-7/6	0	1/6	0	1	0	0	2

d_1^+ enter
d_3^+ leaves

Table (4), shows that p_3 is not satisfied since it is still in the bases.

Step3. ∃ g_{4j} >0 for some j. i.e 3th priority row. {So solution not optimal}

Step4. $\{\max g_{4j}\}$ =max {-7/6,0, 1/6, 0, 1,0, 0}=1/6 at g_{43}. But , d_1^- cannot re-enter for lower priority to leave the basis. Therefore p_3 cannot be satisfied further, so go to step 7.
Step7. Set k=4 and go to step 3.

Step3. ∃ g_{3j} >0 for some j. i.e 4th priority row. {So solution not optimal}

Step4. $\{\max g_{3j}\}$ =max {1/6,0, -5/6,0,0, 0,-1}=5/6 at at $|g_{33}|$. So, d_1^+ enters the basis.

Step5. Min $\frac{b_i}{|g_{i3}|}$: $|g_{i3}| > 0$ =min {6}= 6 at $\frac{b_3}{g_{33}}$. So d_3^+ leave..

Step 6. Perform the same operation to update the new tableau Table 5 and check if p_4 is still in the basis (C_B) to test for optimality.

Table 5: 4TH ITERATION FOR PROBLEM(i)

	x_1	x_2	d_1^-	d_2^-	d_4^-	d_1^+	d_2^+	d_3^+	RHS
d_2^+	8/5	0	0	-1	0	0	1	-3/2	6
x_2	6/5	1	0	0	0	0	0	-1/5	6
d_1^+	1/5	0	-1	0	0	1	0	-6/5	6
d_4^-	-6/5	0	0	0	1	0	0	1/5	1

d_3^+ reenter
d_4^- leaves

Table (5), shows that p_4 is satisfied since it has left the bases. But p_3 can be improved.

Step3. $\exists\, g_{4j} > 0$ for some j. i.e 3th priority row. {So solution not optimal}

Step4. $\{\max g_{4j}\}$ =max {-6/5,0, 0, 0, 1, 0, 0,1/5}=1/5 at g_{48}. so , d_3^+ re-enter for higher priority to leave the basis.

Step5. Min $\frac{b_i}{g_{i8}} : g_{i8} > 0$ =min {5}=5 at g_{48}. So d_4^- leave.

Step 6. Perform the same operation to update the new tableau Table 6 and check if p_4 is still in the basis (C_B) to test for optimality.

Table 6: Final iteration

	x_1	x_2	d_1^-	d_2^-	d_4^-	d_1^+	d_2^+	d_3^+	RHS
d_2^+	37	0	0	-1	$15/2$	0	1	0	27/2
x_2	0	1	0	0	1	0	0	0	7
d_1^+	-7	0	-1	0	6	1	0	0	12
d_3^+	-6	0	0	0	5	0	0	1	5

Z=5
The above is optimum since they cannot be achieved further.

V. RESULT

Problems from standard published papers of various sizes and complexities were solved to test the efficiency of the new lexicographic algorithm. The models varied widely in the number of constraints, decision variables, deviational variables and pre-emptive priority levels as shown in the table below.

TABLE 7. RESULT SUMMARY OF THE SOLVED PROBLEMS USING THE PROPOSED METHOD

source	No of constraints	No of decision variables	No of deviational variables	No of preemptive priorities
Igizio(1982)	5	4	10	3
Crowder & Sposito (1987)	4	2	8	3
Cohon (1978)	4	2	6	2
Hana (2006)	4	2	8	4
Gupta(2009)	4	2	8	2
Gupta(2009)	5	2	8	3
Rifia (1996)	4	2	6	2
Baykasoglu(1999)	4	2	7	3
Baykasoglu(2001)	2	4	8	4
Olson(1984)	3	2	6	2

VI. CONCLUSION

The proposed method is an efficient method of solving lexicographic Goal programming. The new method is used in solving various lexicographic linear Goal programming problems of different variables sizes, goals, constraints and deviational variables. The proposed method is an efficient method and its formulation represents a better model than the existing ones.

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Influence of Socio-Economic and Educational Background of Parents on their Children's Education in Nigeria

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Abstract- This conceptual paper studies the influence of parent's socio-economic status and educational background on their children's education in Nigeria. The paper reviews literature on how socio-economic status and educational background of the parents affects the education of their children; examine the role of parents' socio-economic status and their educational background on the Educational process of their children. In addition, studies and researches from the previous works of scholars relating to the factors that influence children's Education were also analyzed and discussed throughout the paper. The discussion in the paper is base on the theoretical framework of conflict theory. This theory is appropriate for the study because it allows the reader to understand how children's education is significantly affected by the socio-economic status and educational background of their parents. Finally, Suggestions for parents on how to overcome personal and economic challenges and to help in the Educational process of their children were presented. Conclusions from the literature were drawn, and the paper concludes that Parents' educational and socio- economic backgrounds influenced the Education of their children.

Index Terms- Socio-economic Status, Educational Background, Parents, Children, Nigeria.

I. Introduction

Traditionally, family status variables such as socio-economic status and parents' level of education have been regarded as predictors of children's academic achievement. Increasingly, research has suggested that, rather than having a direct association with children's academic achievement, socio-economic status and parents' level of education is part of a larger constellation of psychological and sociological variables influencing children's school outcomes (Joan, 2009). Attendant on higher levels of education may be access to resources, such as income, time, energy, and community contacts, that allow for greater parental involvement in a child's education. Thus, the influence of socio-economic status and parents' level of education on student outcomes might best be represented as a relationship mediated by interactions among status and process variables (Joan, 2009).

The literature also suggests that level of education influences parents' knowledge, beliefs, values, and goals about childrearing, so that a variety of parental behaviors are indirectly related to children's school performance. For example, higher socio economic status and high levels of education may enhance parents' facility at becoming involved in their children's education, and also enable parents to acquire and model social skills and problem-solving strategies conducive to children's school success. Thus, students whose parents have higher socio-economic status and higher levels of education may have an enhanced regard for learning, more positive ability beliefs, a stronger work orientation, and they may use more effective learning strategies than children of parents with lower socio-economic status and lower levels of education (Joan, 2009). With this information, it is important to note that parents are one of the most influential yet significantly underrated factors in their children's education, and society should encourage more parental participation in public education as it has been highlighted by most researches (Ramachandrant et al 2003; Palmer 2005; Verpoor 2005; Cooter 2006; Nannyonjo H. 2007; Hanushek 2007; Lynch 2009 Okummu et al 2008; cited in Robert Onzima 2010),

II. Background to the Study

Students' academic achievement and educational attainment have been studied within different frameworks. Many of them have a focus on parents' education, occupation or home background (like; family income, language of the home, activities of the family and work methods), while other studies looked at it from the teachers' variables (such as teacher's age, experience, education, gender, etc), school variables (such as environment, structures, buildings, location, etc), students' variables (such as attitude, self-concept, self-esteem, study habit, interest, etc) or parents' support (such as achievement motivation of wards, parental attitudes towards education, the aspiration of parents, etc). There is evidence that parents' education will affect students' academic achievement in schools. According to Grissmer (2003) parents' level of education is the most important factor affecting students' academic achievement. Taiwo (1993) submits that parents' educational background influence the academic achievement of students. This, according to him, is because the parents would be in a good position to be second teachers to the child; and even guide and counsel the child on the best way to perform well in education and provide the necessary materials needed by the child. This was supported by Musgrave (2000) who said that a child that comes from an educated home would like to follow the steps of his or her family and by this, work actively in his or her studies. He said further that parents

who have more than a minimum level of education are expected to have a favored attitude to the child's education and to encourage and help him or her with school work. They provide library facilities to encourage the child to show examples in activities of intellectual type such as reading of newspapers, magazines and journals. They are likely to have wider vocabulary by which the children can benefit and develop language fluency.

Onocha (1985) concludes that a child from a well educated family with high socio-economic status is more likely to perform better than a child from an illiterate family. This is because the child from an educated family has a lot of support such as a decent and good environment for academic work, parental support and guidance, enough textual and academic materials and decent feeding. He or she is likely to be sent to good schools where well seasoned teachers will handle his or her subjects. Children's academic achievement was found to be affected by varying family processes. Campbell and Wu (1994) said that the home environment and family processes provide a network of physical, social and intellectual forces and factors which affect the students' learning. According to them, the family's level of encouragement, expectations, and education activities in the home are related to socio-economic status, while Song and Hattie (2004) agreed that families from different socio-economic groups create different learning environments that affect the child's academic achievement. There is no doubt that parents' attitudes help to condition their children's attitudes. A parent who shows complete regard for education might have some effect upon his or her children's education progress. Many studies have examined the relationships among those constructs and students' achievement. Schunk, Pintrich and Meece (2008) affirm the fact that there is a consistent finding of motivation being related to achievement behaviors. In a nutshell the influence of socio-economic and educational background of the parents on their children education cannot be undermined.

III. Theoretical perspectives

The study is based on conflict theory which sees the purpose of education as maintaining social inequality and preserving the power of those who dominate society. Conflict theorists see the educational system as perpetuating the status quo by dulling the lower classes into being obedient workers. Conflict theorists agree that the educational system practices sorting, and argue that schools sort along distinct class and ethnic lines. According to conflict theorists, schools train those in the working classes to accept their position as a lower-class member of society. Conflict theorists call this role of education the "hidden curriculum."

Conflict theorists see education not as a social benefit or opportunity, but as a powerful means of maintaining power. They argued that teachers treat lower-class kids like less competent students, placing them in lower "tracks" because they have generally had fewer opportunities to develop language, critical thinking, and social skills prior to entering school than middle and upper class kids. When placed in lower tracks, lower-class kids are trained for blue-collar jobs by an emphasis on obedience and following rules rather than autonomy, higher-order thinking, and self-expression. Likewise children from low socio-economic status will be given equal treatment as lower class kids in the school and society at large compared with those from high socio-economic status. They point out that while private schools are expensive and generally reserved for the upper classes, public schools, especially those that serve the poor, are underfunded, understaffed, and growing worse. Schools are also powerful agents of socialization that can be used as tools for one group to exert power over others – for example, by demanding that all students learn English, schools are ensuring that English-speakers dominate students from non-English speaking backgrounds. Many conflict theorists argue, however, that schools can do little to reduce inequality without broader changes in society (e.g. creating a broader base of high-paying jobs or equalizing disparities in the tax base of communities).

In the case of schooling and Educational Opportunities Weber and his followers believed that inequality of resources in society is the source of conflict and, that schools are ultimately linked to the kinds of economic opportunities individuals have. Conflict Theory and Education Schools play a vital role in legitimizing the inequalities and transmitting knowledge in accordance with the power elite's interests. Social class awareness, ethnical superiority and gender difference are transmitted via hidden curriculum. Language and culture is embedded within the formal curriculum. Power Elite controls the schools, religious communities and the media in order to maintain the social order.

IV. Aims and Objectives of the Study

The purpose of this study is:

1. To review literature on how socio-economic status and educational background of the parents affects the education of their children.
2. To examine the role of parents' socio-economic and educational background on the Educational process of their children.
3. To discuss about studies and researches from the previous works of scholars relating to the factors that influence children's education.
4. To explain how children's education is significantly affected by the socio-economic status and educational background of their parents.
5. To provide some suggestions for parents on how to overcome personal and economic challenges and to help in the Educational process of their children.

V. Literature Review

How socio-economic status and educational background of the parents affects the education of their children.

Parent's socioeconomic status and educational background are based on family income, parental education level, parental occupation, and social status in the community (such as contacts within the community, group associations, and the community's perception of the family). Despite all the research and policy making, the relativity between those of high and low status from among the parents in relation to their children's' education is widening rather than narrowing across educational achievement (Galindo-Rueda, Marcenaro-Gutierrez & Vignoles, 2004;

Conger & Donnellan, 2007). It is believed that low SES and low Educational Background negatively affects academic achievement because they both prevents access to vital resources and creates additional stress at home (Eamon 2005, Majoribanks 1996, Jeynes 2002).

According to a draft report of the Australian commission on health Krieger, Williams and Moss (2007) refer to socioeconomic position as an aggregate concept that includes both resource-based and prestige-based measures, as linked to both childhood and adult social class position from among the children. Akanle (2007) also mentioned Parental income in his work to be a strong factor upon which the academic and vocational successes of secondary and junior secondary school students lie. According to his investigation, parental income cannot be sufficient to sustain the academic and personal social life of the student in sub rural school areas. And this can seriously affects the psychological balance or homeostatic balance in the classroom, which causes low concentration, low perception, frustration, sickness and emotional disability in academic performance of the students and can also lead to dropping out or withdrawal. Therefore a child may be found to perform poorly in his school work and even drop out of school, when he is deprived of essential needs. This is consistent with Bugembe et al (2005) finding which suggested that child welfare at school is a determinant of child retention and also incorporates the rights of children to adequate living standards (shelter, nutrition and healthcare, water, and sanitation services) that are vital for child growth and development .Bugembe et al (2005) explained that In urban areas, most poor families can hardly afford the cost of water talk less of education of their children; and this can no dough lead to a low academic performance and high dropout rate.

The educational background on the other hand basically means the type of education acquired by an individual; it can be western or religious depending on the environment and geographical location. Educational background may be the number of schools attended and the type of certificates obtained right from primary to tertiary level. Research shows that pupils from families where parents have less education tend to systematically perform worse in schools than pupils whose parents have more education. According to Nannyonjo H. (2007} students from the educated parents who attended and finished senior four or senior 6 or university performed considerably better than the students with parents who did not finish primary or just finished primary school. Students whose fathers had university degree may likely expect to have the highest increase in test score. Similarly Okumu et al (2008) cited in Robert Onzima (2010) in a study of Socioeconomic Determinants of Primary School Dropout found that High academic attainment of the parents significantly reduces chances of primary school drop out for both boys and female children in rural and urban areas. Also educated parents are more concerned and more effective in helping their children in academic work. In doing so, they are also able to supervise and monitor their children's academic progress. And this can in no small measure contribute to the academic progress of children. But parents with low educational attainment mostly do not care to supervise their children performance due to lack of sufficient knowledge to face the challenge and this will discourage the children and may lead to their dropping out of school (Ramachandran et al 2003; Palmer 2005; Verpoor 2005). Educational level usually creates differences between people in terms of access to information and the level of proficiency in benefiting from new knowledge, whereas income creates differences in access to scarce material goods.

In families where parents happen to experience difficulties in reading and writing continuously, there is a danger that low literacy is passed on to the next generation(Cooter, 2006).In another research Dearing et al. (2004); Cooter (2006) and Lynch (2009) put forward that the importance of literacy development stretches far beyond children's school achievements. Well-developed literacy ability is an important condition for children's development in other intellectual and social areas and vice-versa (Dearing et al., 2004; Patall et al., 2008).

The Role of Parent's Socio-economic and Educational Background on the Educational Process of their Children.

In determining access to education by children, household income is found to be an important factor; this is because there are many costs associated with schooling and educational process ranging from school fees, uniform PTA fees and the opportunity costs of sending a female- child to school. Household income is linked to a range of factors: when children start school, how often they attend, whether they have to temporarily withdraw and also when and if they drop out (Barrera- Osorio et al; Glewwe & Chang 2010).The link between socio-economic and educational background of the parents and children educational process had been highlighted by number of studies in looking at the interaction between the children in particular and the household income and socio-economic status. All the studies agreed that children's 'enrolment, retention and completion can seriously be affected by the low socio-economic status and low educational level of the parents which resulted to poverty. (Porteus et al, 200; Gakuru cited in Ackers et al, 2001; Ranasinghe & Hartog, 2002; Vavrus, 2002;Hunter & May, 2003; Dachi & Garrett, 2003; UNICEF, 2005; Birdsall et al, 2005; Bruneforth, 2006; Cardoso & Verner, 2007; Guo & Zhang 2008; Zhao & Glewwe,2010; Wang 2010). Poverty could be regarded as 'the most common primary and contributory reason for many children to be out of school' (Glewwe, 2010) call poverty, 'a plausible explanation of school disruption'. According to Dachi and Garrett (2003) a Series of questions were asked to parents and guardians about the financial circumstances surrounding children's school enrolment in Tanzania their answers was no more than financial problem militating against sending their children to school. Wang (2010) also mentioned poverty as a contributing factor of children's dropout in rural areas of China.

Children from better off households are more likely to remain in school, whilst those who are poorer are more likely never to have attended, or to drop out once they have enrolled. This has been suggested by both statistical data and empirical research. For example, a research conducted in rural China by Glewe & Kreme (2006) saw 'poor and credit constrained children' three times more likely than other children to drop out of primary school. The links between wealth and school retention has been described in more detail by Colclough (2000) where he stated that "amongst those out-of-school, the mean wealth index for school drop-outs was generally higher than for those who had

never enrolled ... children at school were, on average, from better-off households than those who had dropped out, who were, in turn, from richer backgrounds than school-age children who had never enrolled". Poor households tend to have lower demand for schooling than richer households: whatever the benefits of schooling, the costs, for them, are more difficult to meet than is the case for richer households. The pressure on children from poorer background in particular, to withdraw from school increases as they get older, particularly as the opportunity cost of their time increases (Colclough et al, 2000: 25). In African traditional societies including the study area, several studies indicated that the children's schooling has been found to have links with socio-economic factors. According to Barrera-Osorio et al, (2008) the most important of these factors include direct and opportunity costs of schooling, limited employment opportunities, socio-economic status, parental and family investment behavior, the economic value of girls, rural and urban residence, and the level of parental education.

The major reasons parents offer for not educating their children or for removing them from the school are no more than the fees for registration and admission, examination, Parent Teachers Association (PTA) fees, the cost of books and uniforms, the provision of other daily monetary demands to their daughters, and the cost of transportation to and from the school on daily basis. These reasons have been discussed from several perspectives. Graham-Browne (1991) and Nejema (1993) argue that low socio-economic status which include poverty and the fiscal crises which force families to cover shortfalls have a devastating impact on household's and the education system as far as children's education is concerned. Glewwe & Chang et al (2010) link the severity of direct costs with the shift of educational costs to parents in the name of cost sharing. It has been mentioned earlier that in Nigeria, about 7.3 million children are out of school and 62% of the total population is female children mostly due to poverty of their households (UNICEF, 2004). In general, several studies suggest that the direct costs or financial constraints affected children and lead to their low participation in schools.

Fizbe & Shady (2009) observed that the opportunity costs of schooling are associated with labor shortage, resources and services lost due to sending children to school. Child labor is Indispensable to the survival of many rural households in Sub-Sahara Africa: agricultural work, domestic work (cooking, collecting fuel. fetching water) marketing as well as child care services are required from children. The need for domestic labor has gown also with the rapid growth of urban areas. Poor rural parents responded by sending their children into the domestic labor market in exchange for regular cash income Kukreti & Saxena v(2004) cited in Kotwal N Neelima & Rani S (2007) Dorsey (1989) refers to a Zimbabwean experience where the economic value of girls takes priority over education.

The relationship between certain household characteristics, poverty and school enrolment has been Empirical evidence from other countries is rich and the main results seem to be in agreement with a priori expectation of a close link between poverty and female student's dropout. Although the list is by no means exhaustive, the works of Carter (2000), Cockburn (2001) Parker & Pederzini (1999), Handa *et al.* (2004), Kurosaki & Khan (2001), Oxaal (1997), and World Bank (2004) are among recent researches from outside Nigeria documenting the links between childrens' education attainment, enrolments, retention completion and household characteristics and poverty (Garba T & Sanda A, 2007). The research conducted by Ahmad Sanda and Tukur Garba (2007) based on data collected from 600 rural households of Sokoto State, Nigeria provided an empirical evidence on the extent to which poverty and household demographic characteristics may affect educational attainment and school attendance of children. The results confirmed significant gender disparity in educational attainment and school attendance, with female children at a serious disadvantage.

Base on the fore going discussions of statistical data and empirical researches in the reviewed literatures, it could be evidently agreed that the socio-economic status and financial well-being of the family greatly affects the participation of children in schooling and minimize the high level of dropout in Nigeria.

Educational Background of the parents on the other hand is found to be another influential factor on their children's' education. According to Ersado (2005), educational level of household members is influential particularly on children and it determines their access to schooling. The notion is widely accepted as the most consistent determinant of child education. Also higher parental or household head level of education is associated with increased access to education. (Ainsworth et al, 2005; Al Samarrai & Peasgood, 1998; Ersado, 2005; Connelly & Zheng, 2003; Grant & Hallman, 2006; Hunter & May, 2003; Duryea, 2003; Rose & Al Samarrai, 2001; Seetharamu, 1984 cited in Chugh, 2004). Parental education and retention in school has been linked together by putting forward many reasons and opinions of scholars. It has been observed that non-educated parents cannot provide the support or often do not appreciate the benefits of schooling (Juneja, 2001; Pryor & Ampiah, 2003).

According to Al Samarrai and Peasgood, (1998: 395).the probability of girls enrolling in primary school can be increased by 9.7% and secondary by 17.6% by her married mother's primary education and it has no significant effect on the enrolment of boys. They claim that educated mothers giving preference to girls' schooling, implies that 'mothers have a relatively stronger preference for their daughters' education and that their education affords them either increased household decision-making power or increased economic status. Glick and Sahn's (2000) results was in line with Al Samarai and Peas good (1998) when conducting a research in an urban poor environment in West Africa. The outcomes of his research favored the female children by relating the improvements in fathers' education to the schooling of both sons and daughters. But mothers' education has significant impact only on daughters' schooling. In order to bolster sustained access to education for many children, Ersado (2005) suggests the provision of adult education programmers to counter the educational deficit facing many households. Yet, this might not be enough.

Discussions on the previous works of Scholars relating to the Factors that influence children's Education.

Many factors have positive or aversive influence upon a child's education. To optimize the positive influencers and limit the negative influencers one must first understand the primary factors that come into play with regard to education. One of the

most important influencers in education is worldview. Worldview comes into the equation from a variety of sources. Every curriculum, text book, and teacher has a worldview that influences the students. Parents need to identify what that worldview is and whether or not it is healthy for their children. One worldview can lean towards a disregard for education in and of itself, whereas another can challenge students to love learning in whatever form throughout their entire lives. One worldview can promulgate philosophy that hinders personal growth and restricts the students from experiencing true life whereas others can free them thereby preparing them to mature into their destiny. Thus, worldviews are instrumental in education whether they are good influencers or not so good (Karla Perry, 2010).

Parents are also of primary influential importance. If children do not have the support of parents who value their education and help challenge them to learn, do their homework, pay attention in class, etc. they will not adopt the necessary drive to become well educated. Parents cannot relegate the education of their children to the school system, whether public or private. They need to be actively involved in the process of their children's education and maintain a high value for academic excellence. Just the same, a negative parental influence can be as much about over involvement as it can be about under involvement. If the parent rides the children to such great lengths that they begin to abhor education there is a problem. There needs to be a healthy support, not a lack of support or an over exertion of parental authority pushing children to their exhaustion. Peers are another factor in gaining an education. If the child has trouble socializing or has friends that are bad influences they could be under achieving due to peer pressure. Also they could become distracted by the values of the peers away from education. It is important for parents to know the friends of their kids and help their children navigate through any problems (Yusuf 2008).

The school system itself can have a positive or negative influence. For instance, if the child dislikes the school they may dislike education in general which could cause lasting problems. Parents can help by listening to their child and find out why there seems to be a disinterest in learning or a dislike for the school. Not every school is for every child. Not every method of learning works for every child. Some need one on one help. Others thrive best in a class room full of children. Some need a structured environment and some need a creatively free environment. Pay attention to what is the real issue hindering the child's education and a solution will become more obvious (Warou, 2006).

The aforementioned influences are an overview of a few big impact influencers that one needs to pay attention to when making educational decisions for children. These factors can even affect college age youth or adults. They are the big picture factors that can make it or break it for getting a good education. Many problems can be avoided by examining the environment, the worldview, and the parental involvement and make sure it is of optimum health for the student. There will always be factors influencing education, but careful navigation can thwart unwanted influences and maximize the desired ones increasing the smooth sailing of the educational experience.

Education covers a number of elements of life, not only what we generally think of as the progress through school and college. These include; attitudes of various people, money, peer behavior and cultural expectations among others. Attitudes to education vary. Parents either have expectations of their child that it will do its best or they are passive in their understanding of education. These ideas can come from the parents' experience of a good education and the benefits it can bring or they can come from healthy ambition not based on personal experience but expecting much from the schools. Again it can come from not believing that education for its own sake is worth anything. In this case it is an unusual child who can overcome this (Rosemary Redfern, 2010).

Education can be enhanced by the parents with visits to museums and interesting places, with exposure to more than the work in school such as books, theaters and films. Part of the parental job is to extend the child's horizons by offering experiences which broaden the child's understanding of the world. The attitudes of teachers can influence children. Most people have experienced a teacher who loved their subject and inspired their classes and many have come across teachers who are ineffectual and uninteresting. Peers have an influence, especially with boys, because they can bully or tease a boy who wants to work at school, treating him as someone who does not belong to the current male culture of the group. Being an outsider is always difficult and it is easy to succumb to such pressure. This is why there is often a problem for able youngsters, who naturally want to belong (Bada, 2003).

However, there are some environments which are actively against education, unable or refusing to see what benefit it can offer. If a child comes from this sort of background it is hampered in making use of what is available. Money is a factor in education. A family which is struggling with everyday needs does not have the money to take the children out and give them experiences, nor can they buy all the supplies the child needs. An affluent family might have the money available but not have the will or understanding of how to use it to help the child.

The emotional development of the child is an important factor in education. A child who has not established some confidence will not believe they can do well and not make the necessary effort. Some success in school can also do wonders for the child's confidence. Confidence can also influence student's approach to college level education. A level of emotional stability is needed to make the best use of educational experiences. Education appears to be straightforward but there are many factors which affect what use is made of it (Bada, 2003).

How children's education is significantly affected by the Socio-economic Status and Educational background of their parents.

Significantly, children's education was affected with the level of education of their parents and it is reflected in the high aspirations of the more educated for the education of their own children. Father's and mother's educational aspirations were found to be the two most consistent factors affecting the children's' education, and this is evidenced in a research conducted on 1,700 husbands and wives in urban and rural areas of Ghana (Cochrane, Mehra, & Osheba, 1985). In another survey conducted by Yeoman (1985) on a sample of 346 dropouts, 83% of the researches counted parental interest and encouragement among the major factors of children's enrolments and retention

in schools. Children with families where parents have less education and low socio-economic status tend to systematically perform worse than children with families where parents have more education and high socio-economic status.

Income shocks do not only affect investment in children's education but also children's performance. When families are constrained by fewer resources, children's learning is consequently affected (Bjorkman M.2005). According to Alissa (2010), Children's test scores are lowest when poverty persist across the generations, and highest when material advantage is long-lasting On the other hand, while good social skills also appeared to be linked across generations, these do not make a significant direct contribution to the current gap in cognitive test scores between rich and poor children. Alisa found that the gap in attainment between children from the poorest and richest backgrounds grew particularly fast during the primary school years. By age eleven, only around three-quarters of children from the poorest fifth of families reached the expected level at Key Stage 2, compared with 97 per cent of children from the richest fifth. according to Alisa, Poorer children who performed well in Key Stage tests at age seven were more likely than better-off children to fall behind by age eleven, and poorer children who performed badly at seven were less likely to improve their ranking compared with children from better-off backgrounds – an important factor behind the widening gap. Akanle, (2007) identified Parental income in his work to be a cogent factor upon which the academic and vocational successes of secondary school students lie. He found Parental income not to be sufficient to sustain the academic and personal social life of the student in sub rural school areas. This to a large extent affects the psychological balance or homeostatic balance in the classroom, which causes low concentration, low perception, frustration, sickness and emotional disability in academic performance of the school children. Therefore when a child is deprived of the essential needs he may be found to perform poorly in his school work. This is consistent with Bugembe et al (2005) finding that child welfare at school is a determinant of child retention and also incorporates the rights of children to adequate living standards (shelter, nutrition and healthcare, water, and sanitation services) that are vital for child growth and development. Bugembe explained that In urban areas, most poor families can hardly afford the cost of water, resulting in children from poor families being sent on long treks in search of water, often having to stand in long queues and consequently being late or absent from school.

Suggestions for parents on how to overcome personal and economic challenges and to help in the Educational process of their children.

Most research that has been done on parental involvement in schools shows that low-income families are less involved in their children's education, and because of this lack of participation, their children are less likely to be successful in school. Considering this statement, Government and society should focus on how to alleviate some of the stress in the lives of these families, and how to help students of all backgrounds thrive in school. One idea that has already been proposed is the concept of establishing workshops to develop the relationships between parents and their children. These workshops could help parents of lower-incomes and of less privileged educational backgrounds to learn how to help their children succeed in school. Ann (1993) writes, "During the last decade, educators and policy makers have become increasingly interested in the notion that educationally disadvantaged parents and children are a learning unit and that family and intergenerational literacy programs are a promising approach to supporting parents in their role as first teachers." Programs, such as these, not only help parents learn how to teach their children, but they also put an emphasis on the importance of parental involvement in the public school system. Parents would be learning how to be good teachers, and additionally they would discover the hardships of being a teacher and perhaps become more willing to work with their children's teachers, instead of against them. There have also been programs suggested specifically for mothers and ways they can improve their children's education. In his research, Ann (1993) found that "the Intergenerational Literacy Action Research Project (ILAR) conducted by Wider Opportunities for Women, involved mothers participating in community-based programs that provide women with basic-skills instruction and job training. The study revealed that 65 percent of the children benefited from their mother's participation in the adult education and training programs." Although this type of program may seem time-consuming, the benefits received after the process greatly outweigh the initial costs. The burden of attending classes on how to be a good first teacher to your children dissipates as soon as a child is excited about learning.

Another solution to the challenges of parents, which may seem oversimplified, is returning to reading to children every night instead of watching television or playing video games. Sclafani (1984) says, "A parent should begin reading to a child as soon as possible...Books provide interesting visual stimuli to infants, which forms the basis for future interest in books and reading. Keeping a child in age-appropriate books is one of the best investments any parent or grandparent can make." Today, there is more and more emphasis on the use of television, video games, and computer games in the education of children and less and less emphasis on the simple act of reading. Parents need to go back to the basics of "providing a warm, supportive home environment that supports exploration and self-directed, autonomous behavior, and that will greatly increase the chances of having an academically successful child." An emphasis on the parental involvement in education is the key to their children's successful education because they are their first teachers, and therefore establish the beginning of the learning process.

VI. Conclusion

One of the biggest problems with children in today's society is youth apathy. Parental involvement in school can help solve this problem by emphasizing the importance of a good education, and getting their children excited about learning. "For most children to succeed in school, their parents' interest in their learning is of paramount importance. But this interest ought to be with what happens on a daily basis, because this is how the child lives, and this is how he understands his life. The essential ingredient in most children's success in school is a positive relation to his parents." (Bettelheim, 1987) Parents' personal educational backgrounds and economic backgrounds have a

significant effect on their children's education. However, if parents are a positive influence in their Children's everyday lives, and most importantly in their everyday education, the future of our society will look brighter and brighter every day.

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Using of Tracking systems for devices designing to face children Kidnapping Phenomenon

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Abstract- The research is concerned with finding out a suitable means to protect the children against this phenomenon of Children abduction using tracking systems like GSM,GPRS,GPS. The research aims at illustrating the advantages of the tracking systems that are used and developing the designing of thetracking system devices of following up the children in order to face this phenomenon to fir huge number of children with different contexts, traditions and financial possibilities. The new method helps in following up the kidnapped child for long time as the used system is connected with the parents via sending messages to their mobile phones when the child changes the defined location as it defines the location more accurately. the researcher designed an attractive shoes connected to a belt containing the GPS tracking system that can be installed in all kinds of shoes that can be used by the child when he want to change or replace this shoes with another one.

Index Terms- tracking system, tracking system for safety

I. INTRODUCTION

The Egyptian Community suffer from security disorders after 25th Revolution. Consequently, this security disorders leads to the spreading of the phenomenon of Children abduction in order to force their parents to pay the ransom as those who commit such crime know very well that their parents are able to do whatever they want in order not to liable not any harms. Therefore, many gangs are formed in order to kidnap and rob the children who are the most precious thing for their parents.

Thus, in Egypt it turns to be "the terrible nightmare" for both fathers and mothers especially after the increasing number of the incidents of Children abduction within the Egyptian community and editing many minutes since the beginning of the revolution till now against the absence of many children from their homes, thus the parents become more worried and terrifying. This phenomenon turns to be a means to earn the living for the members of the gangs that are specializing in such crimes under the shadow of this secure chaos and the inability of the Police to arrest the criminals or following them especially after the escalation of Violence and barbarism practices.

Therefore, the research is concerned with finding out a suitable means to protect the children against this phenomenon as well as searching for the best systems that can be used to follow up the children during their residence outside homes and developing the systems that are used in the other communities that are previously used and prove their effectiveness in the field of following up the children and decreasing the incidents of children kidnapping. As well as the research is concerned with securing the children to decrease the psychological crises from which some children suffer as result of spreading the process of their kidnapping by the means of media that are took place lastly as well as the suffering of the parents of psychological pressures as result of their hopelessness in their children's return due to not performing the necessary precautions before the crises.

A. The research problem

At the last time, Egypt witnesses a new strange phenomenon within the Egyptian community; this phenomenon is coming out from abroad to add one of the most disturbing and worrying results over the parents beside the results of the security disorder.

This phenomenon is the phenomenon of kidnapping children for gaining money and it becomes one of the crimes that are committed by a new gangs formed from time to time. Thus, the peoples become insecure in terms of themselves, their children, their money and their possessions. So, The research is concerned with the crime of kidnapping children as a problem arouses and worries the parents as result of not performing the necessary precautions and not using the means to follow up their children outside the home.

B. The Objective of the Research:

The research aims at illustrating the advantages of the systems that are used in following u process (GSM-GPRS-GPS) and developing the designing of the systems of following up the children in order to face this phenomenon to fir huge number of children with different contexts, traditions and financial possibilities. These systems shall be unclear and working through conceal and disguise before the kidnapper in order to be difficult for him to realize such system till knowing the location of the kidnapped child.

C. The Significance of the Research:

1) The new method helps in following up the kidnapped child for long time as the used system is connected with the parents via sending messages to their mobile phones when the child changes the defined location as it defines the location more accurately.
2) The new method renders the families feel comfort and hope to find out their children.

3) The following-up systems helps in following up the kidnappers and easing the process of arresting them.

II. PREVIOUSSTUDIESOF**TRACKING DEVICES**

A. ***GSM System :***

GSM (Global System for Mobile Communications, originally Groupe Special Mobile), is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones..

The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for full duplex voice telephon. This was expanded over time to include data communications, first by circuit-switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).Further improvements were made when the 3GPP developed third generation (3G) UMTS standards followed by fourth generation (4G) LTE Advanced standards.

B.GPRS System

General packet radio service (GPRS) is a packet orientedmobile data service on the 2G and 3Gcellular communication system's global system for mobile communications (GSM). GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP). GPRS usage is typically charged based on volume of data transferred, contrasting with circuit switched data, which is usually billed per minute of connection time. Usage above the bundle cap is either charged per megabyte or disallowed.GPRS is a best-effort service, implying variable throughput and latency that depend on the number of other users sharing the service concurrently, as opposed to circuit switching, where a certain quality of service (QoS) is guaranteed during the connection. In 2G systems, GPRS provides data rates of 56–114 kbit/second. 2G cellular technology combined with GPRS is sometimes described as 2.5G, that is, a technology between the second (2G) and third (3G) generations of mobile telephon. It provides moderate-speed data transfer, by using unused time division multiple access (TDMA) channels in, for example, the GSM system. GPRS is integrated into GSM Release 97 and newer releases.

C.GPS System :

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone **.**The use of GPS system was started by the US Defense Department to keep track of their soldiers but later on this device was available for commercial use in the world. This device was greatly used by the transportation and logistics companies who used this technology to track the real and exact position of their vehicle, ships and cargoes. Today the GPS tracking system is used for tracking individuals to know their position or to help them in case of any emergency. GPS equipped individual can seek quick and immediate help whenever required by just pressing alarm button. Besides these the GPS tracking device can easily perform the following tasks:

1). Easily locate a missing child
2) Track the real and exact position of the child
3) Validate and confirm the child's position
4) Allows parents to keep track 24/7 on their children

D.GPS Specifications and ***Working of Tracking Systems***

GPS tracking device for children is based on Global Positioning System technology that functions with the help of satellite systems deployed on the orbits of the earth. Continuous signals are sent by the satellites that are received by the receptor on the earth. Thus, current position of any object or individual can be traced by determining the latitude and longitude. If the GPS device is aware of its position it can help user to determine distances and direction of other locations.

E.GPS Child Locator – Latest Gift of Technology

GPS tracking device for children is an extremely versatile device that has the potential to keep the parents informed about their child where about. This GPS child locator is time and again incorporated with latest technology to make it more and more advanced for the better performances and uses. It is all due to the effort of latest technology that the device has get key ring sized that can be instantly and inexpensively used to keep tabs on kids anytime and anywhere. GPS child locator system has a transmitter that can be attached to wrist or kid's schoolbag or to cell phone or computer. The transmitter with the help of existing GPS network calculates its position and then transmits to the cell phone or computer. The individual's position is usually given as a map coordinate and if the person is using any smart

phone or a computer then the location is presented in a real time on a high resolution map, just like Google maps.
GPS tracking device for children has come as a boon for parents who are extremely concern and stressed about their children when they are outside their protection. With GPS child tracker around parents can have 24/7 track on their kids thereby assuring them complete safety and protection.

E.GPS tracking achild's shoes

Equipping shoes with GPS tracking devices is one way to help parents put their minds at ease. parents' is losing their children, whether in a busy mall or through abduction. Many look for

ways to ensure they can find their children if they get separated. Some other parents want a way to know when their teens arrive safely at their destinations and to ensure that they stay where they say they are going. Smart GPS shoes, which have built-in GPS devices with cellphone and motion-detector capabilities as showing figure No 1. Parents can program the shoe devices to text them if their child travels more than a specified distance from a central location. The devices transmit their locations in real time, so parents can log on to the tracking site from anywhere and use Google Maps to see where the device is. These devices are designed to be tracked nearly anywhere in the world.

Figure No1 .*showing Some GPS tracking devices are small enough to fit in child's shoes*

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F.shoes offer advanced personal location services

incorporate a small and robust GPS tracking device which hooks up with GTXC's internet user portal to offer a very compelling array of personal location services. The portal enables caretakers to easily define safe zones or un-safe zones or geographical boundaries on a Google Earth map and to set up cell phone alerts if a perimeter is breached by the wearer. This should significantly benefit caretakers of children and the elderly, asthey can easily customize their monitoring and text location alerting through a simple "set it and forget it"system. The shoes also employ assisted GPS for enhanced indoor location accuracy, and will transmit for days before a recharge is needed. The intelligent power source enables a guardian to track the whereabouts of a loved one and the performance and status of the device itself from any handheld as shown in figure No 2

.Figure No2 ***.showing the tracking shoe***

The device contains a GPS receiver, cellular phone, motion detector, battery charger, weighs in at just over an ounce and is slightly larger than a match box as well as being waterproof, shockproof and interchangeable as is the external, rechargeable battery.It uses the Global Positioning System (GPS) location reporting platform to determine its location, then it forwards that information with a time stamp over the GSM cellular system to a central data receiving location. The information is processed and made available over the internet. It can be accessed with any internet connected PC, laptop or PDA and location information is displayed as a location on a Google map.

G.The Toddler Tag Child

It is a great Locator for child in a crowd. This unobtrusive device attaches easily to a child's shoe, clothing or book bag with its built-in clip or included Velcro strap. The parent transmitter doubles as a keychain, so it's easy to carry anywhere as shown in figure No 3.The moment of child wanders 30 feet away from transmitter, parents'll receive an instant alert which will make it easier for parents to find her. Additionally, they can push the button on their transmitter to sound a loud alarm on their child's receiver unit .as shown in figure No3

Figure No3 .*showing the toddler tag*

To use the Toddler Tag Child Locator,we must follow the instructions below:
1) Simply attach the Toddler Tag Child Locator receiver to your child's shoe, bag, or belt.
2) Attach the wireless transmitter to your key ring or simply place it in your pocket.
3) Switch on the receiver.
4) You will see a red light illuminate on the device.
5) At this point, the transmitter and receiver establish their own unique radio frequency connection.
6) Push the button on your wireless transmitter once to activate the receiver.
7) You will hear a few faint beeps to indicate that the unit is armed and ready for use

III. METHODOLOGY

A. *Tracking devices design for kids(The proposed design):*

As result of the previous studies about the systems that are working by GPS tracking system, the researcher finds that a new forms can be added in the design of those systems to fit the children in terms of the behavior and wishes as well as to fit the behavior of the kidnapper and his wish to steal the child's possession. Upon this, the researcher is able to design an attractive shoes connected to a belt containing the GPS tracking system that can be installed in all kinds of shoes that can be used by the child when he want to change or replace this shoes with another one as well as to decrease the layouts as well as it can be charged electrically away from the shoes and it can be maintained and its spare parts can be replaced.
The design is shown in figure no. (4)

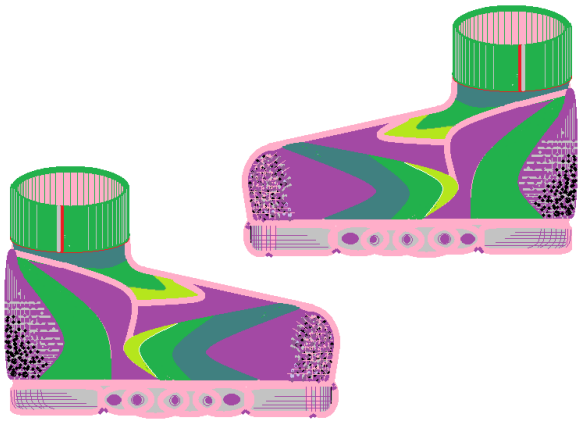

Figure No 4. shows illustration of the proposed design

After The illustration, the researcher used GPS tracking system provided with cell phone can send text message to the parents mobile if the device is out of range and they can, as it is shown in the figure No5 . hear their kids voice,

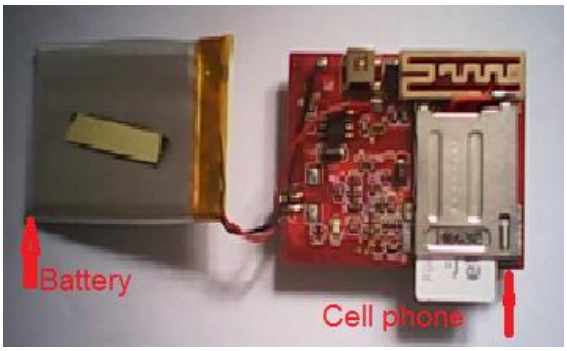

Figure No 5. *shows the tracking system with cell phone*

The researche used this system and made the shoe prototype model and performed the design by the materials and the appropriate dimensions as well as the design is provided with the system in special belt, as it is shown in the figure. No(6) and figure No7 shwing the system inside the belt.

After performing the design and his success in achieving the objective, the researcher decides to recommend to use this type of tracking shoe.

Figure No 6. *shows the prototype of the proposed designed shoe*

Figure No7 *shwing the tracking system inside the belt.*

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.

IV. RESULTS

The researcher conducts a questionnaire of the idea of securing the children by using the GPS tracking systems accompanied the children especially the proposed design, he notes that:

1- The concern with the idea especially as many of them have no experience concerning the systems connected to the child requirements (shoes, wristwatch, school bags…etc).
2- The parents show their feeling of security by approximately 80% when using the following-up systems connected to the tools of the children and their supplies.

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EFFECT OF ELECTRO-MAGNETIC FIELD ON THE GROWTH CHARACTERISTICSOF OKRA (*Abelmoschus Esculentus*), TOMATO (*Solanum Lycopersicum*) and EGGPLANT (*Solanum Melongena*)

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Abstract- The study aimed to determine the effect of electro-magnetic field on the growth characteristics of Okra, Tomato and Eggplants and set to establish baseline data for farmers on the possible utilization of Electro-Magnetic Field (EMF). It was conducted on November 2011 to June 2012 and primed with the use of an inductor that produces EMF, exposing on it the Okra, Eggplants and Tomato. Susceptibility of the plants to insects and pests was also looked into by the study. The experimental and descriptive methods were used. The study found out that Okra plants when exposed to EMF grew faster and have its height, weight, sizes and number of fruits per plant significantly bigger and heavier than the Okra not exposed to EMF. On the other hand, EMF brought negative effect to Tomato. Egg plants, both exposed and not exposed to EMF were found with no significant effects on its growth characteristics. Moreover, Okra, Tomato and Eggplant plants which were exposed to EMF were observed with less number of insects and pests compared to those not exposed to EMF.A follow up study on the positive effect of EMF to the growth characteristics of Okra considering other variables is recommended.

Index Terms-Electricity, electromagnetic field, electric field, inductor

I. INTRODUCTION

Electricity as a highly commercialized prime drivers of technology undoubtedly has served its influence in the creation of paths of development as its physical effects include many recognized phenomena such as light effect, sounds, electromagnetic induction, photo electric effect, heat, refrigeration and air conditioning. It is an energy which is brought about by mechanical induction, chemical reaction and solar inducement. This energy can be converted or can produce another form of energy in order to become more useful and functional.

Any electrical loads or devices when supplied with electricity create electric field. It is present even when the loads are switched off or disconnected from voltage source. Its strength is measured in volt per meter (V/m) and its strength decreases with respect to distance from source. On the other hand electro-magnetic field (EMF) arises due to current flowing along a conductor. Unlike electric field, EMFexistsonly when a load or device isswitched on or connected to the voltage source. Its strength decreases with distance from the source.

Electromagnetic as a physical field produced by a moving electrically charged object can be measuredeverywhere in the environment. The electric current along a coiled-wire or conductor formed into an inductor produces an electromagnetic field (EMF) that may affect the living organisms like plants, animals and human beings around it near to it. It exists when there is a current flowing along a conductor and its strength increases as soon a device like inductor or coiled-wire is switched on and current moves through it. Definitely, the magnetic field becomes stronger when there is greater electricity flow.

According to Somasekaran (2007,) one of the sources of producing electromagnetic field is the high power transmission lines. Electromagnetic fields from high power transmission lines may affect the growth of plants and human beings. However no reports are made essential/available on the effects of EMF from high voltage power transmission lines in crop plants.

Shawanroy (2012) presented that EMF can be viewed as the combination of an electric field and a magnetic field. Electric field is produced by stationary charges, and the magnetic field by moving charges (currents); these two are often described as the sources of the field. Electro-Magnetic Field strength is measured in Ampere per meter (A/m). Commonly, EMF researchers and investigators use a related measure, flux density (in microtesla (μT) or millitesla (mT) instead.

In this study however, the researchers utilized the inductive-resistive (RL) loads formula to determinethe inductance value of the coiled-formed inductors being used in this study as an electro-magnetic field producer.

This concept and application of electro-magnetic field needs to set foot in places like the Rizal province where this way of electricity utilization in plants growth is still unknown. This will set new culture of technology application and utilization so as to establishtrend that may lead to a positive development inrural areas and indigenous places of the province.

League of provinces of the Philippines, (revised 2009) reported thatRizal province is very affable for agricultural development in consideration of its climatic condition, soil fertility, proximity to markets and vast agricultural lands. There are 32,276 hectares devoted to agriculture where 6,019.58 hectares are planted with diversified or high value crops like vegetables, fruits and root crops. Among the High Value Crops that can be potentially produced in the province are vegetables like cucumber, cabbage, lettuce, ampalaya, beans, okra, tomatoes among others. For the fruits are mango, cashew, citruses, rambutan, avocado, santol, atis, jackfruit (nangka), and the likes. Among these, tomatoes, okra and eggplant are one of the major producers in the province which can produce an average of 35,000 metric tons per year supplying almost three fourth of the annual local market demand of the province. All these prove right that Rizal province is rich not just with talents, tourist destination, products and crop but also in agricultural lands which people could still improve.

Today, Rizal-Philippines is stepping up to the challenges that are inspired by the declared policy in Sec 2 of Republic Act 9168 otherwise known and cited as Philippine Plant Variety Protection Act of 2002, which states…

> The State recognizes that science and technology are essential for national development and promotes the adaptation of technology and knowledge from all sources for the national benefit. The State also recognizes the need to protect and secure the exclusive rights of scientists and other gifted citizens to their intellectual property and creations.

The said Republic Act inspired the researchers to conduct the present study and cling to the belief that technology adaptation will definitely assured of national development. In support to this R.A.,Rizal has started to take a leap with its dealings in hydroponics technology, organic farming and other innovative system and processes. And yet, none so far has employed electro-magnetic fields in the growing of plants. Thus, the study becomes imperative. Furthermore, the present study attempted to label, introduce and employ electrical technology application and utilization in the farming process. It is expected that the result of this study may set a new trend among farmers not only in the province but also within the country.

Common household devices under 60 Hz frequency/220 volts source such as electric blanket has approximately 1 to 10 gauss, vacuum cleaners-.001 to .010 gauss, fluorescent lamps-.001 to .01 gauss washers ,blenders dryers-1 to 2 gauss of electro-magnetic strength (Anonymous, 1985).

Men are not aware that magnetism and plant growth are related to each other. Louis Pasteur discovered that magnetism affects plant growth when he was experimenting on the fundamentals of fermentation. He found out that the earth's magnetism affects the growth of plants. This concept can be effectively utilized in agricultural areas. Plant growth can be stimulated by treating the seeds, water, soil and nutrients in the soil. Magnetism is a renewable source of energy that can enhance plant growth (Aarti, n.d.)

Many scientists had made an investigations and came up with hypothesis that if a magnet was placed below the plants, those containing iron lean towards the ground. However, experiments have proved them wrong. In fact, plants with magnets grew taller than those without magnets below them.

The positive effect of magnetism on plant, animal and human life has been studied since the discovery of magnetism in the 16th century. It wasn't until the 19th century, however, that Louis Pasteur observed the positive effect of the earth's magnetic field on plant growth. Today, seed distributors magnetically treat seeds to encourage optimal plant growth (O' Grady, n.d.).

The cited literatures have significant bearing to the present study since it considered application of electro-magnetic field in plant growth through EMF producing device. It study relates with the idea and adherence of Pasteur that electro-magnetic field influences growth performance of plants.

Somasekaran (2007) disclosed in his study the effects of electro-magnetic field to selected crops, detailed the concept that the flow of electricity along a wire / conductor establishing an electromagnetic field (EMF) around it influences the living organisms like plants, animals and human beings by the way of electromagnetic induction.

The present study has relationship with Somasekaran's concept since both studies adhered with the idea that the flow of electricity along a conductor establishes an electromagnetic field. (EMF). This follows the concept that any living things near EMF will be affected by it and so with okra, tomato and eggplants that were used and exposed to electro-magnetic field in the conduct of this study.

II. Setting of the Study

The study was conducted inMorong Rizal, Philippines. The experimental lot was located at the garden field of the "Gusaling Ugnayan" of the College of Industrial Technology-Morong Campus of University of Rizal System. It was once an agricultural land where farmers sow their crops and vegetable plants to earn a living. At present, the site has variety of plants grown inside and alongside of the fence of the campus. The soil is observed to be rich with aluminum ion and has contained organic matters which are needed by plants in order

to grow better. The area is equipped with garden tools, equipment and water system intended for gardening and watering of plants. A 220 Volts AC-3 phase source is located near the area for electrification purposes.

Objectives

Generally, the study aimed to determine the effects of electro-magnetic field to growth characteristics of Okra, Tomato and Eggplants. The study established a baseline data which will serve as future reference for farmers in the planting and growing of these plants. Specifically, the study aimed to:

1. Determine the growth characteristics of Okra, Tomato and Eggplant which were exposed to and not exposed to electro-magnetic field with respect to:
   1.1 plant height;
   1.2 length of fruit;
   1.3 basal diameter of fruit;
   1.4 weight of fruit; and
   1.5 number of fruits per plant
2. Label the significant difference between the plants which were exposed to and not exposed to electro-magnetic field considering the above cited variables.
3. Describe the susceptibility to insects and pests of the plants which were exposed to and not exposed to electro-magnetic field.
4. Prepare detailed technical guidelines on how to develop a coiled-wire EMF producer.
5. Prepare and submit reports of the findings of the study to the provincial government.

III. METHODOLOGY

The experimental and descriptive methods of investigations were usedin this study to determine the effects of electro-magnetic field (EMF) in the growth characteristics of growing plants. Two groups of plants were used and subjected to the study. The first group of plants was exposed to EMF while the second group was not exposed to EMF. Okra, Tomato and Eggplant were utilized in this study. Six plants were sown in a garden plot. These plants were chosen because of their capability to grow in summer season and abilities to withstand changing temperature and weather condition. The researchers followed the farmer's conventional way and standard procedure of planting and growing of plants. Descriptive method of research was thenused to describe the susceptibility to insects of both groups of plants. The two groups of plants were observed and compared as to their susceptibility to insects and pests. The observations processes were done from the time the plants sprout leaves up to the day they are ready for harvest. Data were taken religiously and recorded for analysis and interpretation.

Two garden plots measuring 5 X 1.5 meter each were cleared from weeds, cultivated and treated with hot water to germinate the soil and manually prepared to remove unnecessary objects like stones and dirt. Two 16-feet X 2" X 2" EMF producer-Inductors coiled with magnetic wire were placed in between the two rows of the first group of plant. It was manually adjusted upward to coincide with the height development of the plants and to ensure that they are near to the EMF by 10 centimeters until such time the plants are matured and ready for data gathering. The two Inductors connected in parallel with indicator lamps were supplied with 220 Volts AC power sourceand have a computed total Impedance value of 252 Ohms and .87 Amperes.

Two cages measuring 2.5 meters high x 2 meter wide and 5 meters long were installed to protect the two groups of plants and the Inductors from external influences like animals and humans. Weekly and monthly observations and data gathering on susceptibility to insects and pests were conducted. Data gathering on growth characteristics for Tomato was done on the 80th day after it was planted while data for Okra and Eggplant was observed on the 70th day after they were planted to determine the height of the plants, length of fruit; basal diameter of fruit; weight of fruit and number of fruits per plant.It was during the harvest time that the data was best gathered because the plants are already matured. To observe plants sensitivity and to record insects and pests which were visible with the garden plot, the researchers had regularly visited, maintained, monitored and observed the site where the experimentation has been done.

IV. RESULTS AND DISCUSSION

Growth Characteristics of Okra, Tomato and Eggplant as Exposed to and Not Exposed to Electro-Magnetic Field with Respect to Plant Height, Length of Fruit, Basal

Diameter of Fruit, Weight of Fruit and Number of Fruit Per Plant

Table 1 presents the computed mean on the response of okra, tomato and eggplant as exposed to and not exposed to electro-magnetic field with respect to plant height.

Table 1
Computed Mean on the Response of Okra, Tomato and Eggplant
as Exposed to and Not Exposed to Electro-magnetic Field
with Respect to Plant Height (in cm)

Plant	**Exposed To Electro-magnetic field**		**Not Exposed To Electro-magnetic field**	
	Mean	SD	Mean	SD
Okra	89.08	2.86	80.23	7.98
Tomato	86.1	2.50	104.5	10.7
Eggplant	83.86	0.48	83.51	1.07

Legend: SD – Standard Deviation

It could be gleaned from the table that with regards to plant height, plants that were exposed to electro-magnetic field, okra had a mean of 89.08 and a standard deviation of 2.86; tomato acquired a mean of 86.1 and standard deviation of 2.50; eggplant obtained a mean of 83.86 and standard deviation of 0.48.

Moreover, plants not exposed to electro-magnetic field, height of okra acquired a mean of 80.23 and a standard deviation of 7.98; tomato obtained a mean of 104.5 and a standard deviation of 10.7; eggplant got a mean of 83.51 and a standard deviation of 1.07.

The results showed that at early vegetative growth stage, okra plants exposed to electro-magnetic field are significantly taller than the ones not exposed to electro-magnetic field.

A different effect happened between the tomato which were exposed to and not exposed to electro-magnetic field when the tomato in the first garden plot came to be shorter than those tomatoes in garden plot 2.

The table further shows that there was almost a similar plant height between the eggplant exposed and not exposed to electro-magnetic field. Thus, implying that electromagnetic field has no effect to eggplants with respect to plant height.

Table 2 presents the computed mean on the response of okra, tomato and eggplant as exposed to and not exposed to electro-magnetic field with respect to length of fruit.

Table 2
Computed Mean on the Response of Okra, Tomato and Eggplant
as Exposed to and Not Exposed to Electro-magnetic Field
with Respect to Length of Fruit (in cm)

Plant	**Exposed To Electro-magnetic field**		**Not Exposed To Electro-magnetic field**	
	Mean	SD	Mean	SD
Okra	15.67	0.28	12.7	0.87
Tomato	4.18	0.20	5.11	0.09
Eggplant	18.4	0.54	18.4	0.45

As revealed on the table, the length of fruits of the plants that were exposed to electro-magnetic field, okra garnered a mean of 15.67 and standard deviation of 0.28; tomato acquired a mean of 4.18 and standard deviation of 0.20; eggplant obtained a mean of 18.4 and standard deviation of 0.54.

Furthermore, the length of the plants that were not exposed to electro-magnetic field shows that okra acquired a mean of 12.7 and a standard deviation of 0.87; tomato obtained a mean of 5.11 and a standard deviationof 0.09; eggplant got a mean of 18.4 and a standard deviation of 0.45.

The result shows that the fruit length of okra exposed to electro-magnetic field is significantly longer than those which were not exposed to electro-magnetic field.

On the other hand, tomatoes exposed to electro-magnetic field have fruit length that are shorter than the fruit lengths of those which were not exposed to electro-magnetic field.

Just like in plant height, electro-magnetic field seemed not to influence length of fruits of plants exposed and not exposed to electro-magnetic field.

Table 3 shows the computed mean on the response of okra, tomato and eggplant as exposed to and not exposed to electro-magnetic field with respect to basal diameter of fruit.

Table 3
Computed Mean on the Response of Okra, Tomato and Eggplant
as Exposed to and Not Exposed to Electro-magnetic Field
with Respect to Basal Diameter of Fruit (in cm)

Plant	**Exposed To Electro-magnetic field**		**Not Exposed To Electro-magnetic field**	
	Mean	SD	Mean	SD
Okra	2.108	0.09	1.83	0.12
Tomato	2.4	0.25	2.96	0.14
Eggplant	2.78	0.15	2.77	0.11

As reflected from the table, the basal diameter of plants exposed to electromagnetic field, okra in particular, garnered a mean of 2.108 and standard deviation of 0.09; tomato acquired a mean of 2.4 and standard deviation of 0.25; eggplant obtained a mean of 2.78 and standard deviation of 0.15.

In addition, the basal diameter of okra which was not exposed to electro-magnetic field acquired a mean of 1.83 and a standard deviation of 0.12; tomato which was not not also exposed to EMF obtained a mean of 2.96 and a standard deviation of 0.14 while eggplant unexposed to EMF got a mean of 2.77 and a standard deviation of 0.11.

The result shows that the basal diameter of the okra exposed to EMF is bigger in diameter compared to those that were not exposed to EMF.

Further, tomatoes which were not exposed to EMF have bigger basal diameter than those with exposure to EMF.The eggplants, both exposed and not exposed to EMF have almost same basal diameter.

Table 4 presents the computed mean on the response of okra, tomato and eggplant as exposed to and not exposed to electro-magnetic field with respect to weight of fruit.

Table 4
Computed Mean on the Response of Okra, Tomato and Eggplant
as Exposed to and Not Exposed to Electro-magnetic Field
with Respect to Weight of Fruit (in grams)

Plant	**Exposed To Electro-magnetic field**		**Not Exposed To Electro-magnetic field**	
	Mean	SD	Mean	SD
Okra	24.17	1.47	13.67	2.42
Tomato	34.5	3.67	50.17	1.47
Eggplant	59.83	1.94	60	1.41

As revealed on the table, with regards to weight of fruits of plants exposed to electromagnetic field, the fruit of okra garnered a mean of 24.17 and standard deviation of 1.47; tomato acquired a mean of 34.5 and standard deviation of 3.67; eggplant obtained a mean of 59.83 and standard deviation of 1.94.

Furthermore, in view of the weight of fruit of plants, okra which were not exposed to electro-magnetic field acquired a mean of 13.67 and a standard deviation of 2.42; tomato obtained a mean of 50.17 and a standard deviation of 1.47; eggplant got a mean of 60 and a standard deviation of 1.41.
As revealed by the result, the weight of fruit of okra plants is significantly heavierthan those which were not exposed to EMF.
On the other hand, the fruits of tomatoes and eggplants which were not exposed toEMF are quite heavier compared to the weight of those which were exposed to EMF.

Table 5 presents the computed mean on the response of okra, tomato and eggplant as exposed to and not exposed to electro-magnetic field with respect to number of fruit per plant.

As can be reflected from the table, plants exposed to EMF specifically okra andeggplants earned a mean of 4 and 4.5 respectively and a standard deviation of 0.89 and 0.84 accordingly. Tomato on the other hand, got a mean of 2.167 and a standard deviation of 0.75.

Table 5
Computed Mean on the Response of Okra, Tomato and Eggplant
as Exposed to and Not Exposed to Electro-magnetic Field
with Respect to Number of Fruit per Plant

Plant	**Exposed To Electro-magnetic field**		**Not Exposed To Electro-magnetic field**	
	Mean	SD	Mean	SD
Okra	4	0.89	2.167	0.75
Tomato	2.167	0.75	3.83	1.47
Eggplant	4.5	0.84	4.167	0.75

An analysis of this result shows that okra exposed to EMF among other plants hasbetter number of fruits while tomato not exposed to EMF has good number of fruitscompared to tomatoes with exposure to EMF.

Significant Difference Between the Plants Exposed to and the Plants Not Exposed to Electro-magnetic Field with Respect to the Different Aspect

Table 6 shows the computed t–test on the significant difference between the plants exposed to and not exposed to electro-magnetic field with respect to plant height.

It could be gleaned from the table that in terms of plant height, okra and tomato obtained p-values of 0.043 and 0.009 respectively which did not exceed at 0.05 level of significance, Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of plant height are rejected for okra and tomato. Therefore, the presence of EMF brought positive effect to okra while negative effect on tomatoes with respect to its height.

Table 6
Computed T–test on the Significant Difference Between the Plants
Exposed To and Not Exposed To Electro-magnetic Field
with Respect to Plant height

Plant		**Mean**	**sd**	**df**	**t-value**	**p-value**	**Ho**	**VI**
Okra	Exposed	89.08	2.86	6	2.55	0.043	R	S
	not exposed	80.23	7.98					
Tomato	Exposed	86.1	2.5	5	4.09	0.009	R	S

	not exposed	104.5	10.7					
Eggplant	Exposed	83.867	0.482	6	0.75	0.483	FR	NS
	not exposed	83.51	1.07					

On the other hand, eggplant obtained a p-value of 0.483 which exceeded the 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field with respect to plant height failed to reject. Therefore, the existence of EMF does not affect the length characteristics of the eggplant.

Table 7 presents the computed t–test on the significant difference between the plants exposed to and not exposed to electro-magnetic field with respect to length of fruit.

As reflected from the table, the length of fruits for okra and tomato obtained p-values of both 0.000 which did not exceed at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field with respect to length of fruits are both rejected for okra and tomato. Therefore, the EMF has positive contribution to okra with respect to latter's length of fruit. On the other hand, EMF has brought negative contribution to tomato with respect to length of fruit.

Table 7
Computed T–test on the Significant Difference Between the Plants
Exposed To and Not Exposed To Electro-magnetic Field
with Respect to Length of Fruit

Plant		**Mean**	**Sd**	**df**	**t-value**	**p-value**	**Ho**	**VI**
Okra	Exposed	15.675	0.281	6	7.96	0.000	R	S
	not exposed	12.7	0.872					
Tomato	Exposed	4.183	0.199	7	10.29	0.000	R	S
	not exposed	5.1167	0.0983					
Eggplant	Exposed	18.4	0.535	9	0.00	1.000	FR	NS
	not exposed	18.4	0.447					

On the other hand, in terms of length of fruits, eggplant obtained a p-value of 1.000 which exceeds at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field with respect to length of fruits failed to reject for eggplants. This closely implies that the use of an inductor/ coil producing EMF in growing eggplants is not advisable.

Table 8 presents the computed t–test on the significant difference between the plants exposed to and not exposed to electro-magnetic field with respect to basal diameter of fruits.

The table shows that with respect to basal diameter of okra and tomato obtained p-values of 0.001 and 0.002 respectively, both of which did not exceed at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of basal diameter is rejected for both okra and tomato. Indeed, the use of EMF to okra is advisable since the study found out its significant contribution in the increase of the basal size of the fruits. This implies that, EMF should not be used with tomatoes as it does not help increase the basal size of the fruit.

On the other hand, with respect to basal diameter, the eggplants obtained a p-value of 0.915 which exceeds at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of basal diameter failed to reject

for eggplant. Therefore, EMF should not be utilized in growing eggplants since it has no effect at all to the basal size of the eggplant.

Table 8
Computed T–test on the Significant Difference Between the Plants
Exposed To and Not Exposed To Electro-magnetic Field
with Respect to Basal Diameter of Fruits

Plant		mean	Sd	df	t-value	p-value	Ho	VI
Okra	Exposed	2.108	0.0861	9	4.64	0.001	R	S
	not exposed	1.833	0.117					
tomato	Exposed	2.4	0.247	7	4.89	0.002	R	S
	not exposed	2.967	0.14					
Eggplant	Exposed	2.783	0.151	9	0.11	0.915	FR	NS
	not exposed	2.775	0.108					

Table 9presents the computed t–test on the significant difference between the plants exposed to and not exposed to electro-magnetic field with respect to weight of fruits.

Table 9
Computed T–test on the Significant Difference Between the Plants
Exposed To and Not Exposed To Electro-magnetic Field
with Respect to Weight of Fruits

Plant		mean	Sd	Df	t-value	p-value	Ho	VI
Okra	exposed	24.17	1.47	8	9.07	0.000	R	S
	not exposed	13.67	2.42					
Tomato	exposed	34.5	3.67	6	9.07	0.000	R	S
	not exposed	50.17	1.47					
Eggplant	exposed	59.83	1.94	9	0.17	0.869	FR	NS
	not exposed	60	1.41					

The table shows that with respect to weight of fresh single fruit, the fruits of okra and tomato obtained p-values of 0.000 which did not exceed at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of weight of fresh single fruit is rejected for both okra and tomato. As observed and tried, Okra exposed to EMF has produced fruits with better weight. It implies that the use of EMF in growing okra should be continually observed.

On the other hand, in terms of weight of fruit, eggplant obtained a p-value of 0.869 which exceeds at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of weight of fresh single fruit failed to reject.

Since the use of EMF in growing eggplant did not show any significant change or effect in the physical growth characteristics of eggplants, there is no need to expose eggplants with EMF.

Table 10 presents the computed t–test on the significant difference between the plants exposed to and not exposed to electro-magnetic field with respect to number of fruits per plant.

The table shows that with respect to number of fruits per plant, okra and tomato plants obtained p-values of 0.004 and 0.043 respectively which did not exceed at 0.05level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of number of fruits per plant is rejected for both okra and tomato. It can be said therefore that the number of fruits for okra increases when it is exposed to EMF. On the other hand, the number of fruits of tomato decreases when exposed to EMF. This then implies that EMF be used in growing Okra.

On the other hand, eggplant obtained a p-value of 0.487 which exceeds at 0.05 level of significance. Thus, the null hypothesis that there is no significant difference between the plants exposed and the plants not exposed to electro-magnetic field in terms of the number of fruits per plant failed to reject for eggplant. Therefore, eggplant should not be exposed to EMF because it has not significant effect to its growth characteristics most particularly in terms of number of fruits.

Table 10
Computed T–test on the Significant Difference Between the Plants
Exposed To and Not Exposed To Electro-magnetic Field
with Respect to Number of Fruits Per Plant

Plant		mean	Sd	df	t-value	p-value	Ho	VI
Okra	exposed	4	0.894	9	3.84	0.004	R	S
	not exposed	2.167	0.753					
Tomato	exposed	2.167	0.753	7	2.47	0.043	R	S
	not exposed	3.83	1.47					
Eggplant	exposed	4.5	0.837	9	0.73	0.487	FR	NS
	not exposed	4.167	0.753					

Susceptibility of Plants to Insects and Pests

After more than three months of monitoring the plants, both exposed to and not exposed to electro-magnetic field, the researchers found a very minimal infiltration of insects and pests among the plants exposed to Electro-magnetic field while manifestation of the presence and existence of worms, leaf hoppers, whitefly and flea beetle were seen in the leaves and fruits of plants that were not exposed to electro-magnetic field. This proves that Electro-magnetic field thwarts insects and other pests dwelling species to come into contact with the plants being exposed to it.

V. CONCLUSIONS

1. Okra plants when exposed to electro-magnetic field (EMF) grow faster and have its height, length, basal diameter, weight and number of fruits per plant, significantly bigger and heavier and have more number of fruits than the plants not exposed to EMF
2. The EMF has positive effect to Okra plant, thus, EMF can be used in growing of Okra.
3. The EMFhas negative effect to Tomato plants on aspects relating to plantheight, length, basal diameter, weight and number of fruits per plant, hence it is not advisable for use in growing of tomato.
4. The study revealed that eggplants exposed not exposed to EMFhaveno significant differences on theirheight, length, basal diameter, weight and number of fruits.
5. The study proved that Okra, Tomato and Eggplant plants when exposed to EMF are less susceptible to insects and pests. Thus, occurrence of pest and insects lessen in plants that are exposed to EMF.

VI. RECOMMENDATIONS

Based on the findings of the study, the following recommendations are hereby stated.

1. The result of the study showed thatEMF has positive effect in the growth characteristic of Okra with respect to its height, length of fruit, basal diameter, weight of fruit and number of fruits per plant.The strength of electro-magnetic field being produced by the electric charge on the coil and the strength of the electric field are the two factors that affect the growth characteristics of Okra, hence, EMF is recommended for use by farmers in growing of Okra.
2. A wider land area shall be applied with electro-magnetic field to have a more reliable specific data on its effectsto Okra in terms of its growth.
3. EMF should not be used in growing Tomato and Eggplant since the present study proves its negative effect on their growth.
4. A parallel study shall be conducted which will involve other plants such as leafy vegetables, Root crops and Vine Crops.
5. Further study shall be conducted to establishmore specific data on the growth response and performance of Okra to electro-magnetic field.This may involve other variables like sizes of stem, sizes of leaves, root elongation, fruit taste and nutrients and plants sensitivity.
6. A variable Inductor shall be utilized instead of a fixed variable to determine how Okra, Tomato and Eggplant respond when applied with different amount of EMF
7. The EMF has good effect to growing Okra since there are no insects and pests thatoccurred in the plants during the process. This implies that Okra if expose to EMF will grow better, hence, using EMF to growing of Okra is recommended. On the other hand, EMF should not be used in growing of tomato and eggplants since the study proved its negative effects to the growth of the tomato and eggplant.
8. A manual or moduleshall be prepared to guide farmers on how to prepare Inductor-EMF generator. This manual shall include the findings of this study for better understanding of the effects of EMF to Okra, Tomato and Eggplant.

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A Survey on Security of Data outsourcing in Cloud

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Abstract- Cloud computing enables on-demand access to shared resources. It lets to use files and applications over the internet. This technology uses both the internet and the central servers to maintain data and resources. Many organizations uses cloud computing services to outsource their data into cloud environment for location independent resource pooling, elasticity and usage-based pricing. Since more enterprises store their private data on the cloud storage, privacy and security become major concern. One of the most challenging problem in Cloud computing is about the security of the outsourced data which is mainly handled by untrusted parties. This paper surveyed different types of techniques used to enhance the security of data stored in cloud environment and compare those techniques.

Index Terms- Cloud computing, Data outsourcing, Data access control, Privacy, Security.

I. INTRODUCTION

Cloud computing relies on sharing computing resources rather than having local servers to handle applications for a particular organization or individuals. Since there is no infrastructure investment needs, the expand or shrink resources based on demand, payment based on usage makes it popular among various technologies. Many enterprises look for these benefits to be utilized to maximum extend. Cloud service makes it possible to access information from anywhere at any time. Cloud computing uses networks of large groups of servers typically low-rate consumer PC technology, spread data processing with specialized connections.

The virtualization techniques maximize the power of cloud computing. Using this concept, cloud computing can also supports heterogeneous resources and flexibility is achieved. The flexibility of cloud computing is a function of allocation of resources on demand. Cloud computing also allows immediate scaling. Cloud computing is a comprehensive solution that delivers IT as a service. It is an internet based solution for computing resources. Data stored in cloud storage is considered as data outsourcing. This data is managed by cloud service providers which is an external party. Cloud services provide a cost effective management of resources, more and more enterprises utilizes this benefit. Since cloud storage is managed by external parties, they cannot be trusted fully. Here security and privacy becomes a major concern.

The cloud security involves restricting access to authorized users, maintaining the integrity of data and ensuring the availability of data and services. Mainly the security includes confidentiality, integrity and availability. By moving storage, applications, other IT infrastructure and services to the cloud, results in increased reliability and flexibility, with low costs but the information security is a major problem. For the security of outsourced data generally the data is stored in encrypted form so that only authorized users can access data.

The objective of this paper is to focus mainly on various cryptographic key management for security. The remaining portion of the paper is organized like this. Section II presents the key concepts of this paper. Section III presents existing workflow scheduling algorithms and section IV concludes the paper with summary.

II. KEY CONCEPTS

The main concepts dealing in this paper are cloud computing and cryptographic key management for security. Cloud computing is a technology that delivers on demand access to shared resources over the internet. With the storage of data in cloud a customer can reduce their burden to maintain the infrastructure for housing the data. But this cannot ensure the security of data in the cloud environment. The data stored in a cloud should be secure enough so that more enterprise can rely on this technology. Confidentiality and privacy are the most important factors related to security. Any organization can depend on cloud service providers in order to keep their data, thereby reduce the cost. If a cloud provider can provide maximum security to the data of their customers, they can catch the attention of more people. Even the customer should also have some control over the security of their data stored in the cloud environment. The major issue concerned with the data stored in the cloud is the security of the data. If the outsourced data in the cloud environment is managed by multiple outsources having different access rights then the security of the data stored in cloud storage become more challenging.

A. Cloud computing

A cloud makes it possible to access information from anywhere in the world at any time provided internet connection should be available. It is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and represented as one or more unified computing resources based on service level agreements established through negotiation between the service providers and consumers. There are different types of cloud depending on needs. This includes private cloud, public cloud, community cloud and hybrid cloud. Public cloud can be accessed using internet connection by any subscriber. Google and Microsoft provide public cloud. A private cloud is build for specific group or oraganisation with access limited to that group. Community cloud is shared among organization with similar cloud requirements. Hybrid cloud is a combination of atleast any of two cloud type.

According to the type of services provided cloud computing is classified into three: Software as a Service (SaaS); Platform as a Service (PaaS); and Infrastructure as a Service (IaaS). These are the service models. IaaS Clouds, example Amazon, provide virtualized hardware and storage where the users can deploy their own applications and services. PaaS Clouds, like Microsoft Azure, provides an application development environment for

users which help them to implement and run applications on the Cloud. According SaaS cloud there are two types of Cloud, which delivers software applications to the users. The first group offers the entire application as a service to the end users, which is used without any changes or customization. Examples of these types of clouds are Google office automation service, like Google Document or Google Calendar. The second group provides on-demand web services to the users, which can be used to build more complex applications.

B. Security in cloud

The information stored in the cloud owns by some other person or organization other than the cloud owner. The data stored in the cloud may be valuable, so it should be secure enough so that no one could have access to these data other than the authorized person. The data stored in a cloud environment is handled by external parties so it can be called as outsourced data. The data are stored in such a way so as to make it independent of geographic location, to reduce the cost to maintain the requirements for storage like hardware and software. The main advantage over the cloud is the usage based pricing and the ready availability of the resources without even care about its maintenance. But since everything have its own pros and cons, cloud too have some cons. The main difficulty is with the security and privacy of the data stored on the cloud environment. The data in a cloud are handled by untrusted parties which may result in insecurity of data. In order to solve this problem one have to take measures to make the data secure. There exist many security measures for the data stored on cloud.

III. EXISTING SECURITY MEASURE FOR DATA STORAGE IN CLOUD

The following are some of the techniques that are currently present in clouds and are summarized

1. A robust single server solution for remote querying of encrypted database on untrusted servers is presented by Damini E [1, 2]. It uses indexing approach. Here indexing information will be attached with encrypted database, which is used by server to select data to be returned in response to a query without revealing the contents in database. The indexes balance the trade-off between query execution efficiency requirements and protection requirements due to inference attack exploiting indexing information. It also investigates quantitative measures to model inference exposure.
2. Atallah MJ [4, 5] proposed a solution to the key management hierarchies by the following properties: space complexity of public information is same as storing the hierarchy; the private information in a class have single key associated with that class; updates are handled locally in hierarchy; the scheme is strong against collusion; each node derive key of descendant. In addition provided a technique for reducing distance between nodes for faster key derivation.
3. Two layer of encryption imposed on data is another approach to protect the data. The owner imposes the inner layer for initial protection. The server imposes the outer layer for policy modifications. This two layer protection provides efficient and robust solution. Thus an approach for policy evolution takes into account the main feature and guarantee confidentiality of information in the presence of significant policy updates, identifies the exposure to collusion when risk arise. Di Vimercati [6, 7] presented this technique for the data security.
4. Wallner [8] proposed another approach which focuses on two main areas of concern with respect to key management: initializing multicast group with common net key and rekeying the multicast group. The important feature regarding multicast key management is to identify a technique. This technique allows for secure compromise recovery, and it is robust against collusion of excluded users. This technique maximizes the number of transmissions required to rekey the multicast group and imposes minimal storage requirements on the multicast group.
5. A novel solution to scalability problem of group/multicast key management is proposed by Wong [9]. Here secure group is formalized as a triple (U, K, R) where U indicates a set of users, K denotes set of keys held by the users, and R is the user-key relation. Then introduce key graphs to specify secure groups. A special class of key graphs, present three strategies for securely distributing rekeys messages after a join/leave, and specifies protocols for joining and leaving as a secure group. These are implemented in a prototype group key server built and it presents measurement results from experiments, thereby shows group key management.

IV. EXISTING APPROACHES COMPARISON

Approach	Merits	DeMerits
Dynamic and efficient key management for access hierarchies.	Updates are handled locally A single key associated with a node.	With parent node key, child would be known.
Balancing confidentiality and efficiency in untrusted relational DBMSS.	Indexing for easy access.	Extra space required for index table.
Efficient key management for enforcing access control in	Key derivation graph. Minimizes the total number of	Maintain graph Problem.

keys.

outsourced scenarios.		
A data outsourcing architecture combining cryptography and access control.	Combination of access control and cryptography	Over encryption
Preserving confidentiality of security policies in data outsourcing.	Privacy of the tokens published in the public catalogue.	Encryption layer to the catalog required.
Secure integration of asymmetric and symmetric encryption schemes.	Uses both asymmetric and symmetric properties.	Complex calculation involved
Simple and fault-tolerant key agreement for dynamic collaborative groups.	A novel approach to group key agreement	With parent node key, child would be known.
Scalable hierarchical access control in secure group communications.	Reduces the communication, computation and storage. Overhead associated with key management	With parent node key, child would be known.
Secure and efficient access to outsourced data.	Fine grained access control to outsourced data. Flexible and efficient key management.	Unauthorized users can access to child node once parent node is known.
Secure group communications sing key graphs.	Key graphs to specify secure groups.	Storage overhead.
Reliable group rekeying: a performance analysis.	Improved scalability.	With parent node key, child would be known.

V. CONCLUSION

Security of data in cloud is one of the major issue in cloud computing environment. This paper surveyed the various existing security measures in cloud computing and compare their various security parameters. To provide security of data in cloud is one of the major issue, which hold back the clients to store their data in cloud environment. Even though the security problems cannot be solved completely, better and powerful security measures can be applied to provide maximum security which can gain the trust of clients to store and access their data from the cloud storage.

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PROTECTION OF WEB APPLICATION AGAINST SQL INJECTION ATTACK

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Abstract - Web applications are used by many users. web applications are consist of web forms, web server and backend. These applications are vulnerable due to attacks and scripts as the number of web application users are increasing. Web application can have sensitive and confidential data which is stored in database. web applications accepts the data from the users. This data is retrieved from the database through the queries. SQL Injection attack is one of the most popular attack used in system hacking or cracking. Using SQL INJECTION ATTACK attacker can gain information or have unauthorized access to the system. When attacker gains control over web application maximum damage is caused. This paper illustrates SQLIA methods and prevention and detection tools.

Index Terms- SQLIA, Attacker, SQL injection attach

I. INTRODUCTION

Web application can have sensitive and confidential data which is stored in database.web applications accepts the data from the users. This data is retrieved from the database through the queries.SQL Injection attack is one of the most popular attack used in system hacking or cracking. Web applications can be harmed by SQL INJECTION ATTACK Using SQL INJECTION ATTACK attacker can gain information or have unauthorized access to the system. When attacker gains control over web application maximum damage is caused.

To insert, retrieve, update, & delete the data from database SQL language is used. When we enter data in the input fields it becomes part of the SQL query written at the backend. For example, to login in our inbox, we provide loginid and password. The loginid and password form the part of the internal SQL query. Then the SQL query is executed on the database to check whether the login credentials provided match with those present in the tables on the database. The attacker, who wants to gain access to the inbox, provides injected code instead of correct input in the input fields of the web application. This injected code changes the structure of the original SQL query and consequently, allows the attacker to gain access to the information it was not authorized for. This type of attack which allows the attacker to alter the original SQL query by adding the injected SQL code in the input field is known as SQL Injection Attack (SQLIA).[1].

In SQLIA, Attacker attempts to change SQL query by inserting new SQL keywords. The attacker modifies the original SQL query by inserting new SQL query through user input field. Injected query formed syntactically correct when concatenated with sql command. The data within the database will be altered, extracted or even dropped.

II. CATEGORIES OF SQL INJECTION ATTACK

The injection attacks are divided into three categories. [6].

First order attack- By entering malicious string in input field of web application original SQL query is modified and modified code is executed immediately.

*Unions added to an existing statement to execute a second statement.
*Subquery added to an existing statement.
*Existing SQL short-circuited to bring back all data(for example, adding a query condition such as OR 1=1)

The second order attack- The trusted source such as persistent storage is injected by an attacker as another activity is executed by an attack. The malicious database object is created by attacker such as function called as part of an API or spitefully named table to introduce dangerous constructs by using double quotation marks.

Lateral Injection-The implicit functions can be manipulated by attacker by changing environmental variables. The PL/SQL procedure that does not take user input can be exploited by an attacker. The risk of injection arises when variable whose data type is date or number is concatenated into text of SQL statement. Using NLS_Date_format or NLS_Numeric_characters, the implicit function TO_CHAR can be manipulated.

III. SQL INJECTION PROCESS

The attacker can gain access to web applications using several methods. Through the web application's input fields or hidden parameters the attackers adds SQL statement to access to resources is known as SQL Injection Attack (SQLIA). Due to the lack of input validation in web applications hackers can be successful. Injecting web applications means having illegal access to data stored in database

A.NORMAL PROCESS IN WEB APPLICATION

In normal user input process in web application, user sends request by providing user inputs to the application server. The application server creates the SQL query statement. This SQL statement is submitted to the backend database. The result is fetched from the database and given back to the user.Fig.1 shows the normal User input process in web application. [9]

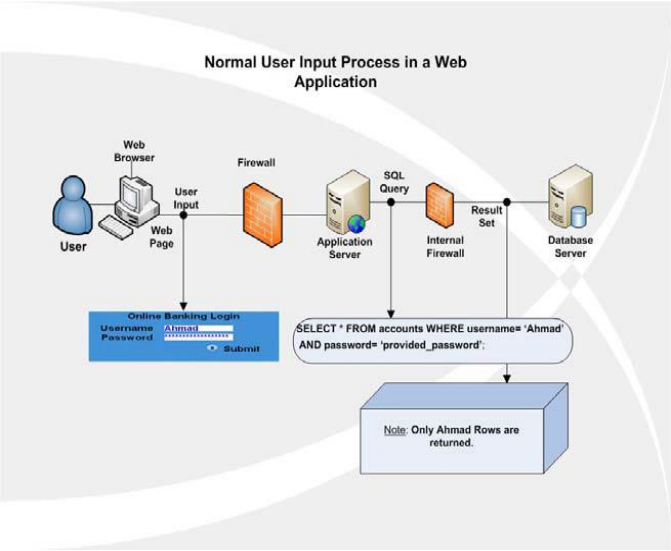

Fig.1 Normal User Input Process in Web Application

B. Malicious Input Process in web Application

In SQLIA, attacker enters malicious input in the input field for example in fig. a attacker enters username as Ahmad OR 1=1- and password as not needed. Because of this malicious input SQL query is altered which is always evaluated to be true. The result of such query will return all the rows of the table.Fig.2 shows malicious input process in web application. [9].

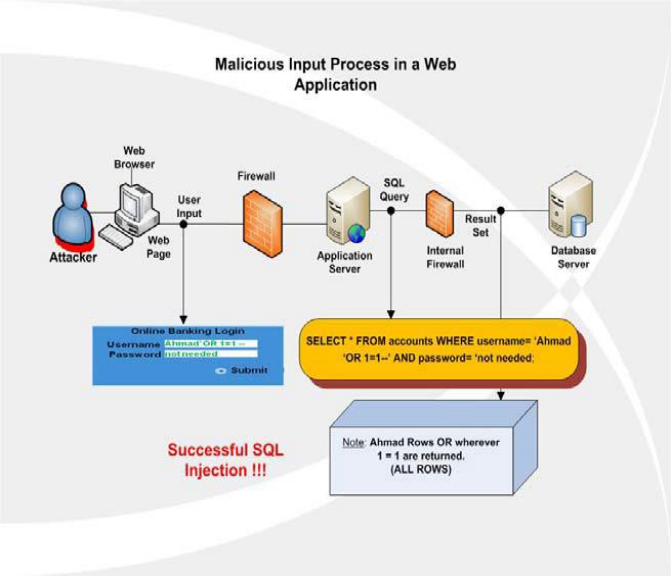

Fig.2 Malicious Input Process in Web Application

IV. SQL INJECTION ATTACK METHODS

Web applications can be attacked by multiple methods. Following are some methods to attack the web applications. ([1],[4],[9]).

1. Tautology based SQL Injection-

Tautology statement is attached to the conditional statement (i.e.1=1') so that it evaluates to true always. Here where clause is vulnerable in SQL query.

Example:

Original query: Select salary from employee where empid='abc' and pwd='xxxxx'

Injected query: Select salary from employee where empid='' or 1=1--' and pwd='not required'
Result: It returns salary of all employees from employee table.

2. Statement Injection-

Original query is altered by injecting new SQL query to the original SQL query.
Example:

Original query: Select salary from employee where empid='abc123' and pwd='xxxxx'

Injected query: Select salary from employee where empid='; Delete from employee where empid='abc123'--'and pwd='not required'

Result: Record of employee "abc" is deleted.

3. Stored Procedures-

It is group of SQL statements compiled into single execution plan.

Example - Consider the stored procedure below:

```
CREATE PROCEDURE new_dept(new IN varchar2, old IN varchar2)
IS line varchar2(8000);
BEGIN
        line:='begin
                update department set dept='" || new || "'
          where dept= '"|| old || "';' || 'END;';
          DBMS_OUTPUT.PUT_LINE ('line: ' || line);
           EXECUTE IMMEDIATE line; END;
```

This procedure has two input fields, old department name and new department name and replaces old name with the new one. The attacker injects the code [„ "; SHUTDOWN;--] in either of the two fields. This injection generates the following query: Update department Set dept ="abc"; SHUTDOWN; -- where dept="aaa" At this stage, the attack behaves like the statement injection attack where the injected query is made to execute with the original query using query delimiter,,; .[1].

4. Illogical/Incorrect queries-

In order to gather information about the internal database structure of application, the attacker deliberately inputs incorrect information in the input fields. The attacker gains the information through the displayed error.

Example:

Original URL: www.samsung.com/proucts?id=23

Injected Query: www.samsung.com/product?id=23'

Result: Error message showed:
SELECT product_name FROM Products WHERE id =23¥'. From the message error we can find out name of table
and fields: Products;producr_name. By the gained information attacker can organize more strict attacks.

5. Union query-
The injected query is joined with the injected query by using SQL keyword, UNION, to gather the information from the tables.

Example:

Original Query: select salary from employees where empid='abc123'

Injected Query: select salary from employees where empid='abc123' UNION select * from employee'

Result: It gives records of all employees from employee.

6. Alternate Encoding:
To inject the code, the attacker inserts alternate encoding like ASCII, Unicode, EBCDIC and Hexadecimal to bypass the validation on input.

Example:

Original Query: select * from employee where empid ='abc123' and pwd='xxx'

Injected Query: select * from employee where empid ='; exec (char (0x73687574646f776e))--' and pwd='not required'.

Result: The hexadecimal value for the SHUTDOWN is passed To the char () function. This code will execute the SHUTDOWN command and bypass the input validation.

7. Inference: It is the attack in which data is analyzed in order to illegitimately gain knowledge about database. When a user is able to infer from unimportant information more vigorous information about a database without directly accessing it an inference attack occurs. There are two major types of Inference
attack: Blind Injection and Timing Attack.

Blind Injection: This attack asks question which will give answer as true or false based on the applications response. This attack is often used when the web application is configured to show generic error messages, but has not mitigated the code that is vulnerable to SQL injection.

Example-When we search for some product in a website, we see something like the following in URL:

Original Query:www.samsung.com/products?id=23

Injected Query: www.samsung.com?id=23 or '1'='0'

This is translated into following SQL query:

Select * from TABLE where id='23' or '1'='0'

Result: This query will return always false which will return error message that infers the information about the tables like table name.

Timing Attacks: The attacker sets the time delay in SQL query through the conditions. If the condition is true, the delay takes place.During this delay attacker gains access to the information.

Example-

Original Query: select*from employee where empid='abc123' and pwd='xxx'

Injected Query: select*from employee where empid='abc123' and ascii (substring (pwd, 1, 1))>z waitfor delay '0:0:5'--'and pwd='not required''

Result: The query will generate delay for 5 seconds if the ascii value of the first character of pwd is greater than the value z.

V. SQL INJECTION DETECTION & PREVENTION TOOLS

To reduce the effect of SQLIA, more research has been done. Many detection and prevention methods have been proposed. Following are some tools invented to detect and prevent the SQL injection attack.

1. JDBC-Checker: It is developed to prevent attacks that take advantage of type mismatch in dynamically generated query string. [1].

2. ADMIRE: It is threat risk model which provides a thorough and step by step technique to identify and moderate the effect of SQL Injection. [1].

3. SQL-PROB: In this tool, SQL proxy based blocker which fetches the user input from SQL query of the application and checks it against syntactic structure of query. It uses proxy that seamlessly integrates with existing operational environments offering protection to front end web server and backend databases. [14].

4. WAVES: It is black box technique for testing web application for SQL injection vulnerabilities The tool identify all points a web application that can be used to inject SQLIA .It builds attacks that target these points and monitors the application how response to attacks by utilizes machine learning. [15].

5. SQLRand: It is a system for preventing SQLIA against web server. The main intension is of using randomized SQL query language to detect and abort the queries that contains injected query.SQL standard keywords are manipulated by appending the random number that attacker cannot easily guess, to them. In this system one proxy server sits between client web server and SQL server. The de-randomized request is received from client and conveys query to the server. If an SQLIA has occurred, the proxy's parser will fail to recognize the randomized query and reject it. [16].

6. POSITIVE TAINTING: It is identification and marking of trusted data. It tracks the trust marked string and performs syntax aware evaluation i.e. nothing but SQL parsing of query string to differentiate literal and non-literal parts. The string which contains characters without trust marking will not allow to pass database. [17].

7. AMNESIA: It uses combination of static analysis & dynamic analysis to detect and prevent SQLIA.It consists of 4 main steps:

1. Identify hotspot: In this step it scans the application to identify the hotspot point that issue SQL queries underlying database.
2. Build SQL query model: For each hotspot it builds the model that represents the all possible queries that may be generated at that hotspot.
3. Instrument Application:-At each hotspot in application adds call to runtime monitor.
4. Runtime monitoring: It checks the dynamically generated queries against the SQL query model at the run time and reject and report queries that violate the model. [18].

8. SQL DOM: It creates one class per table and for each class table one method per possible operation per column, making the API both insufficient and cumbersome. All database structure mapping information will be access statically to avoid unnecessary object duplication. [19].

9. VIPER: It uses heuristic approach for detecting SQL Injection. It relies on knowledge base of heuristics that guides the generation of SQL queries .Firstly it analyzes the web application with the aim of determining its hyperlinks structure of identifying its input forms. Then it stacks seeding a series of standards SQL attacker. Then it matches the output produced by web application against library of regular expression related to error message that database can produce. It continues the attack using text mined from error message with object of identifying likely table of field name until it is able to retrieve database structure. [20].

10. CANDID: It computes the intended query by running the application on candidate inputs that are self evidently non-attacking. It creates benign sample input (candidate input for every user input. It executes program simultaneously over actual input and candidate input .Generates candidate query along with actual query. Issue actual query only if parse structure matches. [21].

VI. COMPARATIVE ANALYSIS OF SQLIA METHODS AND TOOLS

Depending on the settings of the system configured, every approach has benefits, so it would not be easy to get an idea about which one is best. In table1.[8][10] we show a chart of different approaches against various SQL injection attacks .Table1 shows comparative analysis of SQL injection detection and prevention techniques with attack type. The symbol " ● " is used for tool that can successfully stop all attacks of that type. The symbol " "is used for tool that attack type only partially because of natural limitations of underlying approach. The symbol – is used for tool that is not able to stop attacks of that type.

Table 1.COMPARATIVE ANALYSIS OF SQLIA METHODS AND TOOLS

Attacks → / Approaches ↓	Tautology	Logically Incorrect Queries	Union Query	Statement Injection	Stored Procedure	Blind Injection	Timing Attacks	Alternate Encoding
AMNESIA	●	●	●	●	_	●	●	●
CANDID	○	○	○	○	○	_	_	○
SQLrand	●	_	●	●	_	●	●	_
SQLDOM	●	●	●	●	_	●	●	●
POSITIVE TENTITIVE	●	●	●	●	●	●	●	●
WAVES	○	○	○	○	○	○	○	○
JDBC CHECKER	○	○	○	○	○	○	○	○

VII. CONCLUSION

This paper alerts the people who are related to database maintenance, DBA and other people who are introducing their sites on Internet. This paper gives idea about the hole which can be secured either by code or protection security like firewalls. It is necessary to check the code before introducing the site.

SQL Injection Attacks are dangerous to the applications on Internet. The intention of the attacker is to gain access to the database. We have analyzed all common attack methods and provided illustration for each of them. We have proposed one solution for input validation. That is create one table which contains special characters like; ‘,--,’.If the input contains such special characters, the SQL query is terminated and is not allowed to be executed on database.

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Energy Aware Data Aggregation Technique in WSN

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Abstract- Wireless sensor networks consist of sensor nodes with sensing, communicating, computing & storage with battery capacity. Data aggregation is a process or scheme to eliminate redundant transmission & provide fused information to base station which improves energy efficiency & network .lifetime of energy constrained WSN**.**.In this paper, we present a survey of data aggregation schemes in Flat & Hierarchical wireless sensor networks & compare them on the basis of metrices such as lifetime, latency and data accuracy. Our main focus on data aggregation in cluster based network using LEACH protocol which delivers 10 times more data than the minimum energy transmission routing which improves system lifetime & reliability of data transmission & energy consumption by a factor of 8 compared to direct transmission. This paper highlights some of the drawbacks and issues in LEACH & the proposed protocol LEACH Acess Point(LEACH-AP).

Index Terms- Clusterhead, Energy Efficiency, LEACH, LEACH-AP

I. INTRODUCTION

Wireless sensor networks (WSNs) have been used for numerous applications including military surveillance, facility monitoring and environmental monitoring. Typically WSNs have a large number of sensor nodes with the ability to communicate among themselves and also to an external sink or a base-station [1, 2]. The sensors could be scattered randomly in harsh environments such as a battlefield or deterministically placed at specified locations. The sensors coordinate among themselves to form a communication network such as a single multi-hop network or a hierarchical organization with several clusters and cluster heads. The sensors periodically sense the data, process it and transmit it to the base station. The frequency of data reporting and the number of sensors which report data usually depends on the specific application.A comprehensive survey on wireless sensor networks is presented in [3].

Data gathering is defined as the systematic collection of sensed data from multiple sensors to be eventually transmitted to the base station for processing. Since sensor nodes are energy constrained, it is inefficient for all the sensors to transmit the data directly to the base station. Data generated from neighboring sensors is often redundant and highly correlated. In addition, the amount of data generated in large sensor networks is usually enormous for the base station to process. Hence, we need methods for combining data into high quality information at the sensors or intermediate nodes which can reduce the number of packets transmitted to the base station resulting in conservation of energy and bandwidth. This can be accomplished by data aggregation. *Data aggregation* is defined as the process of aggregating the data from multiple sensors to eliminate redundant transmission and provide fused information to the base station. Data aggregation usually involves the fusion of data from multiple sensors at intermediate nodes and transmission of the aggregated data to the base station (sink). In the rest of the paper, we use the term data aggregation to denote the process of data gathering with aggregation. We also use the term sink to represent the base station

Data aggregation attempts to collect the most critical data from the sensors and make it available to the sink in an energy efficient manner with minimum data latency. Data latency is important in many applications such as environment monitoring where the freshness of data is also an important factor**.** It is critical to develop energy efficient data aggregation algorithms so that network lifetime is enhanced. There are several factors which determine the energy efficiency of a sensor network such as network architecture, the data aggregation mechanism and the underlying routing protocol. In this paper, we describe the influence of these factors on the energy efficiency of the network in the context of data aggregation. We now present a formal definition of energy efficiency.

Energy Efficiency*:* The functionality of the sensor network should be extended as long as possible. In an ideal data aggregation scheme, each sensor should have expended the same amount of energy in each data gathering round. A data aggregation scheme is energy efficient if it maximizes the functionality of the network. If we assume that all sensors are equally important, we should minimize the energy consumption of each sensor. This idea is captured by the network lifetime which quantifies the energy efficiency of the network.

Network lifetime, data accuracy, and latency are some of the important performance measures of data aggregation algorithms. The definitions of these measures are highly dependent on the desired application. We now present a formal definition of these measures.

Network lifetime*:* Network lifetime is defined as the number of data aggregation rounds till □% of sensors die where □ is specified by the system designer. For instance, in applications where the time that all nodes operate together is vital, lifetime is defined as the number of rounds until the first sensor is drained of its energy.

Data accuracy*:* The definition of data accuracy depends on the specific application for which the sensor network is designed.

Latency*:* Latency is defined as the delay involved in data transmission, routing and data aggregation. It can be measured as the time delay between the data packets received at the sink and the data generated at the source nodes.

The rest of the paper is organized as follows. In Section 2, we categorize different data aggregation protocols based on the network architecture involved in data aggregation. Section 3 describes LEACH Protocol In Section 4 Proposed Protocol

LEACH-AP Protocol. Section 5 Simulation Results. Section6 describes Conclusion & futurework.

II. DATA AGGREGATION PROTOCOLS BASED ON NETWORK ARCHITECTURE

The architecture of the sensor network plays a vital role in the performance of different data aggregation protocols. In this section, we survey several data aggregation protocols which have specifically been designed for different network architectures.

2.1 Flat networks

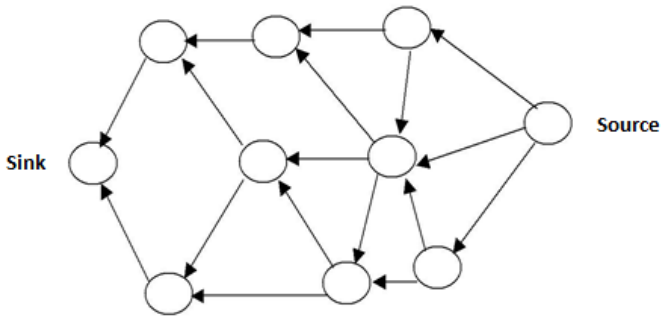
In flat networks, each sensor node plays the same role and is equipped with approximately the same battery power. In such networks, data aggregation is accomplished by data centric routing where the sink usually transmits a query message to the sensors, e.g, via flooding and sensors which have data matching the query send response messages back to the sink. The choice of a particular communication protocol depends on the specific application at hand. In the rest of this subsection, we describe these protocols and highlight their advantages and limitations.

2.1.1 Push diffusion

In the push diffusion scheme, the sources are active participants and initiate the diffusion while the sinks respond to the sources. The sources flood the data when they detect an event while the sinks subscribe to the sources through enforcements. The *sensor protocol for information via negotiation* (SPIN) [4] can be classified as a push based diffusion protocol. The two main features of SPIN are negotiation and resource adaptation. For successful data negotiation, sensor nodes need a descriptor to succinctly describe their observed data. These descriptors are defined in SPIN as *metadata*.

2.1.2 Two phase pull diffusion

Intanagonwiwat et al. [5] have developed an energy efficient data aggregation protocol called directed diffusion. Directed diffusion is a representative approach of two phase pull diffusion. It is a data centric routing scheme which is based on the data acquired at the sensors. The attributes of the data are utilized message in the network. Figure 1 illustrates the interest propagation in directed diffusion. If the attributes of the data generated by the source match the interest, a gradient is set up to identify the data generated by the sensor nodes. The sink initially broadcasts an interest message in the network. The gradient specifies the data rate and the direction in which to send the data. Intermediate nodes are capable of caching and transforming the data. Each node maintains a data cache which keeps track of recently seen data items. After receiving low data rate events, the sink reinforces one particular neighbor in order to attract higher quality data. Thus, directed diffusion is achieved by using data driven local rules.



Impact of source- destination location on directed diffusion

The performance of the data aggregation protocol in directed diffusion is influenced by factors such as the position of source and destination nodes and network topology. Krishnamachari et al. [6] have studied the impact of source-destination placement and communication network density on the energy costs associated with data aggregation. The event radius model (*ER*) and random source (*RS*) model are considered for source placement. In the *ER* model, all sources are assumed to be located within a fixed distance of a randomly chosen " event" location. In the *RS* model, a fixed number of nodes are randomly chosen to be sources.

2.1.3 One phase pull diffusion

Two phase pull diffusion results in large overhead if there are many sources and sinks. Krishnamachari et al. [7] have proposed a one phase pull diffusion scheme which skips the flooding process of directed diffusion. In one phase pull diffusion, sinks send interest messages that propagate through the network establishing gradients. However, the sources do not transmit exploratory data. The sources transmit data only to the lowest latency gradient pertinent to each sink. Hence, the reverse route (from the source to the sink) has the least latency. Removal of exploratory data transmission results in a decrease in control overhead conserving the energy of the sensors.

2.2. Hierarchical networks

A flat network can result in excessive communication and computation burden at the sink node resulting in a faster depletion of its battery power. The death of the sink node breaks down the functionality of the network. Hence, in view of scalability and energy efficiency, several hierarchical data aggregation approaches have been proposed. Hierarchical data aggregation involves data fusion at special nodes, which reduces the number of messages transmitted to the sink. This improves the energy efficiency of the network. In the rest of this subsection, we describe the different hierarchical data aggregation protocols and highlight their main advantages and limitations.

2.2.1 Data aggregation in cluster based networks

In energy constrained sensor networks of large size, it is inefficient for sensors to transmit the data directly to the sink. In such scenarios, sensors can transmit data to a local aggregator or cluster head which aggregates data from all the sensors in its cluster and transmits the concise digest to the sink. This results in

significant energy savings for the energy constrained sensors. Figure 2 shows a cluster based sensor network organization. The cluster heads can communicate with the sink directly via long range transmissions or multi hopping through other cluster heads. In this section we discuss three such protocols viz., *Low Energy Adaptive Clustering Hierarchy* (LEACH), *Hybrid Energy Efficient Distributed ClusteringApproach* (HEED) and *clustered diffusion with dynamic data aggregation* (CLUDDA).

Heinzelman [8] et al. were the first to propose an energy conserving cluster formation protocol called LEACH. The LEACH protocol is distributed and sensor nodes organize themselves into clusters for data fusion. A designated node (cluster head) in each cluster transmits the fused data from several sensors in its cluster to the sink. This reduces the amount of information that is transmitted to the sink. The data fusion is performed periodically at the cluster heads. LEACH is suited for applications which involve constant monitoring and periodic data reporting. The two main phases involved in LEACH are: setup phase and steady state phase. The setup phase involves the organization of the network into clusters and the selection of cluster heads.

The steady state phase involves data aggregation at the cluster heads and data transmission to the sink. LEACH employs randomization to rotate cluster heads and achieves a factor of eight improvement compared to the direct approach in terms of energy consumption. LEACH was compared with minimum transmission energy routing (MTE) in which intermediate nodes are chosen such that the sum of squared distances between adjacent nodes of the route is minimized. The simulation results show that LEACH delivers ten times more data than MTE for the same number of node deaths.

Although LEACH improves the system lifetime and data accuracy of the network, the protocol has some limitations. LEACH assumes that all sensors have enough power to reach the sink if needed. In other words, each sensor has the capability to act as a cluster head and perform data fusion. This assumption might not be valid with energy-constrained sensors. LEACH also assumes that nodes have data to send periodically.

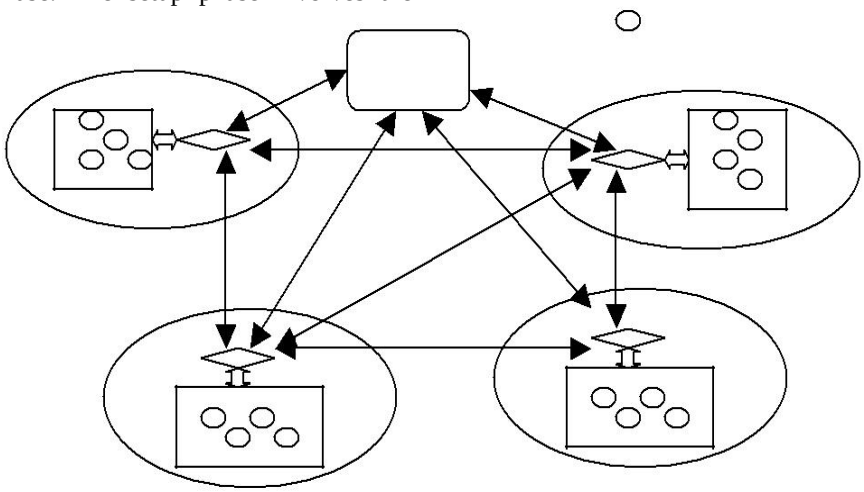


Figure 2: Cluster based sensor network. The arrows indicate wireless communication links.

Younis et al. [10] have proposed HEED whose main goal is to form efficient clusters for maximizing network lifetime. The main assumption in HEED is the availability of multiple power levels at sensor nodes. Cluster head selection is based on a combination of node residual energy of each node and a secondary parameter which depends on the node proximity to its neighbors or node degree. The cost of a cluster head is defined as its average minimum reachability power (AMRP). AMRP is the average of the minimum power levels required by all nodes within the cluster range to reach the cluster head. AMRP provides an estimate of the communication cost.

At every iteration of HEED, each node which has not selected a cluster head, sets its probability P_{CH} of becoming the cluster head as

$$P_{CH} = C \times \frac{E_{residual}}{E_{max}} \qquad (1)$$

where C denotes the initial percentage of cluster heads (specified by the user) , $E_{residual}$ is the estimated current residual energy of the node and E_{max} is its initial energy corresponding to a fully charged battery. Each node sends a *cluster_head_msg* where the selection status is set to tentative if P_{CH} is less than 1 or final if P_{CH} is 1. A node selects its cluster head as the node with the lowest cost (AMRP) in the set of tentative cluster heads**.** Every node then changes its probability to min(2 × *PCH* , 1) in the next iteration. The process repeats until every node is assigned to a cluster head.

HEED improves the network lifetime over gen-LEACH. In gen-LEACH the selection of cluster heads is random which may result in rapid death of certain nodes. However, in HEED the cluster heads are selected such that they are well distributed with minimum communication cost. In addition, the energy dissipated in clustering is less in HEED compared to gen-LEACH. This is due to the fact that gen-LEACH propagates residual energy. To conclude, HEED prolongs network lifetime and achieves a geographically well-distributed set of cluster heads

Recently a hybrid approach [11] has been proposed. The new data aggregation scheme proposed in [11] is called clustered diffusion with dynamic data aggregation (CLUDDA). CLUDDA

performs data aggregation in unfamiliar environments by including query definitions within interest messages.

The key idea behind chain based data aggregation is that each sensor transmits only to its closest neighbor. Lindsey et al. [12] presented a chain based data aggregation protocol called power efficient data gathering protocol for sensor information systems (PEGASIS). In PEGASIS, nodes are organized into a linear chain for data aggregation. The nodes can form a chain by employing a greedy algorithm or the sink can determine the chain in a centralized manner. Greedy chain formation assumes that all nodes have global knowledge of the network. The farthest node from the sink initiates chain formation and at each step, the closest neighbor of a node is selected as its successor in the chain.

The PEGASIS protocol has considerable energy savings compared to LEACH.

The main disadvantage of PEGASIS is the necessity of global knowledge of all node positions to pick suitable neighbors and minimize the maximum neighbor distance. In addition, PEGASIS assumes that all sensors are equipped with identical battery power and results in excessive delay for nodes at the end of the chain which are farther away from the leader node.

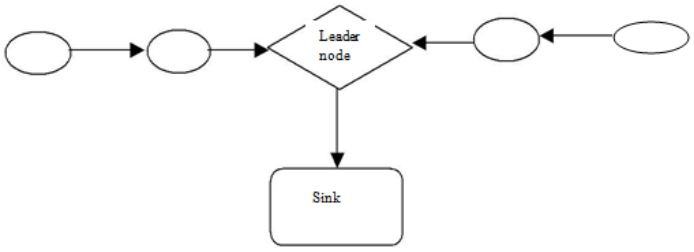


Figure 3: Chain based organization in a 1: Chain based organization in a sensor network.The ovals indicate sensors and the arrows indicate the direction of data transmission.

2.2.3 Tree based data aggregation

In a tree based network, sensor nodes are organized into a tree where data aggregation is performed at intermediate nodes along the tree and a concise representation of the data is transmitted to the root node. Tree based data aggregation is suitable for applications which involve in-network data aggregation. An example application is radiation level monitoring in a nuclear plant where the maximum value provides the most useful information for the safety of the plant. One of the main aspects of tree-based networks is the construction of an energy efficient data aggregation tree.

2.2.4 Grid based data aggregation

Vaidhyanathan et al. [16] have proposed two data aggregation schemes which are based on dividing the region monitored by a sensor network into several grids. They are: grid-based data aggregation and in-network data aggregation. In grid-based data aggregation, a set of sensors is assigned as data aggregators in fixed regions of the sensor network. The sensors in a particular grid transmit the data directly to the data aggregator of that grid. Hence, the sensors within a grid do not communicate with each other.

Table 1: Summary of hierarchical data aggregation protocols

Protocol	**Organization Type**	**Objectives**	**Characteristics**
LEACH	Cluster	Network lifetime: number of nodes that are alive, latency	Randomized cluster head rotation, non-uniform energy drainage across different sensors.
HEED	Cluster	Lifetime: number of rounds until the first node death	Assumption: Multiple power levels in sensors. Cluster heads are well distributed. Achieves better performance than LEACH
PEGASIS	Chain	Lifetime: average energy expended by a node	Global knowledge of the network is required. Considerable energy savings compared to LEACH.
Hierarchical chain based protocols	Chain	Energy□ delay	Binary chain based scheme is eight times better than LEACH and the three level scheme is 5 times better than PEGASIS.
EADAT	Tree	Lifetime: number of	Sink initiated broadcasting

		alive sensors at the end of simulation time	approach. It is not clear how to choose the threshold power (P_{th}) for broadcasting help messages. No comparisons made with other existing aggregation algorithms.
PEDAP-PA	Tree	Lifetime: time until the death of last node	Minimum spanning tree based approach. Achieves two times performance improvement compared to LEACH, PEGASIS.

III. LEACH PROTOCOL

Low Energy Adaptive Clustering Hierarchy (LEACH) is the first hierarchical cluster-based routing protocol for wireless sensor network which partitions the nodes into clusters, in each cluster a dedicated node with extra privileges called Cluster Head (CH) is responsible for creating and manipulating a TDMA (Time division multiple access) schedule and sending aggregated data from nodes to the BS where these data is needed using CDMA (Code division multiple access**)**. Remaining nodes are cluster members. This protocol is divided into rounds; each round consists of two phases:

3.1 Set-up Phase

Each node decides independent of other nodes independent of other nodes if it will become a CH or not. This decision takes into account when the node served as a CH for the last time In the following advertisement phase, the CHs inform their neighborhood with an advertisement packet that they become CHs. Non-CH nodes pick the advertisement packet with the strongest received signal strength.

3.2 Steady-state phase:

Data transmission begins; Nodes send their data during their allocated TDMA slot to the CH. This transmission uses a minimal amount of energy. When all the data has been received, the CH aggregate these data and send it to the BS. LEACH is able to perform local aggregation of data in each cluster to reduce the amount of data that transmitted to the base station.

3.3 LEACH Disadvantages:

Leach is not applicable to networks that are deployed in large region as it uses single hop routing where each node can transmit directly to the cluster head and the sink.

The cluster heads used in the LEACH will consume a large amount of energy if they are located farther away from the sink.
Leach does not guarantee good cluster head distribution and it involves the assumption of uniform energy consumption for the cluster heads.

Leach uses dynamic clustering which results in extra overhead such as the head changes , advertisement that reduces the energy consumption gain.

As the nodes are rotating every time a new cluster head has to be formed ,which consumes energy .

IV. PROPOSED PROTOCOL

In our new version of LEACH protocol, the cluster contains access points which is having very high energy (unlimited) compared to cluster head. So here instead of cluster head ,we are using Access points. The Access points are just like mini base stations. Each and every cluster has an access point. Every time there is no need to form new cluster head as there are no cluster heads. When the nodes rotate then also we have the same access point i.e head . We have implemented this protocol using Ns2 Simulator.

- Network Simulator (Version 2), widely known as NS2, is simply an event driven simulation tool that has proved useful in studying the dynamic nature of communication networks.
- Simulation of wired as well as wireless network functions and protocols (e.g., routing algorithms, TCP, UDP) can be done using NS2.
- In general, NS2 provides users with a way of specifying such network protocols and simulating their corresponding behaviors.
- Due to its flexibility and modular nature, NS2 has gained constant popularity in the networking research community since its birth in 1989.
- NS2 provides users with an executable command ns which takes on input argument, the name of a Tcl simulation scripting file.
- Users are feeding the name of a Tcl simulation script (which sets up a simulation) as an input argument of an NS2 executable command ns.
- In most cases, a simulation trace file is created, and is used to plot graph and/or to create animation.NS2 consists of two key languages: C++ and Object-oriented Tool Command Language (OTcl).
- While the C++ defines the internal mechanism (i.e.,a backend) of the simulation objects, the OTcl sets up simulation by assembling and configuring the objects as well as scheduling discrete events (i.e., a frontend). The C++ and the OTcl are linked together using TclCL.

Red hat Linux operating system

- Company/Developer : Red Hat
- OS family : Unix-like
- Source model : Open source

- Initial release : May 13,1995
- Latest stable release : 9 alias Shirke/March 31,2003
- Kernel type : monolithic kernel type
- License : Various
- Official website : http://www..redhat.com

From the simulation results, we can draw a number of conclusions.

• The delay involved in LEACH-AP is less than the original LEACH.

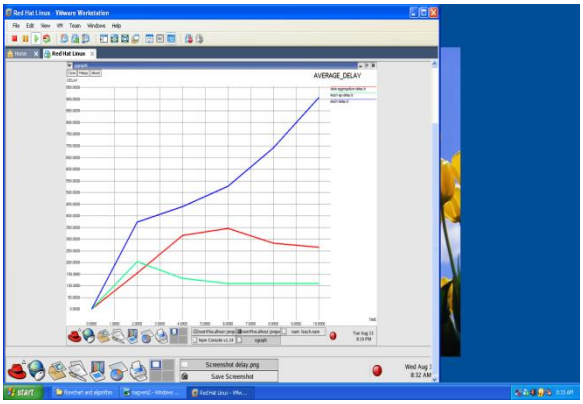
• The energy spent in LEACH-AP is less than the original LEACH.

• The packet delivery ratio in LEACH-AP is more than the original LEACH.

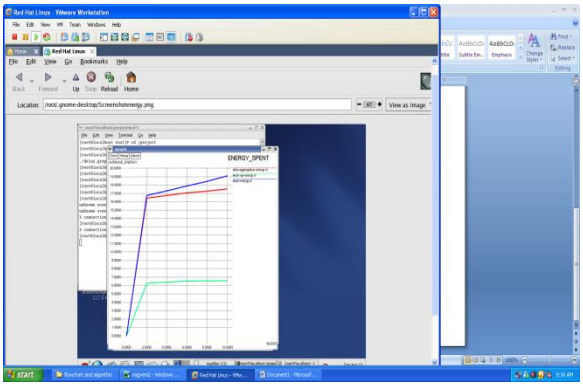
Application of such points is in Military Field or Glacier Monitoring etc where the cluster head has to long last for 6 months or more. So we can go for Access points in such case instead of cluster head which die soon.

V. Simulation Results

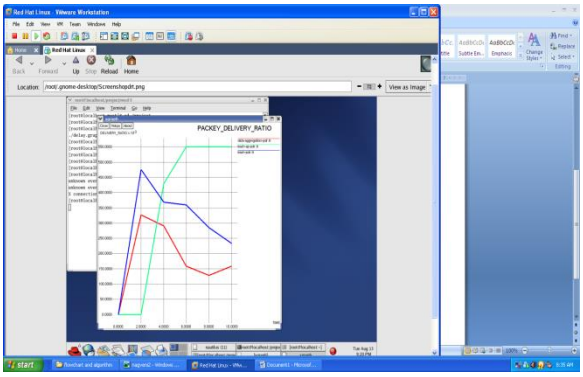
To validate the performance of proposed LEACH-AP protocol, we simulate the protocol and utilize a network with 50 nodes.



Comparison between data aggregation, leach, leach-ap, based on delay



Comparison between data aggregation, leach, leach-ap, based on energy spent



Comparison between data aggregation, leach, leach-ap, based on pdr

VI. CONCLUSION

In this paper we considered a well known protocol for wireless sensor networks called LEAH protocol which rotate the leader based on available energy, with our new LEACH-AP we have the fixed leader also called access point & conclude that for critical application like military ,glaciour monitoriong our LEACH-AP outperforms in terms of accuracy of data transmission at the cost of abundant of energy source.

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GSM Based Email Sender: Through Non GPRS Mobile via SMS

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Abstract- Email is one of the mostly used utility of Internet for communication. A person can communicate with any other person with email in seconds. Also various important documents, images, scanned documents etc. can be sends as attachments. Emails can be sent using a Computer or Mobile The firm requirement to send Email from mobile is that it requires GPRS activation on Computer or Mobile. Naturally everyone cannot afford GPRS to be activated on their mobile device. Also email with attachments with a normal mobile device is not possible. In this paper we explore the viability and present our system implementation to allow registered users to send email with their non-GPRS Mobile via SMS. Also Attachments can be sent with Email. That too will be sent from non-GPRS mobile.

Index Terms- *Attachment, Email, GPRS, GSM, non-GPRS, SMS*

I. INTRODUCTION

Text messaging is one of the most utilized forms of electronic communication. Cheap phones with limited capabilities are often restricted to voice calls and SMS. Short Message Service, or text messaging is a major communication system worldwide; more than 2 billion mobile messages are sent. Text messaging is utilized in almost every field. It can be also be utilized in sending Emails and with modifications for sending Emails with attachments. Our effort in this paper is to make Email facility available through SMS. We developed a text messaging system for processing incoming SMS as request for sending email from user, processing SMS, authenticating sender's mobile Number against the database, retrieving documents information from database that are to be sent as an attachment and sending them as Email to the user email-Id specified in SMS. The usability of such a system is likely to be very high as the users only need to know the mobile number of the server. There is no need to obtain, install and learn new software. Moreover sending SMS is cheap and reliable.

II. SYSTEM IMPLEMENTATION

This section focuses on the implementation of GSM Based Email Sender that is currently under development. This actual application consists of the following components:

1) A web front-end that allows USER to signup, login and update his/her profile as well as uploads documents that in future can be sent as attachments. Also users in the role of an administrator can allow or disallow any Users from using this facility. Field.
2) A database which stores the user signup and profile information as well as information of the various types of documents that are uploaded by various registered users.
3) A SMS processor that is capable of sending and receiving SMS to and from users.

A. SMS PROCESSING:

This module is used to process the request coming in the form of SMS for sending Email from registered non-GPRS mobile. It checks the SMS format, split it into various components and validates against the validation module testing whether it is from registered users. Also verifies the document IDs received with SMS for sending those documents as an attachment with the Email.

B. Email ID Validation And Email Sender:

This module is used for validation purpose It verifies Email-Id for its correctness and then using an account forwards the message or the message along with attachments as Email to the users from senders from their non-GPRS mobile. Any Email service provider can be used for sending email. We have used Google account for this purpose. It requires name of Email server and port number.

C. DOCUMENT UPLOADER:

This module is used for validation purpose It verifies Email-Id for its correctness and then using an account forwards the message or the message along with attachments as Email to the users from senders from their non-GPRS mobile. Any Email service provider can be used for sending email. We have used Google account for this purpose. It requires name of Email server and port number.

D. SIGNUP MODULE:

It is a part of the web front end that the new users can use to register on the web site to avail the facility of sending Email from their registered Mobile Numbers of the non-GPRS mobile Device. The facility of sending Email or Email with attachments

is only made available to the registered users. Registration is made compulsory.

E. AUTHENTICATION:

It is a part of the web front end that is used to authenticate the users. After successful login only, the registered users will be able to update their personal profile and upload the documents on the web site.

F. DATABASE MODULE:

The system is being developed as Three-Tier architecture. This component is responsible for implementing the data layer. It is used to interact with the database. This simplifies maintenance of software. With minor changes, the Back End can be changed.

III. FIGURE

Figure below describes the working of the system being developed. It depicts that the user interested in sending Email from his/her non-GPRS mobile sends as SMS the message to be sent, the receiver's email-ID along with the optional document-Id that is to be attached with Email to the modem attached to the server which is capable of sending and receiving SMS. The server running Internet forwards the Email to the recipient.

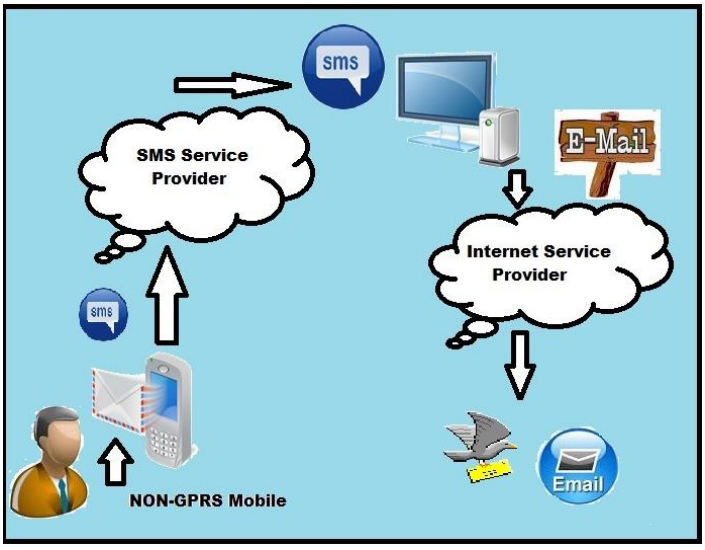

Fig 1.0 Architecture of GSM Based Email Sender

IV. CONCLUSION

The system being developed allows the registered users to send Email or Emails with attachments from their non-GPRS mobile device. The system can serve as a Helpline for the users. The service being made available can be offered as either free or it can be paid that depends on the organization that will like to implement the system. The limitation of the system comes from the fact that the size of characters is limited to 160 characters. However this can be overcome by sending multiple SMS.

Advantages:

1. Registered Users with non-GPRS mobile can use the web site for sending Emails with or without attachments.

2. Registered users can upload their documents. In future, the users can download the same from the site in case of loss of documents.

3. It prevents anonymous users or unregistered users from using the service.

Disadvantage:

1. Storage issues with increased users and with more uploaded contents.

2. System crashes if server running the application is down.

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Comparative study of Optimization methods for Unconstrained Multivariable Nonlinear Programming Problems

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Abstract- In this paper we propose to discuss unconstrained multivariable search methods that are used for optimization of nonlinear programming problems. Earlier Dr.William P.Fox and Dr.William H.Richardson [1] have attempted to solve such problems by using MAPPLE. But we have preferred to solve these problems by OR methods as our present area of research is OR. Although several OR methods are known but we have confined our discussions to Gradient search method, Newton's method and Quasi-Newton methods. We propose to conclude the discussion by taking a suitable example.
.

Key Words- Multivariable,Optimization, Quasi -Newton methods, steepest ascent/descent

I. INTRODUCTION

Problems containing more than one variable are called multivariate. The univariate results have multivariate analogues. In the multivariate case, again the necessary and sufficient condition for optimality is given by the system of equations obtained by setting the respective partial derivatives equal to zero. The first and second order partial derivatives are again key to the optimization process, except that a vector of the first derivatives and a matrix of second derivatives are involved.

II. Gradient Search Method

First of all, we take up the gradient search method also known as steepest ascent/descent method which is the simplest and most fundamental method for unconstrained optimization. When the negative gradient is used as its descent direction , the methd is known as steepest descent method and when the positive gradient is used as its ascent direction, the method is called steepest ascent method. The gradient search method can be summarized in the following steps:

1) Choose an initial starting point x_0. Thereafter at the point x_k :

2) Calculate (analytically or numerically) the partial derivatives

   $\partial f(x)/\partial x_j$, j= 1,2,……n

3) Calculate the maximum/minimum of the new function $f(x_k \pm t_k \nabla f(x_k))$ by using one dimensional search procedure (or calculus method) to find $t=t_k$ that maximizes/minimizes $f(x_k \pm t_k \nabla f(x_k))$ over $t_k \geq 0$ (for maximization) or $t_k \leq 0$ (for minimization).

4) Reset $x_{k+1} = x_k + t_k \nabla f(x_k)$ (for maximization) , $x_{k+1} = x_k - t_k \nabla f(x_k)$ (for minimization). Then go to the stopping rule.

   Stopping rule:
   At the maximum/ minimum, the value of the elements of the gradient vector will be each equal to zero. So we evaluate $\nabla f(x_k)$ at $x=x_k$. If $|\partial f/\partial x_j| \leq \epsilon$ for all j= 1,2,3……n
   we must stop with the current x_k as the desired approximation of an optimal solution. If not, repeat above steps and set k= k+1.

III. Newton's method

Newton's method for multivariable optimization is analogues to Newton's single variable algorithm for obtaining the roots and Newton –Raphson method for finding the roots of first derivative, given a x_0 , iterates

$x_{k+1}= x_k- f'(x_k)/f''(x_k)$ until $Ix_{k+1}- x_kI<\epsilon$

The algorithm is expanded to include partial derivatives w.r.t. each variable's dimension. The algorithm is developed by locating the stationary point of equation

$$f(x)= f(x_k)+ \nabla f(x_k)^T(x-x_k)+ ½(x-x_k)^TH(x-x_k)$$

where H is the Hessian matrix and $(x-x_k)^T$ is the row vector, which is the transpose of the column vector of the difference between the vector of independent variables x and the point x_k used for Taylor's series expansionby setting the first partial derivatives with respect to $x_1, x_2,\ldots\ldots x_n$ equal to zero i.e.

$$\nabla f(x_k)+ H(x- x_k)= 0$$

Then solving for x , the optimum of the quadratic approximation, Newton's method algorithm is obtained as

$$X_{k+1}= x_k- H^{-1}\nabla f(x_k)$$

The Newton's method consists of the following steps:

1) Choose an initial point x_0 .

2) Calculate (analytically or numerically) the partial derivatives $\partial f(x)/\partial x_j$, j= 1,2,3……,n

3) Calculate the Hessian matrix H_k , the matrix of second partial derivatives at the point x_k.

4)Find the inverse of H_K i.e. H_K^{-1}.

5) Set $x_{k+1}= x_k- H^{-1}\nabla f(x_k)$ 6) If $\|\nabla f(xk)\|<\epsilon$then stop otherwise repeat the above steps.

IV. Quasi -Newton methods

We have noticed that Newton's method $x_{k+1} = x_k + H_K^{-1} \nabla f(x_k)$ (for maximization) is successful because it uses the Hessian which offers the useful curvature information. However for various practical problems, the computing efforts of the Hessian matrices are very expensive or the evaluation of Hessian is very difficult. Sometimes the Hessian is not available analytically. To overcome these disadvantages Quasi-Newton methods were developed. These methods use the functional values and the gradients of the objective function and also at the same time maintains a fast rate of convergence. There are several updates of Quasi-Newton method. Here we confine our discussion only to DFP update and BFGS update which are both rank two updates.

DFP update

DFP update is a rank- two update and has become the best known of the Quasi-Newton algorithms. The DFP update formula was originally proposed by Davidon [6] and developed later by Fletcher and Powell [7]. Hence it is called DFP update. This formula preserves the positive definiteness in case of minimization and negative definiteness in case of maximization and also symmetry of matrices H_k . DFP method is superlinearly convergent. But for a strictly convex function, under exact line search, DFP method is globally convergent. The DFP algorithm has the following form of equation for maximizing f(x):

$$x_{k+1} = x_k + t_k H_K \nabla f(x_k)$$

where $H_k = H_{k-1}+ A_k+ B_k$ and

the matrices A_k and B_k are given by

$A_k= \{(x_k- x_{k-1}) (x_k- x_{k-1})^T \}/\{(x_k- x_{k-1})^T (\nabla f(x_k)- \nabla f(x_{k-1})\}$

$B_k= \{-H_{k-1}(\nabla f(x_k)- \nabla f(x_{k-1}))(\nabla f(x_k)- \nabla f(x_{k-1}))^TH_{k-1}^T\}/\{ (\nabla f(x_k)- \nabla f(x_{k-1}))^TH_{k-1}(\nabla f(x_k)- \nabla f(x_{k-1}))\}$

The algorithm begins with a search along the gradient line from the starting point x_0 as given by the following equation

$$x_1= x_0+ t_0H_0 \nabla f(x_0)$$

where H_0 =I is the unit matrix.

BFGS update

The other famous Quasi-Newton update – BFGS update overcomes all the drawbacks ofoter methods discussed previously and performs better than DFP update. The BFGS update formula developed simultaneously by Broyden[8] , Fletcher[9], Goldfarb[10], Shanno[11] in the year 1970 and hence known as BFGS formula. The BFGS algorithm for maximizing f(x) is given by

$$x_{k+1}=x_k + t_k H_k \nabla f(x_k)$$

where $H_k = H_{k-1}- A_k+ B_k$

The matrices A_k and B_k are given by

$A_k = \{H_{k-1}\Upsilon_k\delta_k^T + \delta_k\Upsilon_k^T H_{k-1}\}/\{\delta_k^T\Upsilon_k\}$

$B_k = \{1 + \Upsilon_k^T H_{k-1}\Upsilon_k/\delta_k^T\Upsilon_k\}\{\delta_k\delta_k^T/\delta_k^T\Upsilon_k\}$

where $\delta_k = x_{k+1} - x_k$ and $\Upsilon_k = \nabla f(x_{k+1}) - \nabla f(x_k)$
Here also x_1 is calculated as in DFP update formula.

V. Illustration:

Maximize $f(x) = 2x_1x_2 + 2x_2 - x_1^2 - 2x_2^2$ using **Gradient search** starting at point $x_0 = (0, 0)$.

Here $f(x) = 2x_1x_2 + 2x_2 - x_1^2 - 2x_2^2$

$\nabla f(x_1, x_2)^T = (-2x_1 + 2x_2, 2x_1 - 4x_2 + 2)$

$\nabla f(x_0)^T = f(0,0)^T = (0,2)$

$x_1 = x_0 + t_0 \nabla f(x_0)$

$= \begin{bmatrix}0\\0\end{bmatrix} + t_0 \begin{bmatrix}0\\2\end{bmatrix}$

$x_1^T = (0, 2t_0)$

Now $f(t) = 4t_0 - 8t_0^2$

For optimum value, $f'(t) = 0$

$t_0 = 1/4$

Also $f''(t) = -16 < 0$

$f(t)$ is maximum at $t_0 = 1/4$

$x_1^T = (0, 1/2)$

Proceeding as above we get a sequence of iterates as $x_2 = (1/2, 1/2)$, $x_3 = (1/2, 3/4)$, $x_4 = (3/4, 3/4)$, $x_5 = (3/4, 7/8)$, $x_6 = (7/8, 7/8)$, $x_7 = (7/8, 15/16)$ and so on.

We observe that these sequence of trials are converging to $x^* = (1,1)$ which is the optimal solution as verified by the analytical method.

By **Newton's method**

We have $f(x) = 2x_1x_2 + 2x_2 - x_1^2 - 2x_2^2$

$\nabla f(x_1, x_2)^T = (-2x_1 + 2x_2, 2x_1 - 4x_2 + 2)$

$\nabla f(0,0)^T = (0,2)$

Now $H_0 = \begin{bmatrix}-2 & 2\\ 2 & -4\end{bmatrix}$

H_0 is negative definite.

Also $|H_0| = (8 - 4) = 4$

$$H_0^{-1} = \begin{bmatrix}-1 & -\frac{1}{2}\\ -\frac{1}{2} & -\frac{1}{2}\end{bmatrix}$$

$x_1^T = x_0 - H_0^{-1}\nabla f(x_0) = (1,1)$ is the required point of maxima. Clearly the optimum of this quadratic function is obtained in one step as stated in the method.

By **DFG update formula**

$f(x) = 2x_1x_2 + 2x_2 - x_1^2 - 2x_2^2$

$\nabla f(x_1, x_2)^T = (-2x_1 + 2x_2, 2x_1 - 4x_2 + 2)$

$\nabla f(x_0) = \nabla f(0,0)^T = (0,2)$

Now, $x_1 = x_0 + t_0 H_0(I) \nabla f(x_0)$

$$= \begin{bmatrix}0\\0\end{bmatrix} + t_0 \begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}\begin{bmatrix}0\\2\end{bmatrix}$$

$x_1^T = (0, 2t_0)$

Now $f(t) = 4t_0 - 8t_0^2$

For optimum value, $f'(t) = 0$

$t_0 = 1/4$

Also $f''(t) = -16 < 0$

$f(t)$ is maximum at $t_0 = 1/4$

$x_1^T = (0, 1/2)$

$\nabla f(x_1)^T = (1,0)$

Now $x_2 = x_1 + t_1 H_1 \nabla f(x_1)$

where $H_1 = H_0 + A_1 + B_1$

Also $A_1 = \dfrac{(x_1 - x_0)(x_1 - x_0)^T}{(x_1 - x_0)^T(\nabla f(x_1) - \nabla f(x_0))}$

$$B_1 = \frac{-H_0(\nabla f(x_1) - \nabla f(x_0))(\nabla f(x_1) - \nabla f(x_0))^T H_0}{(\nabla f(x_1) - \nabla f(x_0))^T H_0(\nabla f(x_1) - \nabla f(x_0))}$$

$$= \begin{bmatrix}-\frac{1}{5} & \frac{2}{5}\\ \frac{2}{5} & -\frac{4}{5}\end{bmatrix}$$

$$H_1 = \begin{bmatrix}\frac{4}{5} & \frac{2}{5}\\ \frac{2}{5} & -\frac{1}{20}\end{bmatrix}$$

$x_2^T = (4t_1/5, 1/2 + 2t_1/5)$

Obtaining t_1 by an exact line search, we get $x_2^T = (1, 1)$

which is the required point of maxima.

We observe that for a quadratic function with two independent variables,the method converges to the optimum after two iterations.

By **BFGS update formula**

Here $f(x) = 2x_1 x_2 + 2x_2 - x_2^2 - 2x_2^2$

$\nabla f(x_1, x_2)^T = (-2x_1 + 2x_2, 2x_1 - 4x_2 + 2)$

$\nabla f(x_0)^T = \nabla f(0,0) = (0, 2)$

Now $x_1^T = x_0 + t_o H(I) \nabla f(x_0)$

$= (0, 2t_0)$

Let $f(t) = 4t_0 - 8t_0^2$

For optimum value, $f'(t)=0$

$t_0 = 1/4$

Also $f''(t) = -16 < 0$

$f(t)$ is maximum at $t_0 = 1/4$

$x_1^T = (0, 1/2)$

$\nabla f(x_1) = (1,0)$

Now $x_2 = x_1 + t_1 H_1 \nabla f(x_1)$

where $H_1 = H_0 - A_1 + B_1$

$$A_1 = \frac{H_0 (\nabla f(x_1) - \nabla f(x_0)) (x_1 - x_0)^T + (x_1 - x_0)(\nabla f(x_1) - \nabla f(x_0))^T H_0}{(x_1 - x_0)^T (\nabla f(x_1) - \nabla f(x_0))}$$

$$= \begin{bmatrix} 0 & -\frac{1}{2} \\ -\frac{1}{2} & 2 \end{bmatrix}$$

$$B_1 = \{1 + \frac{(\nabla f(x_1) - \nabla f(x_0))^T H_0 (\nabla f(x_1) - \nabla f(x_0))}{(x_1 - x_0)^T (\nabla f(x_1) - \nabla f(x_0))}\} X \frac{(x_1 - x_0)(x_1 - x_0)^T}{(x_1 - x_0)^T (\nabla f(x_1) - \nabla f(x_0))}$$

$$= \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$$

$$H_1 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 0 & -\frac{1}{2} \\ -\frac{1}{2} & 2 \end{bmatrix} + \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & \frac{1}{2} \\ \frac{1}{2} & 0 \end{bmatrix}$$

Now $x_2 = \begin{bmatrix} 0 \\ \frac{1}{2} \end{bmatrix} + t_1 \begin{bmatrix} 1 & \frac{1}{2} \\ \frac{1}{2} & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

$x_2^T = (t_1, 1/2 + 1/2\, t_1)$

Obtaining t_1 by an exact line search, we get

$x_2^T = (1, 1)$

which is the required point of maxima.

VI. Conclusion

Surprisingly not much attention has been given to maximization of multivariable nonlinear programming problems by the scholars. So we have chosen to study maximization problems and to our pleasant surprise, the results obtained are compatible with theoretical observations. In gradient search methods, the rate of convergence is slow and the result obtained is approximate to the optimal value. But in Newton's method and Quasi-Newton methods, the rate of convergence is faster and the results are accurate.

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Tracing With Real-Time Compression for an On-Chip AHB Bus

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ABSTRACT: A multiresolution AHB on-chip bus tracer named SYS-HMRBT (AHB multiresolution bus tracer) for versatile system-on-chip (SoC) debugging and monitoring. The bus tracer is capable of capturing the bus trace with different resolutions, all with efficient built-in compression mechanisms, to meet a diverse range of needs. Experiments show that the bus tracer achieves very good compression ratios of 79%–96%, depending on the selected resolution mode. The SoC has been successfully verified both in field-programmable gate array and a test chip.

Index Terms: AHB, AMBA, compression, system-on-chip (SoC) debugging

I. Introduction

The On-Chip bus is an important system-on-chip (SoC) infrastructure that connects major hardware components. Monitoring the on-chip bus signals is crucial to the SoC debugging and performance analysis/optimization. Unfortunately, such signals are difficult to observe since they are deeply embedded in a SoC and there are often no sufficient I/O pins to access these signals. Therefore, a straightforward approach is to embed a bus tracer in SoC to capture the bus signal trace and store the trace in an on-chip storage such as the trace memory which could then be off loaded to outside world (the trace analyser software) for analysis.

Unfortunately, the size of the bus trace grows rapidly. For ex-ample, to capture AMBA AHB 2.0 bus signals running at 200 MHz, the trace grows at 2 to 3 GB/s. Therefore, it is highly desirable to compress the trace on the fly in order to reduce the trace size. However, simply capturing/compressing bus signals is not sufficient for SoC debugging and analysis, since the de-bugging/analysis needs are versatile: some designers need all signals at cycle-level, while some others only care about the transactions. For the latter case, tracing all signals at cycle-level wastes a lot of trace memory. Thus, there must be a way to cap-ture traces at different abstraction levels based on the specific debugging/analysis need.

II. TRACE GRANULARITY

This section first introduces the definitions of the abstraction level. Then, it discusses the application for each abstraction mode.

At the timing dimension, it has two abstraction levels, which are the cycle level and transaction level. The cycle level captures the signals at every cycle. The transaction level records the signals only when their values change (event triggering). For example, since the bus read/write control signals do not change during a successful transfer, the tracer only records this signal at the first and last cycles of that transfer. However, if the signal changes its value cycle-by-cycle, the transaction-level trace is similar to the cycle-level trace.

A) Mode FC:

The tracer traces all bus signals cycle-by-cycle so that designers can observe the most detailed bus activities. This mode is very useful to diagnose the cause of error by looking at the detail signals. However, since the traced data size of this mode is huge, the trace depth is the shortest among the five modes. Fortunately, it is acceptable since designers using the cycle-level mode trace only focus on a short critical period.

B) Mode FT:

The tracer traces all signals only when their values are changed. In other words, this mode traces the un-timed data transaction on the bus. Comparing to Mode FC, the timing granularity is abstracted. It is useful when designers want to skim the behaviours of all signals instead of looking at them cycle-by-cycle. Another benefit of this mode is that the space can be saved without losing meaningful information. Thus, the trace depth increases.

C) Mode BC:

The tracer uses the BSM, such as NORMAL, IDLE, ERROR, and so on, to represent bus transfer activities in cycle accurate level. Comparing to Mode FC, although this mode still captures the signals cycle-by-cycle, the signal gran-ularity is abstracted. Thus, designers can observe the bus hand-shaking states without analysing the detail signals. The benefit is that designers can still observe bus states cycle-by-cycle to analyse the system performance.

D) **Mode BT**:

The tracer uses bus state to represent bus transfer activities in transaction level. The traced data is abstracted in both timing level and signal level; it is a combination of Mode BC and Mode BT. In this mode, designers can easily understand the bus transactions without analysing the signals at cycle level.

E) **Mode MT**:

The tracer only records the master behaviours, such as read, write, or burst transfer. It is the highest abstraction level. This feature is very suitable for analysing the masters' transactions. The major difference compared with Mode BT is that this mode does not record the transfer handshaking activities and does not capture signals when the bus state is IDLE, WAIT, and BUSY. Thus, designers can focus on only the masters' transactions

III. BUS TRACER ARCHITECTURE

This section presents the architecture of our bus tracer. We first provide an overview of the architecture for the post-T trace. We then discuss the three major compression methods in this architecture.

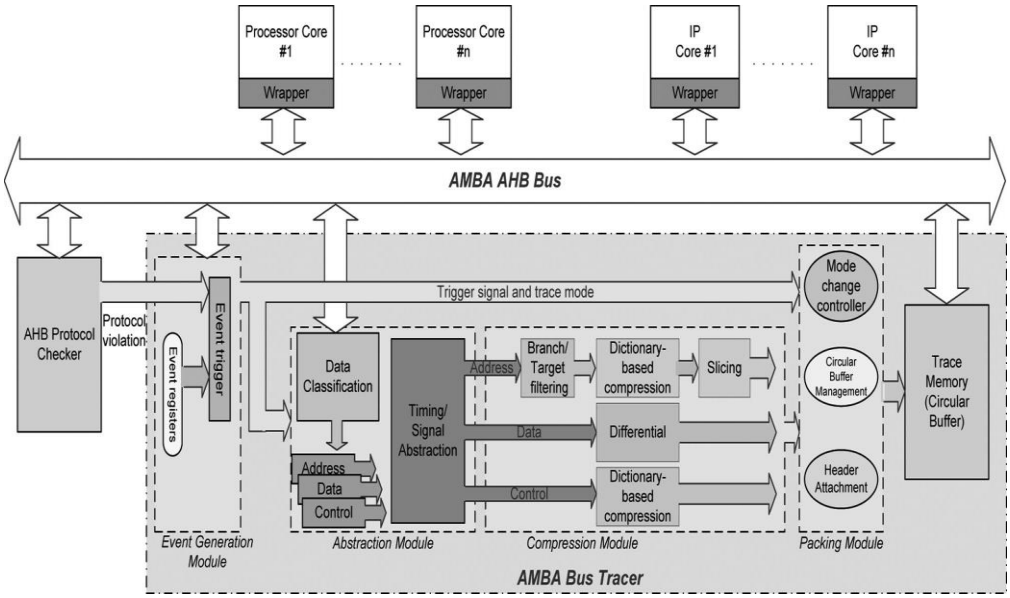

Figure 1: Bus Tracer Block Diagram

A) POST-TRACER ARCHITECTURE OVERVIEW:

It mainly contains four parts: Event Generation Module, Abstraction Module, Compression Modules, and Packing Module. The Event Generation Module controls the start/stop time, the trace mode, and the trace depth of traces. This information is sent to the following modules. Based on the trace mode, the Abstraction Module abstracts the signals in both timing dimension and signal dimension. The abstracted data are further compressed by the Compression Module to reduce the data size. Finally, the compressed results are packed with proper headers and written to the trace memory by the Packing Module.

The Event Generation Module decides the starting and stopping of a trace and its trace mode. The module has configurable event registers which specify the triggering events on the bus and a corresponding matching circuit to compare the bus activity with the events specified in the event registers. Optionally, this module can also accept events from external modules.

The abstraction module monitors the AMBA bus and selects/filters signals based on the abstraction mode. The bus signals are classified into four groups. Then, depending on the abstraction mode, some signals are ignored, and some signals are reduced to states. Finally, the results are forearded to the compression module for compression

The compression module is to reduce the trace size. It accepts the signals from the abstraction module is pipelined to increase the performance.

i. Program Address Compression:

We divide the program address compression into three phases for the spatial locality and the temporal locality. Fig. 2 shows the compression flow. There are three approaches: branch/target filter, dictionary-based compression, and slicing.

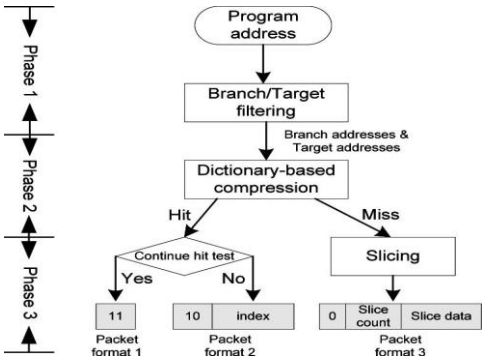

Figure 2: Program Address Compression Flow And Trace Format

ii. Branch/Target Filtering:

This technique aims at the spatial locality of the program address. Spatial locality exists since the program addresses are sequential mostly. Software programs (in assembly level) are composed by a number of basic blocks and the instructions in each basic block are sequential. Because of these characteristics, Branch/target filtering can records only the first instruction's address (Target) and the last instruction's address (Branch) of a basic block. The rest of the instructions are filtered since they are sequential and predictable.

iii. Dictionary-Based Compression:

To further reduce the size, we take the advantage of the temporal locality. Temporal locality exists since the basic blocks repeat frequently (loop structure), which implies the branch and target addresses after Phase 1 repeat frequently. Therefore, we can use the dictionary based compression. The idea is to map the data to a table keeping frequently appeared data, and record the table index instead of the data to reduce size. Fig. 11 shows the hardware architecture. The dictionary keeps the frequently appeared branch/target addresses. To keep the hardware cost reasonable, the proposed dictionary is implemented with a CAM-based FIFO. When it is full, the new address will replace the address at the first entry of FIFO

iv. Slicing:

The miss address can also be compressed with the Slicing approach. Because of the spatial locality, the basic blocks are often near each other, which means the high-order bits of branch/target addresses nearly have no change. Therefore, the concept of the Slicing is to reduce the data size by recording only the different digits of two consecutive miss addresses. To implement this concept in hardware, the address is partitioned into several slices of a equal size. The comparison between two consecutive miss addresses is at the slice level.

v. Data Address/Value Compression:

Data address and data value tend to be irregular and random. Therefore, there is no effective compression approach for data address/value. Considering using minimal hardware resources to achieve a good compression ratio, we use a differential approach based on the sub-traction.

vi. Control Signal Compression:

We classify the AHB control signals into two groups: access control signals (ACS) and protocol control signals (PCS). ACS are signals about the data access aspect, such as read/write, transfer size, and burst operations. PCS are signals controlling the transfer behaviour, such as master request, transfer type, arbitration, and transfer response. Control signals have two characteristics. First, the same combinations of the control signals repeat frequently, while other combinations happen rarely or never happen. The reason is that many combinations do not make sense in a SoC. It depends on the processor architecture, the cache architecture, and the memory type. Therefore, the IPs in a SoC tend to have only a few types of transfer despite the bus protocol allows for many transfer behaviours. Second, control signals change infrequently in a transaction.

IV. EXPERIMENTAL RESULTS

The specification of the implemented SYS-HMRBT bus tracer is shown in Table

Feature	Configuration
Trace Mode	FC, FT, BC, BT, MT
Trace Direction	Pre-T, Post-T
Input AHB signals	91 bits (HADDR, HRDATA, HWDATA, ACS's, PCS's)
Output trace word	32 bits
Pipeline stage	5
Max. # of masters	16
FIFO buffer	512 bits

Table I: Specification Of The Implemented Sys-HMRBT Bus Tracer

It has been implemented at C, RTL, FPGA, and chip levels. The synthesis result with TSMC 0.13-μ technology is shown in Table II

Components	Gate count	Frequency
Bus interface unit	930	
Event Gen. Module*	5,115	
Abstraction Module	270	
Compression Module	13,565	
Packing Module	4,594	
Periodical triggering	1,032	
FIFO buffer (512 bits)	16,294	
Total	41,800	500 MHz

* The event generation module contains two event registers. Each uses about 1,500 gates.

Table II: Syntheses Results Under Tsmc 0.13- M Technology

The bus tracer costs only about 41 K gates, which is relatively small in a typical SoC. The largest component is the FIFO buffer in the packing module. The second one is the compression module. The cost to support both the pre-T and post-T capabilities (periodical triggering module) is only 1032 gates. The major component of the event generation module is the event register, which is roughly 1500 gates per register. The implementation in this paper has two event registers. More registers can be added if necessary. Compared with our previous work the gate count is reduced by 31%. The reason is that this paper optimizes the ping-pong architecture by sharing most of the data path instead of duplicating all the hardware components. As for the circuit speed, the bus tracer is capable of running at 500 MHz, which is sufficient for most SoC's with a synthesis approach under 0.13-μm technology. If a faster clock speed is necessary, our bus tracer could be easily partitioned into more pipeline stages due to its streamlined compression/packing processing flow.

CONCLUSION

We have presented an on-chip bus tracer SYS-HMRBT for the development, integration, debugging, monitoring, and tuning of AHB-based SoC's. It is attached to the on-chip AHB bus and is capable of capturing and compressing in real time the bus traces with five modes of resolution. These modes could be dynamically switched while tracing. The bus tracer also supports both directions of traces: pre-T trace (trace before the triggering event) and post-T trace (trace after the triggering event). In addition, a graphical user interface, running on a host PC, has been developed to configure the bus tracer and analyse the captured traces. With the aforementioned features, SYS-HMRBT supports a diverse range of design/de-bugging/monitoring activities, including module development, chip integration, hardware/software integration and debugging, system behaviour monitoring,

system performance/power analysis and optimization, etc. The users are allowed to trade off between trace granularity and trace depth in order to make the most use of the on-chip trace memory or I/O pins.

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Secure Cloud Storage with Controlled Data Access, Assured Deletion and Data Forwarding

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***Abstract*-** A cloud storage system, consisting of a collection of storage servers, provides long-term storage services over the Internet. Storing data in a third party's cloud system causes serious concern over data confidentiality and to reduce data management costs. However, we must provide security guarantees for the outsourced data. We design and implement a secure cloud storage system that achieves fine-grained, policy-based access control file assured deletion and secure data forwarding to specified users. It associates outsourced files with file access policies, assuredly deletes files to make them unrecoverable to anyone upon revocations of file access policies. To achieve such security goals, a set of cryptographic key operations that are maintained by a separate key server(s) or manager(s). We propose a threshold proxy re-encryption scheme and integrate it with a decentralized erasure code such that a secure distributed storage system is formulated. The distributed storage system not only supports secure and robust data storage and retrieval, but also lets a user forward his data in the storage servers to another user without retrieving the data back.

***Index Terms*-** Decentralized erasure code, proxy re-encryption, threshold cryptography, secure storage system, access control, assured deletion, cloud storage

I. INTRODUCTION

Cloud computing providers offer their services according to several fundamental models: infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) where IaaS is the most basic and each higher model abstracts from the details of the lower models [10]. Cloud storage is a new business solution for remote backup, as it offers an abstraction of infinite storage space for clients to host data backups in a pay-as-you-go manner. It helps organizations and government agencies significantly reduce their financial overhead of data management, since they can now archive their data backups remotely to third-party cloud storage providers rather than maintain data centers on their own. Many services like email, Net banking, E-commerce etc… are provided on the Internet such that clients can use them from anywhere at any time. Cloud computing is a concept that treats the resources on the Internet as a unified entity, a cloud. Clients just use services without being concerned about how computation is done and storage is managed. In this paper, we focus on designing a cloud storage system for robustness, confidentiality, file access controls and functionality. A cloud storage system is considered as a large scale distributed storage system that consists of many independent storage servers.

The major requirement for storage systems is data robustness. There have been many proposals of storing data over storage servers. One way to provide data robustness is to encode a message of k symbols into a codeword of n symbols by erasure coding [3]. To store a message, each of its codeword symbols is stored in a different storage server. A storage server failure corresponds to an erasure error of the codeword symbol. As long as the number of failure servers is under the tolerance threshold of the erasure code, the message can be recovered from the codeword symbols stored in the available storage servers by the decoding process. This provides a tradeoff between the storage size and the tolerance threshold of failure servers. After the message symbols are sent to storage servers, each storage server independently computes a code-word symbol for the received message symbols and stores it. This finishes the encoding and storing process. The recovery process is the same.

To provide strong confidentiality for messages in storage servers, a client can encrypt messages by a cryptographic method before applying an erasure code method to encode and store messages. There are three problems in the above straightforward integration of encryption and encoding. First, the user has to do most computation and the communication traffic between the user and storage servers is high. Second, the user has to manage his cryptographic keys. If the user's device of storing the keys is lost or compromised, the security is broken. In this paper, we address the problem of forwarding data to another user by storage servers directly under the command of the data owner. The tight integration of encoding, encryption, and forwarding makes the storage system efficiently meet the requirements of data robustness, data confidentiality, and data forwarding. Accomplishing the integration with consideration of a distributed structure is challenging. We consider the system in a more general setting than previous works. This setting allows more flexible adjustment between the number of storage servers and robustness. Assume that there are n distributed storage servers and m key servers in the cloud storage system. A message is divided into k blocks and represented as a vector of k symbols [3].

One of the other major problems is files accessing. File access policies are used to control unauthorized access. (e.g., time expiration, read/write permissions of authorized users), such that data files are accessible only to clients who satisfy the file access policies. In addition in this paper, generalizes time-based file assured deletion

Our contributions are as follows:

- **Policy based access control and file assured deletion**
- **Secure data forwarding to specified users**

II. RELATED WORK

Policy-Based Deletion

We now generalize time-based deletion [1][2] to policy-based deletion as follows: we associate each file with a single atomic file access policy (or policy for short), or more generally, a Boolean combination of atomic policies. Each (atomic) policy is associated with a control key, and all the control keys are maintained by the key manager. Suppose now that a file is associated with a single policy. Then similar to time-based deletion, the file content is encrypted with a data key, and the data key is further encrypted with the control key corresponding to the policy. When the policy is revoked, the corresponding control key will be removed from the key manager. Thus, when the policy associated with a file is revoked and no longer holds the data key and hence the encrypted content of the file cannot be recovered with the control key of the policy. In this case, we say the file is assuredly deleted. The main idea of policy-based deletion is to delete files that are associated with revoked policies.

The definition of a policy varies across applications. In fact, time-based deletion is a special case under our frame-work. In general, policies with other access rights can be defined. To motivate the use of policy-based deletion, let us consider a scenario where a company outsources its data to the cloud. We consider four practical cases where policy-based deletion will be useful [4].

- Storing files for tenured employees.
- Storing files for contract-based employees.
- Storing files for a team of employees.
- Switching a cloud provider.

Distributed Storage Systems

At the early years, the Network-Attached Storage (NAS) and the Network File System (NFS) provide extra storage devices over the network such that a user can access the storage devices via network connection. Afterward, many improvements on scalability, robustness, efficiency, and security were proposed.

A decentralized architecture for storage systems offers good scalability. One way to reduce the expansion rate is to use erasure codes to encode messages. A message is encoded as a codeword, which is a vector of symbols, and each storage server stores a codeword symbol. A storage server failure is modeled as an erasure error of the stored codeword symbol. Random linear codes support distributed encoding, that is, each codeword symbol is independently computed. To store a message of k blocks, each storage server linearly combines the blocks with randomly chosen coefficients and stores the codeword symbol and coefficients. To retrieve the message, a user queries k storage servers for the stored codeword symbols and coefficients and solves the linear system. The case that n = ak for a fixed constant a. They showed that distributing each block of a message to v randomly chosen storage servers is enough to have a probability $1 - k/p - o(1)$.of a successful data retrieval, where $v = b \ln k$, $b >$ 5a, and p is the order of the used group. The sparsity parameter v = b ln k is the number of storage servers which a block is sent to. The larger v is, the communication cost is higher and the successful retrieval probability is higher. The system has light data confidentiality because an attacker can compromise k storage servers to get the message.

A secure decentralized erasure code for the networked storage system [16] in addition to storage servers, their system consists of key servers, which hold cryptographic key shares and work in a distributed way. In their system, stored messages are encrypted and then encoded. To retrieve a message, key servers query storage servers for the user. As long as the number of available key servers is over a threshold t, the message can be successfully retrieved with an overwhelming probability. One of their results shows that when there are n storage servers with $n = ak\sqrt{k}$, the parameter v is $b\sqrt{k} \ln k$ with $b > 5a$, and each key server queries 2 storage servers for each retrieval request, the probability of a successful retrieval is at least $1 - k/p - o(1)$.

A. Proxy Re-Encryption Schemes

Proxy re-encryption schemes [3][5], PK_A to a new one under another public key PK_B by using the re-encryption key $RK_{A->B}$. The server does not know the plaintext during transformation. Our work further integrates encryption, re-encryption, and encoding such that storage robustness is strengthened.

Type-based proxy re-encryption schemes [8] provide a better granularity on the granted right of a re-encryption key. A user can decide which type of messages and with whom he wants to share in this kind of proxy re-encryption schemes. In a key-private proxy re-encryption scheme, given a re-encryption key, a proxy server cannot determine the identity of the recipient. This kind of proxy re-encryption schemes provides higher privacy guarantee against proxy servers.

Let G_1 and G_2 be cyclic multiplicative groups with a prime order p and g ε G 1 be a generator. A map $\tilde{e} : G_1 \times G_1 \to G_2$ is a bilinear map if it is efficiently computable and has the properties of bilinearity and no degeneracy: for any $x, y \varepsilon Z^*_p$, $\tilde{e}(g^x . g^y) = \tilde{e}(g.g)^{xy}$ and $\tilde{e}(g.g)$ is not the identity element in G 2 . Let $Gen(1^\lambda)$ be an algorithm generating $(g, \tilde{e}, G_1, G_2, p)$, where λ is the length of p. Let x ε R X denote that x is randomly chosen from the set X.

Decisional bilinear Diffie-Hellman assumption. This assumption is that it is computationally infeasible to distinguish the distributions $(g, g^x, g^y, g^z, \tilde{e}(g.g)^{xyz})$ and $(g, g^x, g^y, g^z, \tilde{e}(g.g)^r)$, where $x, y, z, r \varepsilon R Z^*_p$.

Threshold proxy re-encryption scheme with multiplicative homomorphic property. An encryption scheme is multiplicative homomorphic if it supports a group operation Θ on encrypted plaintexts without decryption $D(SK, E(PK, m_1) \Theta E(PK, m_2)) = m_1 . m_2$ where E is the encryption function, D is the decryption function, and (PK , SK) is a pair of public key and secret key. Given two coefficients g_1 and g_2, two message symbols m_1 and m_2 can be encoded to a codeword symbol $m_1^{g1} \; m_2^{g2}$ in the encrypted form $C = E(PK, m_1)^{g1} \Theta E(PK , m_2)^{g2} = E(PK , m_1^{g1} . m_2^{g2})$

A secret key is shared to key servers with a threshold value t via the Shamir secret sharing scheme, where $t \geq k$.

C. Integrity Checking Functionality

Another important functionality about cloud storage is the function of integrity checking. After a user stores data into the storage system, he no longer possesses the data at hand. The user may want to check whether the data are properly stored in storage servers. The concept of provable data possession and the notion of proof of storage are proposed in previous papers. Later, public audit ability of stored data is addressed in previous. Nevertheless all of them consider the messages in the clear text form.

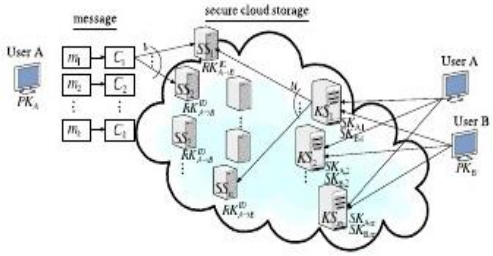
III. SCENARIO

D. System Model

As shown in Fig.1, our system model consists of users, n storage servers $SS_1, SS_2, \ldots, SS_n$, and m key servers $KS_1, KS_2, \ldots, KS_m$ [3]. Our system consists of **seven** phases: system setup, policy agreement, data storage, data forwarding, data retrieval, policy renewal and assured deletion. These seven phases are described as follows.

In the system **setup phase**, the system manager chooses system parameters and publishes them. Each client A is assigned a public-secret key pair (PK_A, SK_A).

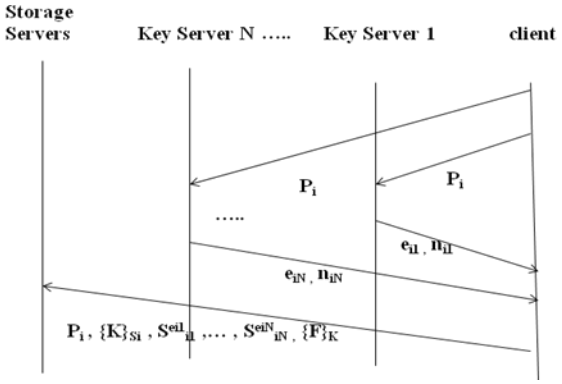
Fig.1. A general system model



User A distributes his secret key SK_A to key servers such that each key server KS_i holds a key share $SK_{A.i}$, $1 \le i \le m$. The key is shared with a threshold t [3].

In **Policy agreement and upload** phase, mainly focus on two kinds of logical connectives: 1) the conjunction (AND), which means the data is accessible only when every policy is satisfied, and 2) the disjunction (OR), which means if any policy is satisfied, then the data is accessible. Conjunctive policies [4], Suppose that F is associated with conjunctive policies $P_1 \wedge P_2 \wedge \ldots \wedge P_m$. To upload F to the cloud, the user first randomly generates a data key K, and i secret keys $S_1, S_2, \ldots, S_i$. It then sends the following to the cloud: $\{\{K\}_{S1}\}_{S2} \ldots_{Si}$, S_1^{e1} , S_2^{e2} , . . . , S_i^{ei} , and $\{F\}_K$. On the other hand, to recover F, the client generates random number R and sends $(S_1 R)^{e1}$, $(S_2 R)^{e2}$,…, $(S_i R)^{ei}$ to the key server ,which then returns $S_1 R$, $S_2 R$,…, $S_i R$. The client can then recover $S_1, S_2, \ldots, S_i$, and hence K and F.

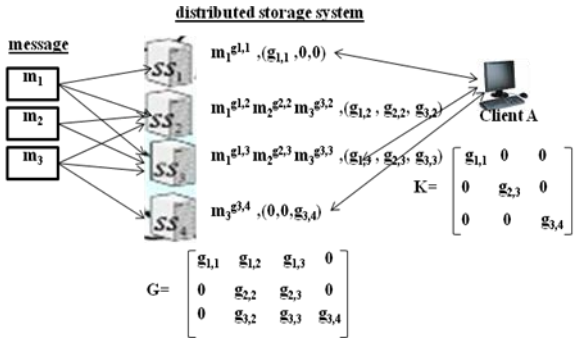
Fig. 2. File upload with multiple key servers



Disjunctive polices, suppose that F is associated with disjunctive policies $P_{i1} V P_{i2} V \ldots V P_{im.}$. To upload F to the cloud, the client will send the following: $\{K\}_{S1}$, $\{K\}_{S2}$, . . . , $\{K\}_{Sm}$, S_1^{e1} , S_2^{e2} , . . ., S_m^{em} , and $\{F\}_K$. Therefore, the client needs to compute m different encrypted copies of K. On the other hand, to recover F, we can use any one of the policies to decrypt the file, as in the above operations.

In the **data storage** phase, user A encrypts his message M and dispatches it to storage servers. A message M is decomposed into k blocks $m_1, m_2, \ldots, m_k$ and has an identifier ID. Client A encrypts each block m_i into a ciphertext C_i and sends it to v randomly chosen storage servers. Upon receiving ciphertexts from a user, each storage server linearly combines them with randomly chosen coefficients into a codeword symbol and stores it. Note that a storage server may receive less than k message blocks and we assume that all storage servers know the value k in advance. Erasure coding over exponents [3], consider that the message domain is the cyclic multiplicative group G_2. An encoder generates a generator matrix $G = [g_{i,j}]$ for $1 \le i \le k$, $1 \le j \le n$ as follows: for each row, the encoder randomly selects an entry and randomly sets a value from Z^*_p to the entry.

Fig. 3. A storage system with random linear coding over exponents

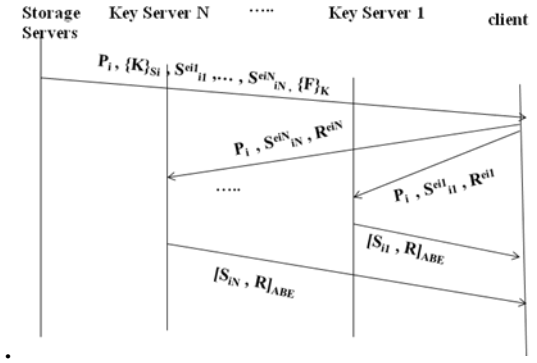


The encoder repeats this step v times with replacement for each row. The values of the rest entries are set to 0. Let the message be $(m_1, m_2, \ldots, m_k) \varepsilon G_2^k$. The encoding process is to generate $(w_1, w_2, \ldots, w_n) \varepsilon G_2^n$, where $w_j = m_1^{g1,j} m_2^{g2,j} \ldots m_k^{gk,j}$ for $1 \le j \le n$. The first step of the decoding process is to compute the inverse of a k X k sub matrix K of G. Let K be $[g_{i,j}]$ for $1 \le i , j_i \le k$. Let $K^{-1} = [d_{i,j}]_{1 \le i,j \le k}$. The final step of the decoding process is to compute $m_i = w_{j1}^{d1i}, w_{j2}^{d2i}, w_{jk}^{dki}$ for the $1 \le i \le k$. An example is shown in Fig.3 Client A stores three

messages m1,m2 and m3 into four storage servers. When the storage servers SS1, SS_3 and SS_4 are available and the k X k sub matrix K is invertible, Client A can decode m1,m2 and m3 from the codeword symbols w_1 , w_3 ,w_4 and the coefficients ($g_{1.1}$,0,0), (0 , $g_{2.3}$,0), (0 ,0, $g_{3,4}$) which are stored in the storage servers SS_1,SS_3 and SS_4.

In the **data retrieval** phase, user A requests to retrieve a message from storage servers. The message is either stored by him or forwarded to him. User A sends a retrieval request to key servers. Upon receiving the retrieval request and executing a proper authentication process with user A, Fig. 4 shows the file download operation with multiple key servers. After retrieving the encrypted key shares S_{i1}^{ei1} , S_{i2}^{ei2}, . . ., S_{iN}^{eiN} from the cloud, the client needs to request each key Server to decrypt a share. For the jth share S_{ij}^{eij} (j = 1, 2, . . ., N), the client decoys it with a randomly generated number R, and sends S_{ij}^{eij} R^{eij} to key Server j. Then, key Server j responds the client with $S_{ij}R$. It also encrypts the response with ABE [7]. After undecoys, the client knows S_{ij}. After collecting M decrypted shares of S_{ij}, the client decrypts codeword symbols, F the original message.

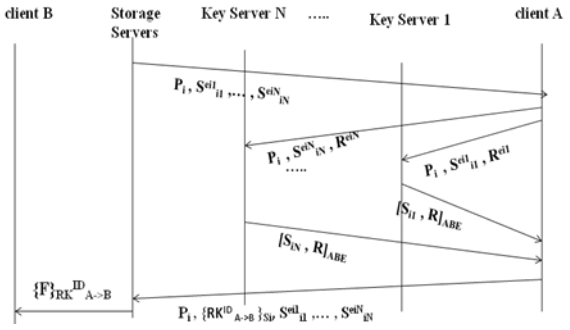
Fig: 4. Data retrieval with multiple key servers.



When a storage server fails, a new one is added. The new storage server queries k available storage servers, linearly combines the received codeword symbols as a new one and stores it. The system is then recovered.

In the **data forwarding** phase, user A forwards his encrypted message with an identifier ID stored in storage servers to user B such that B can decrypt the forwarded message by his secret key. To do so, A uses his secret key SK_A and B's public key PK_B to compute a re-encryption key[3] $RK^{ID}_{A->B}$ and then sends $RK^{ID}_{A->B}$ to all storage servers. Each storage server uses the re- encryption key to re-encrypt its codeword symbol for later retrieval requests by B.

Fig: 5. File forwarding from client A to B



The re-encrypted codeword symbol is the combination of ciphertexts under B's public key. In order to distinguish re-encrypted codeword symbols from intact ones, we call them original codeword symbols and re-encrypted codeword symbols, respectively.

In **policy renewal** phase, policy renewal means to associate a file with a new policy (or combination of policies). For example, if a user wants to extend the expiration time of a file, then the user can update the old policy that specifies an earlier expiration time to the new policy that specifies a later expiration time.

Policy renewal fully operates on keys, without retrieving the encrypted file from the cloud. The procedures can be summarized as follows [4]:

- Download all encrypted keys from the Storage servers.
- Send them to the key server for decryption.
- Recover the data key.
- Re-encrypt the data key with the control keys of the new Boolean combination of policies.
- Finally, send the newly encrypted keys back to the Storage servers.

Fig. 6. Policy renewal

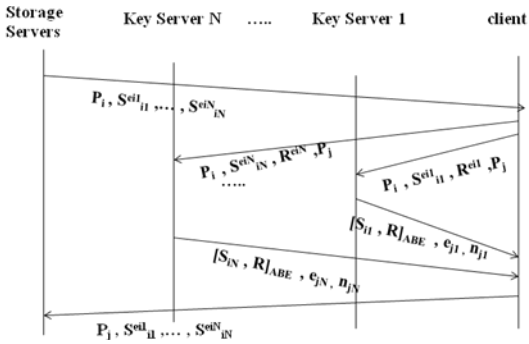


Fig. 6 illustrates this special case of policy renewal. In this case, the client simply sends the decoyed version S_i^{ei} R^{ei} to the key manager, which then returns S_iR. The client then recovers S_i. Now, the client re-encrypts S_i into S_i^{ej} (mod n_j), where (n_j, e_j) is the public control key of policy P_j, and sends it to the cloud. Note that the encrypted data key K remains intact.

In **data deletion** phase, to delete a file associated with conjunctive policies, we simply revoke any of the policies (say, P_j). Thus, we cannot recover S_j and hence the data key K and file F. On the other hand, to delete a file associated with disjunctive policies, we need to revoke all policies, so that S_j^{ej} cannot be recovered for all j. Note that for any Boolean combination of

policies, we can express it in canonical form, e.g., in the disjunction (OR) of conjunctive (AND) policies.

Implementation

We started our working prototype as web application using Netbeans IDE 6.9.1. Java in Windows OS. Java DB is used as Key storage servers, which is provided by Netbeans IDE. For encryption and decryption processes the inbuilt API's in JDK 6.n was used. In addition, we used LBRCE Storage Servers as our cloud storage. XenServer6.2.0 was used to construct the cloud. JSP was used to create the server pages in our application. The client interacts with the cloud as follows:

Registration:

The client must register with primary information before going to use the cloud.

Policy Agreement (policy):

Policy agreement is used to use the cloud storage for the client, which is takes the information about policy and duration of the period.

Upload (policy, file)

The client encrypts the input file according to the specified policy (or a Boolean combination of policies). Here, the file is encrypted using the 128-bit AES algorithm with the cipher block chaining (CBC) mode. After encryption, the client also appends the encrypted file size (8-bytes long) and the HMAC-SHA1 signature (20-bytes long) to the end of encrypted file for integrity checking in later downloads. It then sends the encrypted file and the metadata onto the cloud.

Forward (Rekey, file, client ID)

The client A wants to forward a file to client B, client gives the data like recipient id, file name, a special key (rekey)

Download (file)

The client retrieves the file and policy metadata from the cloud. It then checks the integrity of the encrypted file, and decrypts the file.

Renewal (file, old policy, revised policy)

The client first fetches the metadata of the given file from the cloud. It updates the metadata with the new policy. Finally, it sends the metadata back to the cloud. Note that the operation does not involve transfer of the input file.

Revocation (policy)

The client tells the key Servers to permanently revoke the specified policy. All files associated with the policy will be assuredly deleted. If a file is associated with the conjunctive policy combination that contains the revoked policy, then it will be assuredly deleted as well.

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A Survey of Various Workflow Scheduling Algorithms in Cloud Environment

Dr. A.Venumadhav

Abstract- Cloud computing is a technology that uses the internet and the central servers to maintain data and resources. Cloud computing allows consumers and businesses to use the applications without installing and access their personal files at any computer with the help of internet. The users request for available services according to their desired Quality of Service, and they are charged on a pay-per-use basis. One of the most challenging problems in Cloud computing is the workflow scheduling the problem of satisfying the Quality of Service of the users as well as minimizing the cost of workflows executions. Workflow scheduling is one of the major issue in cloud computing environment. This paper surveyed different types of scheduling algorithms and compare their various parameters. Existing workflow algorithms does not consider the execution time. Therefore there is a need to implement a new scheduling algorithm that can minimize the execution time in cloud environment.

Index Terms- Cloud computing, Workflow scheduling, SaaS, Workflow management, Qos scheduling.

I. INTRODUCTION

A Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and represented as one or more unified computing resources based on service level agreements established through the negotiation between the service providers and consumers. Cloud computing is a term that involves delivering hosted services over the Internet.

By using the virtualization concept, cloud computing can also support heterogeneous resources and flexibility is achieved. Another important advantage of cloud computing is its scalability. Cloud computing has been under growing spotlight as a possible solution for providing a flexible on demand computing infrastructure for a number of applications. All these factors increased the popularity of cloud computing The services are broadly divided into three categories Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).

Workflows constitute a common model for describing a wide range of scientific applications in distributed systems. Workflow is described by a Directed Acyclic Graph (DAG) in which each computational task is represented by a node, and control dependency between tasks is represented by a directed edge between the corresponding nodes. Workflow scheduling is the problem of mapping each task to appropriate resource and allowing the tasks to satisfy some performance criterion. Workflow is processes that consist of a series of steps which simplifies the complexity of executions and management of applications.

The objective of this paper is to focus mainly on various workflow scheduling algorithms. The remainder of the paper is organized like this. Section II presents the key concepts of this paper. Section III presents existing workflow scheduling algorithms and section V concludes the paper with summary.

II. KEY CONCEPTS

The main concepts dealing in this paper are cloud computing and workflow scheduling. Cloud computing is a term that involves delivering hosted services over the Internet. Workflow scheduling is the problem of mapping each task to appropriate resource allowing the tasks to satisfy some performance criterion. Workflows are supported by Workflow Management Systems. Workflow scheduling discovers resources and allocates tasks on suitable resources. Software as a service (SaaS), sometimes referred to as on-demand software, is a software delivery model in which software and associated data are centrally hosted on the cloud. SaaS is typically accessed by end users, via a web browser .Qos is associated with end users and providers.

A. Cloud computing

A cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and represented as one or more unified computing resources based on service level agreements established through negotiation between the service providers and consumers. According to the type of services provided cloud computing is classified into three. They are called as service models. Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as aService (IaaS) are the service models. IaaS Clouds, like Amazon, provide virtualized hardware and storage on top of which the users can deploy their own applications and services. PaaS Clouds, like Microsoft Azure, provide an application development environment in which the users can implement and run applications on the Cloud. According SaaS cloud there are two types of Cloud, which deliver software applications to the users. The first group offers an entire application as a service to the end users, which can be used without any changes or customization. Examples of these Clouds are Google office automation service like Google Document or Google Calendar. The second group provides rudimentary web services to the users (known as on-demand web services), which can be used to build more complex applications.

Clouds are deployed in four ways. They are community cloud, public cloud, private cloud and hybrid cloud. In community cloud type the resources are shared between organizations. Community clouds are mainly benefited by Government, banks etc.Public cloud provide applications, storage, and resources available to the general public by using a service provider. These services are free or on a pay-per-use

model. Generally, public cloud service providers like Microsoft and Google owns and operates the infrastructure and offer access only via Internet.Hybrid cloud is a composition of two or more clouds i.e (private, community or public) Hybrid clouds lack the flexibility, security in applications. Private cloud is mainly operated for single organization,and managed by internally or by a third party that hosted either internally or externally.

B. Workflow scheduling

Workflow scheduling is the problem of mapping each task to appropriate resource and allowing the tasks to satisfy some performance criterion. A workflow consists of a sequence of concatenated (connected) steps. Workflow mainly focused with the automation of procedures and also in order to achieve a overall goal thereby files and data are passed between participants according to a defined set of rules. A workflow enables the structuring of applications in a directed acyclic graph form where each node represents the task and edges represent the dependencies between the nodes of the applications .A single workflow consists of a set of tasks and each task communicate with another task in the workflow. Workflows are supported by Workflow Management Systems. Workflow scheduling discovers resources and allocates tasks on suitable resources. Workflow scheduling plays a vital role in the workflow management. Proper scheduling of workflow can have an efficient impact on the performance of the system .For proper scheduling in workflows various scheduling algorithms are used.

III. EXISTING WORKFLOW SCHEDULING ALGORITHM

The following workflow scheduling algorithms are currently present in clouds and these algorithms are summarized

1. A Particle Swarm Optimization based Heuristic for Scheduling Workflow Applications: Pandey, LinlinWu, Guru, Rajkumar Buyya presented a particle swarm optimization (PSO) based heuristic to schedule the applications to cloud resources that takes both computation and data transmission cost. It is used for workflow applications by varying its computation and communication costs. The evaluation results shows that PSO can minimize the cost and good distribution of workload onto resources.

2. Meng Xu, Lizhen Cui, Haiyang Wang, Yanbing Bi worked on multiple workflows and multiple QoS.They implemented a strategy for multiple workflow management system with multiple Quality of Service. The access rate for scheduling is increased by using this strategy. This strategy minimizes the make span and cost of workflows .

3. Heterogeneous Earliest Finish Time algorithm (HEFT): Topcuoglu et. al, presented the HEFT algorithm. This algorithm finds the average execution time of each task and also the average communication time between the resources of two tasks. Then tasks in the workflow are ordered on a rank function. Then the task with higher rank value is given higher priority. In the resource selection phase tasks are scheduled in priorities and each task is assigned to the resource that complete the task at the earliest time.

4. Market-Oriented-Hierarchical Scheduling**:** Salehi, M.A. and Buyya, R. proposed a market oriented hierarchical scheduling strategy which consists of both service level scheduling and tasklevel scheduling. The service level scheduling deals with the Task to Service assignment and the task level scheduling deals with the optimization of the Task to Virtual Machine assignment in local cloud data centers.

5. Cost based scheduling of scientific workflow applications on utility grids: Yu, J., Buyya, R. and Tham, C.K. proposed a cost based workflow scheduling algorithm minimizes the execution cost while meeting the deadline for delivering results.It can also adapt to the dealys of service executions by rescheduling unexecuted tasks.

6. Scheduling workflows with budget constraints: Sakellariou, R., Zhao, H., Tsiakkouri, E. and Dikaiakos, M.D proposed a basic model for workflow applications that modelled as directed acyclic graph(DAGs) and that allow to schedule the nodes of DAG onto resources in a way that satisfies a budget constraint and is optimized for overall time.

IV. EXISTING WORKFLOW SCHEDULING ALGORITHMS

Scheduling algorithm	**Scheduling parameters**	**Scheduling factors**	**Findings**	**Environment**	**Tools**
A particle swarm optimization-based heuristic[1]	Resource utilization time	Group of tasks	Good distribution of workload onto resources. Cost savings.	Cloud environment	Amazon EC2
HEFT workflow scheduling algorithm[3]	Make span	Highest upward rank	Reduce make span in a DAG .	Grid environment	Grid sim

Multiple Qos constrained scheduling strategy for multi-workflows[2]	Successrate,cost, time,makespan	Multiple workflows	Schedule the workflow dynamically. Minimize the execution time and cost.	Cloud environment	Cloud sim
Market oriented hierarchial strategy[4]	Cost,cpu time	Service and task level scheduling	Running cost is minimized. Optimize both cost and cpu time	Cloud environment	Amazon EC2
Workflow with budget constrained[9]	Makespan,budget	DAG scheduling	Minimize the execution time Makespan is minimized	Cloud environment	Amazon EC2
Cost based scheduling on utility grids[11]	Cost	Task scheduling	Reschedule the unexecuted tasks Minimize the cost	Grid environment	Grid sim

V. CONCLUSION

Workflow scheduling is one of the major issue in cloud computing environment. This paper surveyed the various existing workflow scheduling algorithms in cloud computing and compare their various parameters. Existing workflow algorithms does not consider the execution time. Therefore there is a need to implement a new scheduling algorithm that can minimize the execution time in cloud environment. Moving workflows to a cloud computing environment enables the use of various cloud services to facilitate workflow execution.

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A comparative economic analysis of Traditional and System of Rice Intensification (SRI) rice cultivation practices in Mahabubnagar district of Andhra Pradesh

RampuramJayapalreddy, Dr. N. Sandhya Shenoy

Abstract: System of Rice Intensification (SRI) paddy was introduced to offset the heavy cost of Traditional paddy cultivation. To decrease the cost of cultivation in Traditional paddy, to increase profits of the farmers in rice cultivation by decreasing the use of fertilizers, pesticides and minimizing water use by scientific water management in the face of labour scarcity, SRI paddy was introduced in Madagascar. In Traditional paddy the spacing of 20x15cms was followed and 20 days seedlings were used, and whereas, in SRI paddy cultivation, the wider spacing of 25x25cms was followed and by 8-12 days seedlings were used. Although large number of labour were needed for weed management in Traditional paddy, minimal labour was required for weed management in SRI paddy because of using weeders and machinery for weed management. While large amount of water to the tune of 2"-5" inundation was required for Traditional paddy cultivation, a film of water up to 1" only is maintained throughout in SRI paddy cultivation. The use of pesticides was heavy in Traditional paddy cultivation, where as the pest management is done without chemical pesticides in SRI paddy cultivation. The profits attained due to SRI paddy cultivation was higher as compared to Traditional paddy cultivation, therefore, SRI paddy was called as poor farmers' crop.

Index Terms: Labour scarcity, Weed management, Water management, Pesticide management, Cost of cultivation, Economic analysis, SRI rice cultivation, Traditional rice cultivation

I. INTRODUCTION

The Traditional paddy cultivation was oldest method of rice cultivation. The Traditional paddy cultivation practices also had undergone changes due to changing times where, the cumbersome practices were replaced. The interest of the farmers in cultivating rice by using Traditional method has decreased as large numbers of farmers were using fertilizers and pesticides in the method of Traditional paddy cultivation to increase the production of rice. SRI paddy was introduced in Madagascar for the benefit all the farmers. The Traditional method needs extra labour and a lot of fertilizers. Farming with modern methods is also expensive using outside inputs. It was noticed that, farmers adopting conventional methods could increase their production only by using expensive inputs such as chemical fertilizers, pesticides and hybrid seed. It is becoming increasingly difficult for the community to afford these things. It is also known that using chemicals is harmful to the environment. A new method of growing rice is designed for increasing rice production which can use the organic compost, and also the local seed. This method is called "System of Rice Intensification"(SRI). In this context, a study was undertaken in Mahabubnagar district of Andhra Pradesh to note the impact of Traditional as well as SRI method of rice cultivation on the farmers.

II. METHODOLOGY

The study on two methods of paddy cultivation i.e., Traditional and SRI was undertaken in Boothpur and Hanwadamandals in Mahabubnagar of AndhraPradesh, where both these methods were practiced. From each of the selected mandals, 6 villages were selected randomly, and, from each village, 5 farmers each were selected randomly for the sample, cultivating paddy with Traditional and SRI methods.

III. FINDINGS

General characteristics of sample farmers:

Traditional paddy farmers are found to be of old age and middle age group whereas in Sri paddy farmers are found to be of younger age group. The average family size of Traditional paddy farmers was middle(4-6 no's) and large whereas the average family size of Sri paddy farmers was medium(4-5 no's). While Traditional paddy respondents were found to be both educated(40 %) and uneducated (60%), all theSRI paddy cultivators were found to be educated (100 %). The average land holding of Traditional paddy farmers was 3-5 acres, whereas, the average land holding of SRI paddy farmers was 4-6 acres.

Nursery management:

There are some differences between the SRI paddy and Traditional paddy in nursery management.While the SRI paddy cultivation needed 2kgs of seed per acre for nursery management, the Traditional cultivation needed 30kgs of seed per acre for nursery management. The cost of the nursery management in SRI paddy cultivation was 168 rupees per acre whereas, for the Traditional paddy nursery management it was 1250 rupees per acre. Therefore, the farmers gained Rs 1082 per acre due to SRI cultivation up to nursery stage.

Method of transplanting:

There are major differences between the SRI and Traditional paddy cultivation in the method of transplanting. The method of transplanting in SRI cultivation needed 5-8 no's of labour per acre, while the Traditional paddy cultivation needed 10-15 no's of labour. The wider spacing was followedbetween the plants and rows in SRI paddy (25x25cms)as compared to Traditional paddy (20x15cms).Therefore, the cost of transplanting incurred in SRI paddy was 1200 rupees peracre, whereas, in Traditional paddy the cost wasdouble to that of SRI method i.e., 2400 rupees per acre. Therefore, was a gain of Rs 1150 per acre for transplantation only due to SRI method of cultivation.

Weed management:

By using the weeder supplied by the department, the SRIfarmertook up weed management without engaging any external labour, while in the Traditional cultivation method the farmer engaged 10-15 no's of labour per acre costingRs2400 per acre. Therefore, the SRI farmers gained Rs 2400 per acre for weed management.

Method of harvesting:

The crop attained maturity earlier by ten days for harvesting in SRI paddy (110 days) as compared to Traditional method of cultivation (120 days). But, the expenditure incurred was observed to be same in SRI paddy as well as in Traditional paddy cultivation methods for crop harvesting which wasRs.2500 per acre.

Yield and cost of cultivation:

The yield differences were observed in case of SRI and Traditional paddy cultivation methods. Whilethe farmer following SRI method could get 40-50 bags of rice per acre, the farmer practicing the Traditional method of paddy cultivation could get only 30-35 bags of rice per acre. It was observed thatin one bunch of paddy panicles of BPT Sona inSRI paddy method there were 8000-10000 grains,while in Traditional method, only 4000-4500 grains were observed. The total cost of cultivation per acre forSRI method was Rs.7208,while in Traditional paddy it was Rs.17190. Therefore, the profits gained due to SRI cultivation was Rs.9982 per acre.

The cost and expenditure of SRI paddy and Traditional paddy cultivation of sample farmers are given in the table as shown below.

Table: The cultivation cost of SRI and Traditional paddy methods

(n = 60)

S.No	Cultivation Practices	Expenditure (per acre)of SRI paddy	Expenditure(per acre) of Traditional paddy
1.	Seed Rate	Rs60/- for 2kgs	Rs600/- for 30kgs
2.	Nursery management	Rs 168/-	Rs1250/-
3.	Land preparation	Rs 1800/-	Rs1800/-
4.	Transplanting management	Rs 1200/-	Rs2400/-
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6.	Weed management	Rs100(weeder rent per day)	Rs2400/-
7.	Pesticide management	Rs120/-	Rs3000/-
8.	Harvesting	Rs2500/-	Rs2500/-
	Total	**Rs7208/-**	**Rs17190/-**

In the tableshownabove, it was observed that the seed rate of SRI paddy was 2kgsper acre costing Rs40, whereas in Traditional paddy it was30kgs per acre costing Rs600. It was observed that in Traditional method,many costs were incurred for land preparation andchemical fertilizers. In SRI paddy cultivation, less expenditure was observed in case of weed management and pesticide management. In Traditional paddy cultivation method, it was observed that there was much cost for fertilizers followed by pesticide management.Less cost per acre was incurred for SRI method for nursery management as compared to Traditional method. The land preparation costs and harvesting costs incurred for both the methods were same.The advantage of SRI method was seen in case of reduction in cost of cultivation, higher yields obtained per acre and lesser duration for harvesting the crop. Therefore, it is concluded that the SRI method of cultivation is advantageous to the paddy farmers as compared to Traditional method.

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Collaborative Writing SupportTools on the Cloud

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Abstract- Managing writing activities and providing feedback to students is very labor intensive and academics often opt out of including such learning experiences in their teaching. We describe the architecture for a new collaborative writing support environment used to embed such collaborative learning activities in engineering courses. IWrite provides tools for managing collaborative and individual writing assignments in large cohorts. It outsources the writing tools and the storage of student content to third party cloud-computing vendors(i.e., Google). We can describe how using machine learning and NLP techniques, the architecture provides automated feedback and automatic question generation, and process analysis features.

Index Terms- Accreditation Board in Engineering and Technology (ABET),Automatic Question Generation (AQG),latent semantic analysis (LSA)

I. INTRODUCTION

Writing is important in all knowledge-intensive professions. Engineers, for example, spend between 20 percent and 40 percent of their workday writing, a figure that increases with the responsibility of the position. It is often the case that much of the writing is done collaboratively .Collaboration and writing skills are so important that accreditation boards such as the Accreditation Board in Engineering and Technology (ABET) require evidence that graduates have the "ability to communicate effectively. Among the claimed positive effects of writing documents collaboratively are learning, socialization, creation of new ideas, and more understandable if not more effective documents This paper reports on an architecture for supporting CW that was designed with both pedagogical and software engineering principles in mind, and a first evaluation. The overall aim of the paper is to demonstrate how our system, called iWrite, effectively allows researchers and instructors to learn more about the students' writing activities, particularly about features of individual and group writing activities that correlate with quality outcomes.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

This article reports on a survey of 162 recent engineering graduates about their writing experiences during co-op. Specifically, the survey obtained data about how much time they spent writing, to what extent they engaged in collaborative writing, what kinds of documents they wrote, and the purposes and audiences for those documents, whether they believed their employers valued writing ability, and what strategies they perceived as most helpful in learning to write like engineers. Data were analyzed in terms of engineering specialty and gender. The findings are presented, along with implications for teaching and future research

Select-a-Kibitzer is a computerized tool that gives feedback to students on their compositions in a unique way. The feedback is based on composition research which describes the process of writing as one of simultaneously solving multiple, possibly conflicting, constraints. In Select-a-Kibitzer, each constraint is personified by a different character. A student enters a composition into the tool and then asks for feedback. A variety of natural language processing techniques are used to analyze the text. Then, each of the characters gives feedback on the text from its particular point of view. Select-a-Kibitzer differs greatly from standard "style checker" mechanisms that focus on surface features of the text. By using Latent Semantic Analysis, Select-a-Kibitzer can address a wide range of meaning-oriented composition issues, including coherence, purpose, topic, and overall quality. This paper describes the composition research that forms the basis of the project t, and the interaction and implementation of Select-a-Kibitzer. It focuses on techniques for using LSA to provide feedback about the meaning of the composition.

This article identifies problems in the computer-supported group writing of MBA students who are both novice strategic report writers and novice users of technology that supports group work. These problems consist of lack of attention to readers' needs, attitudes, and expectations; poor conflict management; leadership problems; genre confusion; shaky definition of the strategic problem; poor commitment and attitudes toward use of new technology; poor computer policies and practices; and conflicting hardware and software preferences. The article suggests several reasons for these problems, draws implications for instruction of computer-supported group writing, and suggests topics for further research.

In the COSAR-project a previous term computer - supported next term collaborative learning environment enables students to collaborate in writing an argumentative essay. The TC3 groupware environment (TC3: Text Composer, previous term Computer supported next term and Collaborative) offers access to relevant information sources, a private notepad, a chat facility including a chat history, and a shared word-processor. Planning tools for writing a shared argumentation diagram for content generation and a shared outline facility for content linearization were added to the basic TC3 environment. About 145 pairs of high school students completed essays on organ donation or cloning in the TC3 environment. We analyzed the logged discussion (chats) and activity protocols for task-related previous term processes next term present during discussion and collaboration. Previous term Processes next term looked into are planning, gathering information and composing the essay, as well as collaborative previous term processes next term such as coordinating, turn taking and time management. Our main research question is how task-related planning activities and collaborative previous term coordination next term with or without the help of planning tools relate to the quality of the resulting argumentative texts. Overall previous term coordination next term and planning of the writing activities on a meta-level and on a content level were found to be crucial for the quality of text.

III. RELATED STUDIES

Glosser: Automatic Feedback Tool Glosser is intended to facilitate the review of academic writing by providing feedback on the textual features of a document, such as coherence. The design of Glosser provides a framework for scaffolding feedback through the use of text mining techniques to identify relevant features for analysis in combination with a set of trigger questions to help prompt reflection. The framework provides an extensible plug-in architecture, which allows for new types of feedback tools to be easily developed and put into production. Glosser provides feedback on the current revision of a document as well as feedback on how the document has collaboratively progressed to its current state. Each time Glosser is accessed, any new revisions of a document are downloaded from Google Docs for analysis. The feedback provided by Glosser helps a student to review a document by highlighting the types of features aDocument uses to communicate, such as the keywords and topics it includes, and the flow of its content. The highlighted features are focused on improving a document by relating them to common problems in academic writing. Glosser is not intended to give a definitive answer on what is good or bad about a document. The feedback highlights what the writers of a document have done, but does not attempt to make any comparison to what it expects an ideal document should be. It is ultimately up to the user to decide whether the highlighted features have been appropriately used in the document. Glosser has also been designed to support collaborative writing. By analyzing the content and author of each document revision, it is possible to determine which author contributed which sentence or paragraph and how these contribute to the overall topics of the document. These collaborative features of Glosser can help a team understand how each member is participating in the writing process. The trigger questions at the
Top of each page are provided to help the reader focus their evaluation on different features of the document. Below the questions is the supportive content called “gloss”, to help the reader answer those questions. The “gloss” is the important feature that Glosser has highlighted in the document for reflection. A rollover window on each sentence indicates who and when wrote it.

Summary Street is educational software based on latent semantic analysis (LSA), a computer method for representing the content of texts. The classroom trial described here demonstrates the power of LSA to support an educational goal by providing automatic feedback on the content of students' summaries. Summary Street provides this feedback in an easy-to-grasp, graphic display that helps students to improve their writing across multiple cycles of writing and revision on their own before receiving a teacher's final evaluation. The software thus has the potential to provide students with extensive writing practice without increasing the teacher's workload. In classroom trials 6th-grade students not only wrote better summaries when receiving content-based feedback from Summary Street, but also spent more than twice as long engaged in the writing task. Specifically, their summaries were characterized by a more balanced coverage of the content than summaries composed without this feedback. Greater improvement in content scores was observed with texts that were difficult to summarize. Classroom implementation of Summary Street is discussed, including suggestions for instructional activities beyond summary writing.

IV. CONCLUSION

The architecture for iWrite, a CSCL system for supporting academic writing skills has been described. The system provides features for managing assignments, group and peer-reviewing activities. It also provides the infrastructure for automatic mirroring feedback including different forms of document visualization, group activity, and automatic question generation. The paper has focused on the theoretical framework and literature that underpins our project. Although not a complete survey of the extensive literature in the area, it highlights aspects that later supported architectural decisions. A key design aspect was the use of cloud computing writing tools and their APIs to build tools that make it seamless for students to write collaboratively either synchronously or asynchronously. A second design guideline was that data mining tools should have access to the document at any point in time to be able to provide real time automatic feedback.

We described aspects of its use with large cohorts, and comments from students and administrators. While an evaluation of the system’s impact on learning and the students’ perceptions of writing are outside the scope of this paper, we analyzed student use of

iWrite in relation to student performance and found that the best predictors for high performance are the way students use iWrite, not necessarily whether they used the tool.

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Effect of Rupee Depreciation on Common Man

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Abstract- This paper presents the effect of rupee depreciation on common man. The main focus of the research was on change in pattern of spending and savings of people who are getting affected by rupee depreciation. Currency depreciation is severely affecting the economy of our country and eventually its residents are getting affected due to drastic change in their monthly budget. For stock market investors, things have turned worse. The fall in the value of Indian currency has several consequences which could have mixed effects on Indian economy and its residents. The study showed that after currency depreciation people are grappling with inflated prices of the commodities which they use in their day to day life and the change in their spending and savings trends, a falling rupee will pinch students who are planning to go abroad or are presently studying outside India. This paper studies the real implications of the depreciation of the rupee on the Indian Nationals and the steps taken by government to stem its fall.

Index Terms- Effect of Rupee Depreciation, Steps to stem fall of rupee, Causes of rupee depreciation.

I. INTRODUCTION

A decrease in the value of a currency with respect to other currencies. This means that the depreciated currency is worth fewer units of some other currency. While depreciation means a reduction in value, it can be advantageous as it makes exports in the depreciated currency less expensive. To put it differently, if one US dollar can buy 45 INRs today, and can buy 60 INRs tomorrow; INR would have depreciated by 33 per cent. The opposite logic holds true for a currency appreciation. But what exactly determines the value of a currency? It is the demand and supply. If more people demand say, US dollar, the value of it goes up relative to the INR, and vice-versa.

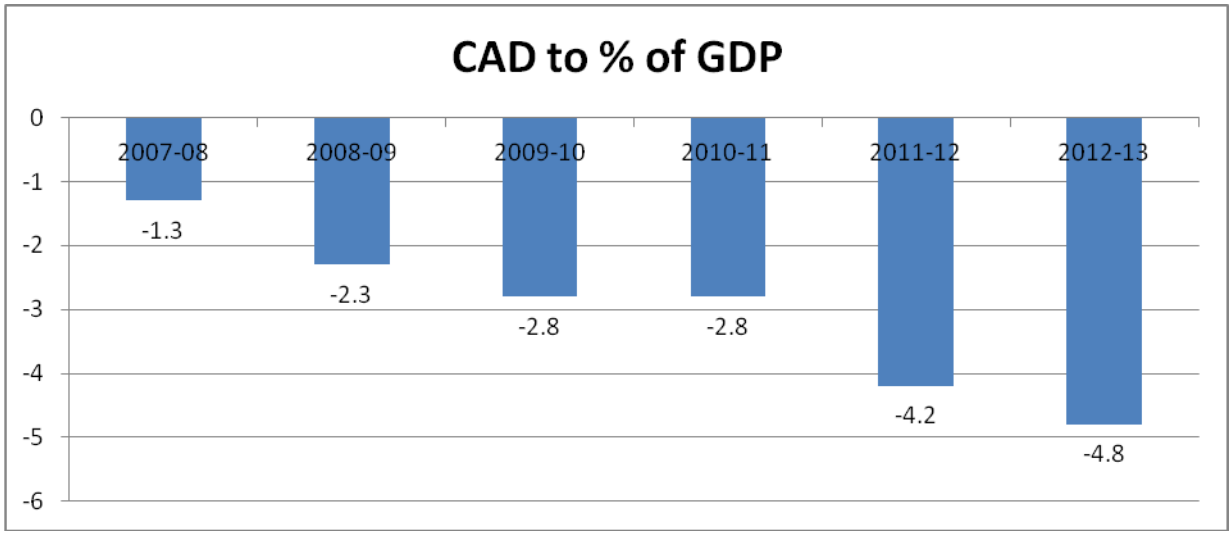
As the S&P BSE Sensex is plunging every other day coupled with the free fall of rupee, there is little any one can do. If the depreciation in rupee continues, it will further increase inflation, because of this extreme fear people across all age groups have started saving more which is good news for banks as banks are grappling with the tight liquidity. The volatility in the stock market, the continuing decline of the rupee, and rising yields in government bonds reveal investors' lack of faith that the Indian government is in control of the situation due to which investment cycle is in its bottom stage which is putting pressure on Indian currency.

II. CAUSES OF RUPEE FALL

High Current Account Deficit:

CAD occurs when a country's total imports of goods, services and transfers is greater than the country's total export of goods, services and transfers. This situation makes a country a net debtor to the rest of the world. The High current account deficit is putting a lot of pressure on rupee. The CAD reached to 4.8% of GDP which has breached the comfort level of 2.5% of GDP as mentioned by RBI in 2012-13. The Primary reason for ballooning CAD is high imports as compared with Exports.

India is Importing crude oil as our country can only produce 20% of the demand , rest 80% is being imported from different oil Producing countries first being Saudi Arabia followed by Iraq. The steadily worsening balance of payments (BoP) outlook has been a central point of concern to not only RBI, but to the finance ministry as well. According to the minister of commerce Mr. Anand Sharma Total import of crude oil is $150 Billion and the import of Gold is $60 billion. The total current account deficit is $150 in 2012-13. The facts show that fertilizer imports surged by 30% in the last two years and coal imports have doubled. Therefore, the problem of CAD continues to persist.



Source: www.rbi.org.in

With the reduction in exports and an increase in imports, on one hand the current account deficit has swelled while on the other, the fiscal deficit is also expected to be above the comfort levels due to increased subsidy by government. A slowdown in the global economy has drastically reduced the demand for Indian goods and services.

The fall in commodity prices on the other hand have increased imports which resulted in an imbalance between payments and receipts. S R Rao, India's trade secretary said that India is unlikely to achieve the export target of $ 350bn which could result in higher current account deficit due to which there will be fall in rupee value.

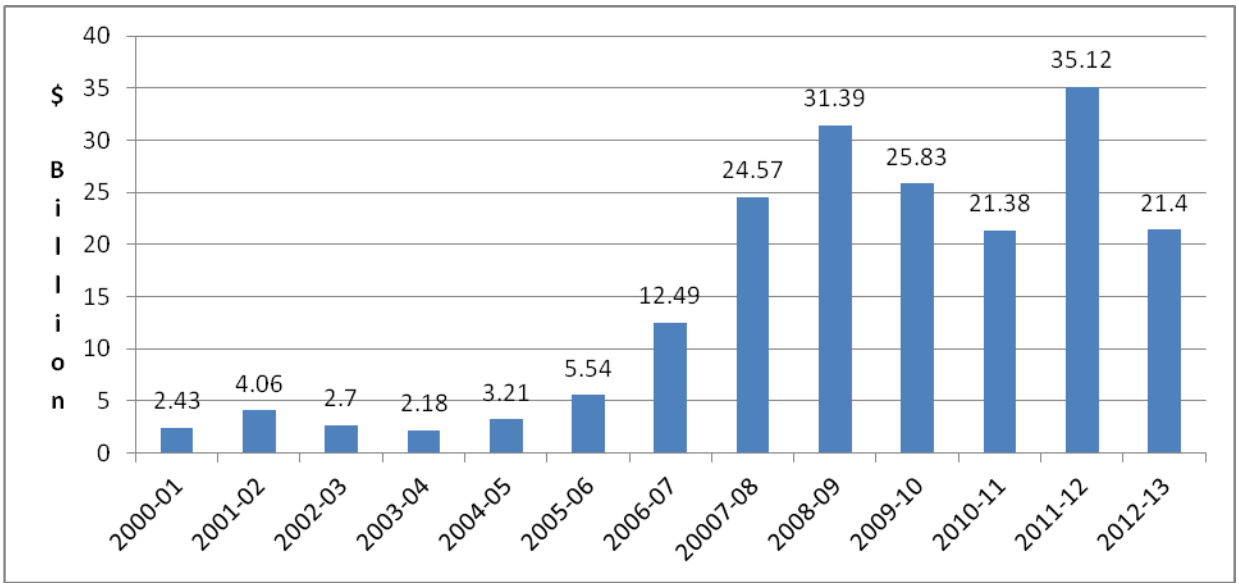
A large fiscal deficit forces central bank (RBI) to print more money and encourage inflation. This further hurts the rupee value.

Less FDI coming to India:

The United Nations Conference on Trade and Development (UNCTAD) june 2013 pointed out that the foreign direct investment in India gone down by 29% to $26 billion in 2012. When dollars come into India through the foreign direct investment (FDI) route they need to be exchanged for INR. Hence, dollars are being sold and rupees are bought. This pushes up the demand for INR, when we increase the supply of dollars, it helps rupee gain value against the dollar or at least hold stable.

In 2012, the FDI coming into India has fallen dramatically. The situation is likely to continue in the near short term.

The corruption scandals revealed in the 2G and the coal-gate scam hasn't improved India's image abroad. In fact in the 2G scam telecom licenses have been cancelled and the message that was sent to the foreign investors was that India as a country can go back on policy decisions. This is something that no big investor who is willing to put a lot of money at stake, likes to hear.



Source: www.dipp.nic.in

Opening up multi-brand retail sector was government's other big plan for getting FDI into the country. In September 2012, the government had allowed foreign investors to invest upto 51% in multi-brand retail sector. But between then and now not even a single global retail company has filed an application with the Foreign Investment Promotion Board (FIPB), which scrutinizes FDI proposals.

This scenario doesn't look like it is changing as still foreign investors struggle to make sense of the regulations as they stand today. Dollars that come in through the FDI route come in for the long run as they are used to set up new industries and factories or to have joint venture in existing companies. This money cannot be withdrawn overnight like the money invested in the stock market and the bond market by FIIs.

Unreasonably High Imports:

Love for gold by Indians has been prime reason behind significant demand for the dollar. Gold is bought and sold internationally in dollars. India extracts very little gold on its own and hence has to import almost all the gold that is required in the country. When gold is imported into the country, the payment has to be done in dollars, thus pushing up the demand for dollars. As many have argued in the past that there is some logic for the love that Indians have had for gold. A major reason behind Indians buy gold is high inflation. Consumer price inflation is still very high. Also, with the marriage season around the corner for the next few months, the demand for gold is likely to go increase. India imported record 162 Tonnes of Gold in May'13, what can also add to the demand is the recent fall in price of gold, which will get those buyers who preferred to stay away from gold because of the rising price, back to the market. All this means a higher demand for dollars. Gold is the 2nd largest commodity after crude being imported by the Govt.

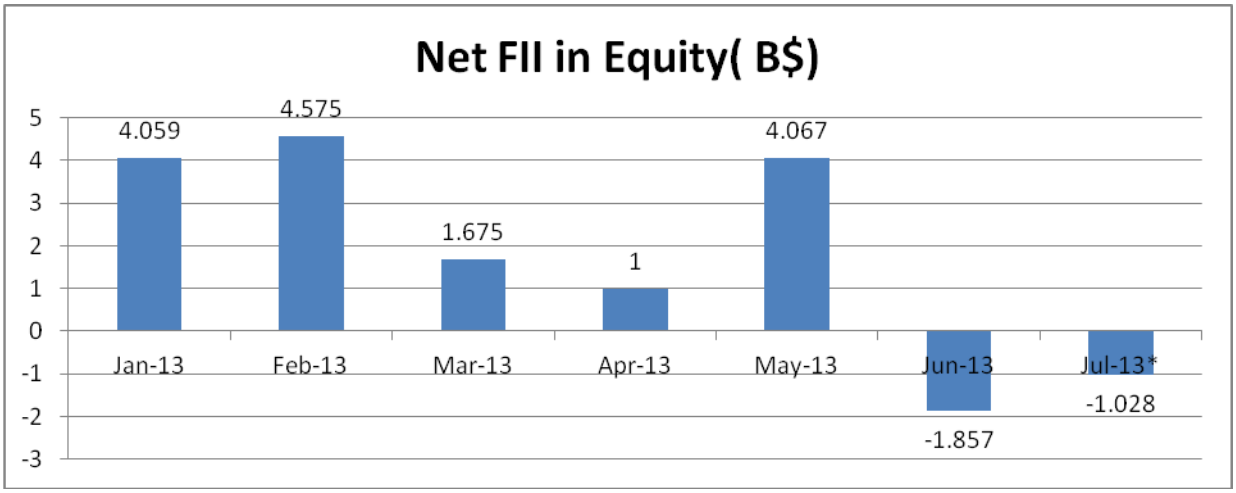
Also India has been importing a huge amount of coal lately to run its thermal power plants. India's coal imports drastically grew by 43% to 16.77 MT in May'13, as compared to the same period in 2012. Importing coal again shows increased demand for dollars.

The irony is that India got huge coal reserves which are still not being extracted. The common logic here is to blame Coal India Ltd, which more or less has had a monopoly to produce coal in country. The government has tried to bring private sector investment in the coal sector but that has been done in a haphazard manner which resulted in the Coalgate scam. This has delayed the process of bigger role that the private sector could have played in the mining of coal and thus led to lower coal imports. The situation cannot be improved overnight.

The major reason for this is that the expertise to get a coal mine up and running in India has been limited to Coal India till now. To develop the similar expertise in the private sector will take time and till then India should continue to import coal, which will need dollars.

Rupee Sinks due to huge FII outflows:

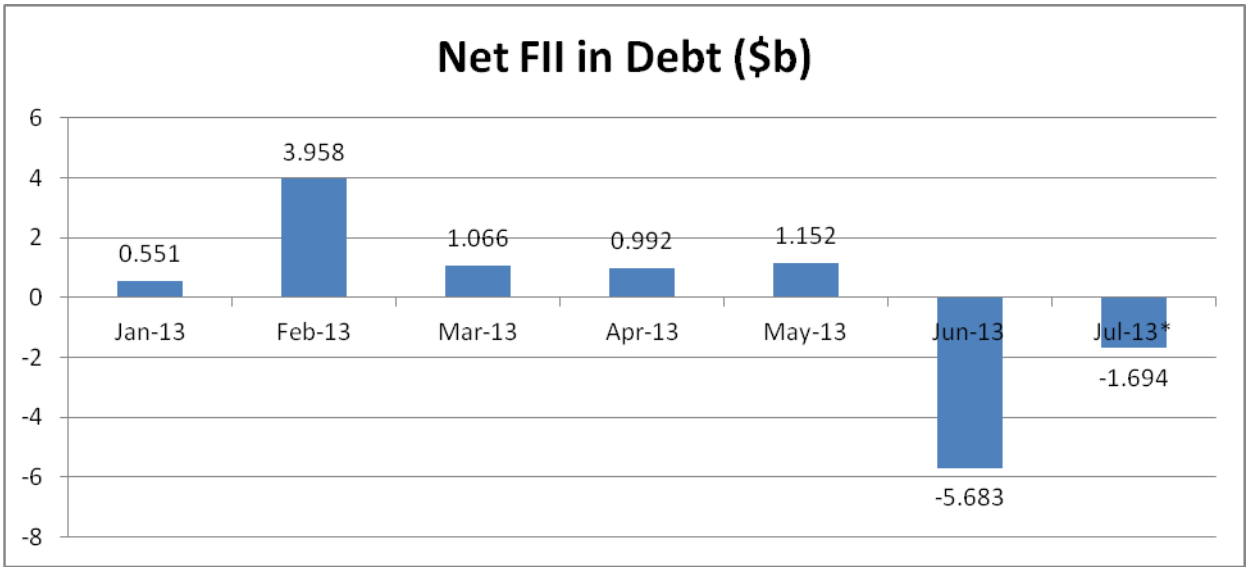
FIIs had resulted sellers in June due to the sharp decline seen in the rupee. With US economy showing signs of improvement, the dollar strengthened, causing currencies across the emerging markets to decline in June-July. The rupee fell by a little more than 10% since June 11.



* Till 21-07-2013

Source: http://www.indiainfoline.com/MarketStatistics/FII-Activity

Improving employment data and lower inflation in the USA were conceived as indicators of a recovering economy, leading investors believed that the Quantitative Easing-3 (stimulus) would be phased out sooner than expected; causing funds to flow away from emerging markets like India, back into developed markets. Emerging economies had been the biggest beneficiary of the QE3 bond-buying programme, worth $85 billion per month.



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Source: http://www.indiainfoline.com/MarketStatistics/FII-Activity

Time to Repay ECB:

While the supply of dollars will remain a problem, the need for them will continue to remain high. A major demand for dollars will come from firms which have raised loans in dollars over the last few years and now have to repay them. In Beginning 2004, the RBI has approved nearly $220 billion worth of external commercial borrowings and foreign currency convertible bonds (FCCB), at the rate of a slightly over $2 billion a month. About two-thirds of this amount was approved in the past 5 years. Much of this ECB will have to be repaid this financial year, putting further pressure on the Indian currency.

A lot of companies have raised foreign loans over the last few years simply because the interest rates in India are very high as compared to outside world. These firms will need dollars to repay their foreign loans as they are nearing maturity. The other thing that may happen is that firms which have cash, might look to repay their foreign loans earlier rather than later. This is simply because as the dollar is appreciating against rupee, it takes a greater amount of Indian currency to buy dollars. So if companies have idle cash lying around, it makes greater sense for them to pre-pay dollar loans. The trouble is that if a lot of companies decide to prepay loans then it will add to the rise in demand for the dollar and thus put further pressure on the INR.

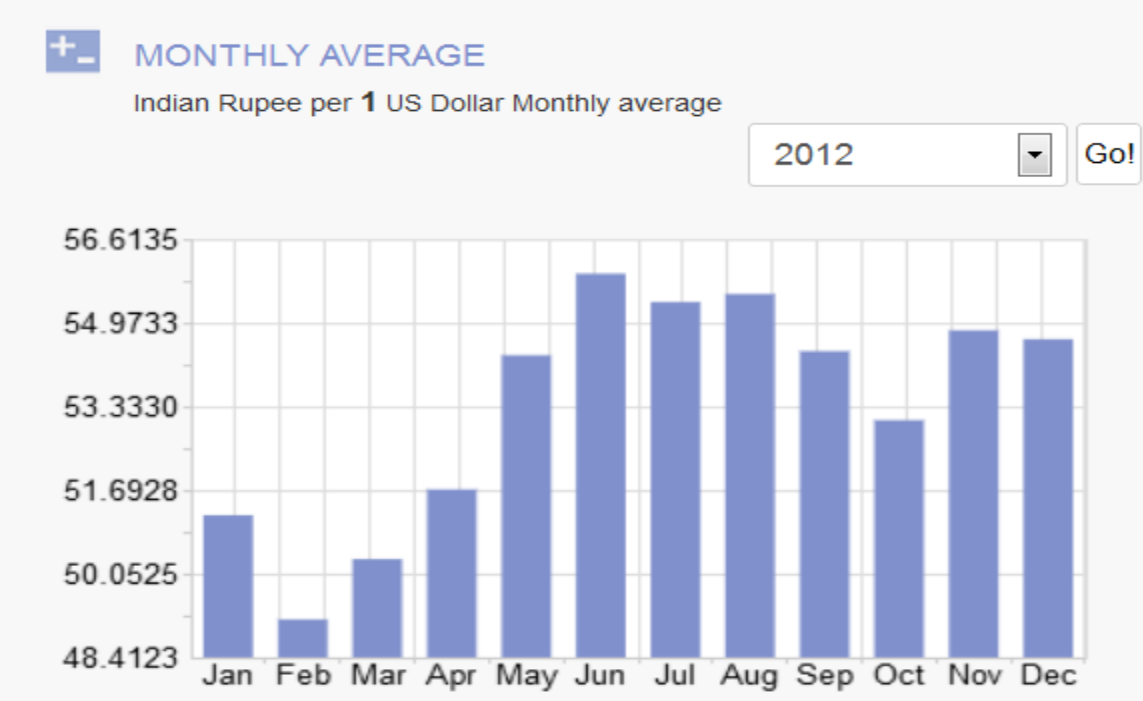
Historical Value of Exchange Rate

Historical Indian Rupee Rate (INR USD)

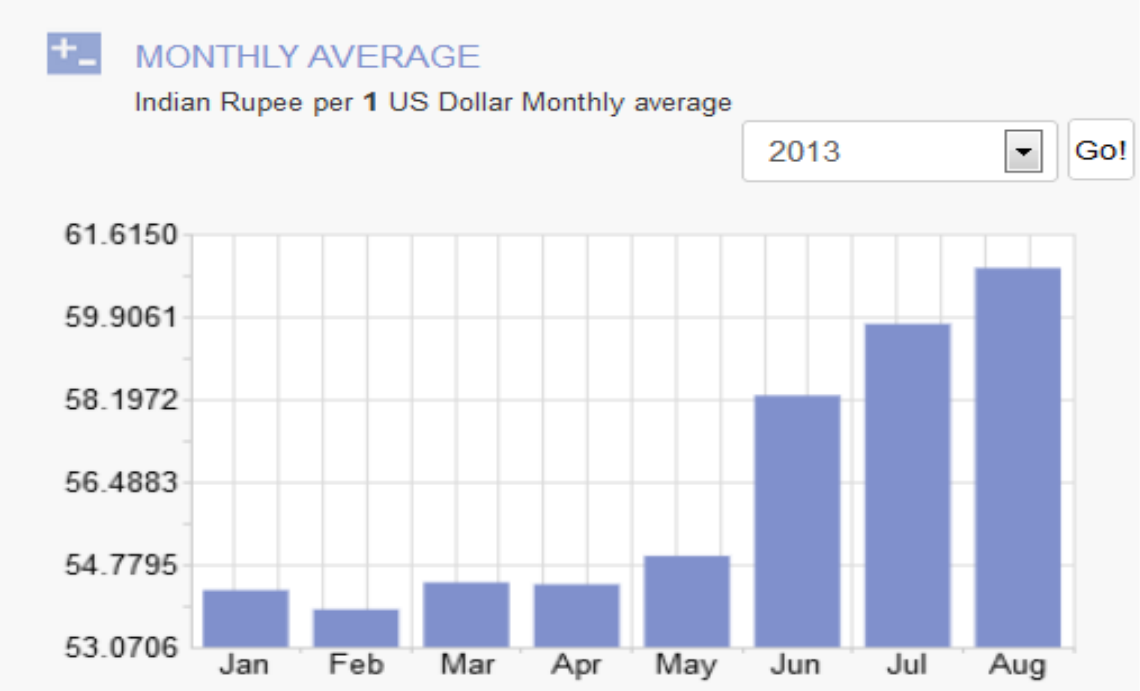
Year	INR/USD	Year	INR/USD	Year	INR/USD	Year	INR/USD
1973	7.66	1984	11.36	1995	32.43	2006	45.17
1974	8.03	1985	12.34	1996	35.52	2007	41.20
1975	8.41	1986	12.60	1997	36.36	2008	43.41
1976	8.97	1987	12.95	1998	41.33	2009	48.32
1977	8.77	1988	13.91	1999	43.12	2010	45.65
1978	8.20	1989	16.21	2000	45.00	2011	46.61
1979	8.16	1990	17.50	2001	47.23	2012	53.34
1980	7.89	1991	22.72	2002	48.62		
1981	8.68	1992	28.14	2003	46.60		
1982	9.48	1993	31.26	2004	45.28		
1983	10.11	1994	31.39	2005	44.01		

Average annual currency exchange rate for the Indian Rupee (Rupees per U.S. Dollar) is shown in this table: 1973 to present.

Source: http://rzdiv.blogspot.in/



Source: http://www.x-rates.com/average/?from=USD&to=INR&amount=1&year=2012



Source: http://www.x-rates.com/average/?from=USD&to=INR&amount=1&year=2012

Indian currency i.e. rupee has been in news because of recent fall against the dollar. Rupee has fallen more than 15% in just 3 months' time against dollar. India rupee has been depreciating against dollar for long time now. Post liberalization, the fall in the rupee against dollar has been rather steep. It is important to note that rupee has started falling against dollar more frequently after partial convertibility of rupee was introduced. The partial convertibility gave it more elbow room to automatically adjust against the dollar.

III. Research Objectives

The research paper emphasizes on the effect of currency depreciation on common man and the main objectives is to find the change in pattern of spending and savings due to depreciation in the value of Rupee in spite of the steps taken by government and RBI to curb the fall of Indian rupee.

IV. Research Methodology

The present study is exploratory as well as descriptive in context of currency depreciation. The primary data for the study was collected from different background of people like students, working employees, housewives. These people were approached with a structured questionnaire and they requested to participate in the study. The secondary data was collected from reliable database of Reserve bank of India, SEBI and besides this data was also extracted from websites of different leading newspapers and magazines.

As the population covered was large, sample size of 126 individuals belonging to different fields, classes, age groups were taken. Though respondents name and contact details are recorded for research verification purpose, but each of them was assured of his/her anonymity.

V. Steps Taken to Curb the Rupee Fall

India's regulators toughen rules for derivatives trading in currency markets.

Regulators toughened rules for derivatives trading in the currency market in a order to check the steep decline of the Indian rupee, which fell to a record low against the dollar on 8th July.

The RBI, in a notification issued late on 8th July, restricted banks from proprietary trading in domestic currency futures and the exchange-traded options market.

In a separate order, SEBI doubled the margin requirement on the domestic dollar-rupee forward trade, which means investors will now have to pay two times as much in margins for a transaction at the time of the trade itself. SEBI said in a circular that it has reduced the exposure that brokers and their clients can take on currency derivatives and also doubled their margins on dollar-rupee contracts. The exposure to all currency contracts for a broker has been capped at 15% of their overall exposure or $50 million, whichever is lower.

SEBI said that the new norms will come into force from July 11 and the changes have been decided in consultation with RBI because of recent turbulent phase of extreme volatility in USD-INR exchange rate. The current exposure limits for brokers and clients were the higher amounts of 15% of their overall exposure or $50 million, and 6% or $10 million, respectively.

The margin requirements vary across different categories and they are being revised upwards by 100% of the present rates for rupee-dollar derivative contracts.

RBI directs OMCs to buy dollars from single PSB.

With the rupee depreciating sharply against the US dollar, the RBI on 9th July 2013 ordered state-owned oil companies (OMCs) to purchase their dollar requirements from single public sector bank to curb volatility in the currency. State oil-refiners, who are biggest dollar guzzlers, agreed to implement the RBI order with immediate effect. The OMCs were even willing to accept RBI selling dollars directly to them through a single window.

The RBI issued orders to Indian Oil (IOC), Hindustan Petroleum (HPCL), Bharat Petroleum(BPCL) and Mangalore Refinery (MRPL) to stop seeking quotes from several banks for their USD 8-8.5 billion of monthly US dollar need. Oil firms seeking multiple quotes for their dollar requirement was felt to be one of the prime reasons adding to speculation on demand for the USD and volatility in the local unit.

IOC, the nation's largest refiner, will buy their monthly requirement of USD 3.8-4 billion dollars from its official banker State Bank of India. Similarly, BPCL, HPCL and MRPL will buy their dollar requirement from a single particular bank. The decision follows Monday's meeting between RBI and OMCs to discuss measures to control volatility and high fluctuations in the Forex rate.

RBI eases overseas borrowing norms for firms.

The Reserve Bank of India on Monday, 8 July 2013, eased norms for non-bank asset finance companies to raise debt from beyond the borders by allowing the lenders to raise such funds through the automatic route as against the approval route earlier, in a step aimed at improving dollar supply amid a weakening rupee.

NBFCs can borrow from outside India up to $200 million in a financial year to finance import of infrastructure equipment, the RBI said. The RBI also allowed them to raise such debt from all recognised lenders with a minimum average maturity period of 5 years.

The rupee ended at 60.61/62 to the dollar, after suspected dollar sales by the central bank through state-run banks pulled the unit off from its lifetime low of 61.21 on 8th July.

The Reserve Bank of India (RBI) extended the time limit for telecom companies to refinance rupee loans through the external commercial borrowing (ECB) route till 31st March, 2014 for 3G spectrum won in telecom auction in 2010. Earlier, the RBI had said overseas loans should be raised within 12 months from the date of payment of final instalment to the government. The Reserve Bank of India has made it easier for property developers to access foreign money in an effort to improve the pace of low-cost housing projects, such as slum rehabilitation. The RBI has extended the limit of $1 billion that can be borrowed through the external commercial borrowing (ECB) scheme to the FY15 from this year.

The RBI also reduced the minimum experience required by companies to have to undertake these projects from 5 years to 3 years.

VI. RBI TIGHTENS LIQUIDITY

The Reserve Bank of India (RBI) announced measures late on 15th July 2013 to curb the rupee's decline by tightening liquidity and making it costlier for banks to borrow funds from the RBI.

The RBI raised the marginal standing facility (MSF) rate and Bank Rate each by 200 basis points to 10.25%, capped the amount up to which banks can borrow or lend under its daily liquidity window and announced a sale of government securities through an open market operation. This could lead to some increased dollar inflows as overall interest rates in the economy will increase.

The RBI said total funds available under its repo window will be capped at 1% of banks' deposits – roughly 750 billion rupees – from Wednesday. It announced a 120 billion rupee sale of government bonds for Thursday.

The MSF is the rate at which banks can borrow from the RBI at an elevated rate against government securities during times of tight cash. The bank rate is linked to the MSF.

RBI has reduced the liquidity adjustment facility.

Liquidity adjustment facilities are used to aid banks in resolving any short-term cash shortages during periods of economic instability or from any other form of stress caused by forces beyond anybody's control.

On 23rd July 2013 RBI has reduced the liquidity adjustment facility (LAF) for each bank from 1 per cent of the total deposits to 0.5 per cent, thus limiting the access to borrowed funds from the RBI. The limit will come into force with immediate effect and continue till further notice.

In another measure to suck out liquidity from the system, RBI has asked banks to maintain higher average CRR (cash reserve ratio) of 99 per cent of the requirement on daily basis as against earlier 70 per cent. CRR is portion of deposits that banks are required to keep with RBI.

According senior bankers, the measures could suck out Rs 4,000-Rs 5,000 crore from the system. The additional measures to check exchange rate volatility comes within 10 days of RBI taking harsh steps to suck out liquidity from the system.

RBI has reduced the liquidity adjustment facility (LAF) for each bank from 1% of the total deposits to 0.5%, thus limiting the access to borrowed funds from the central bank. The limit will come into force with immediate effect and continue till further notice.

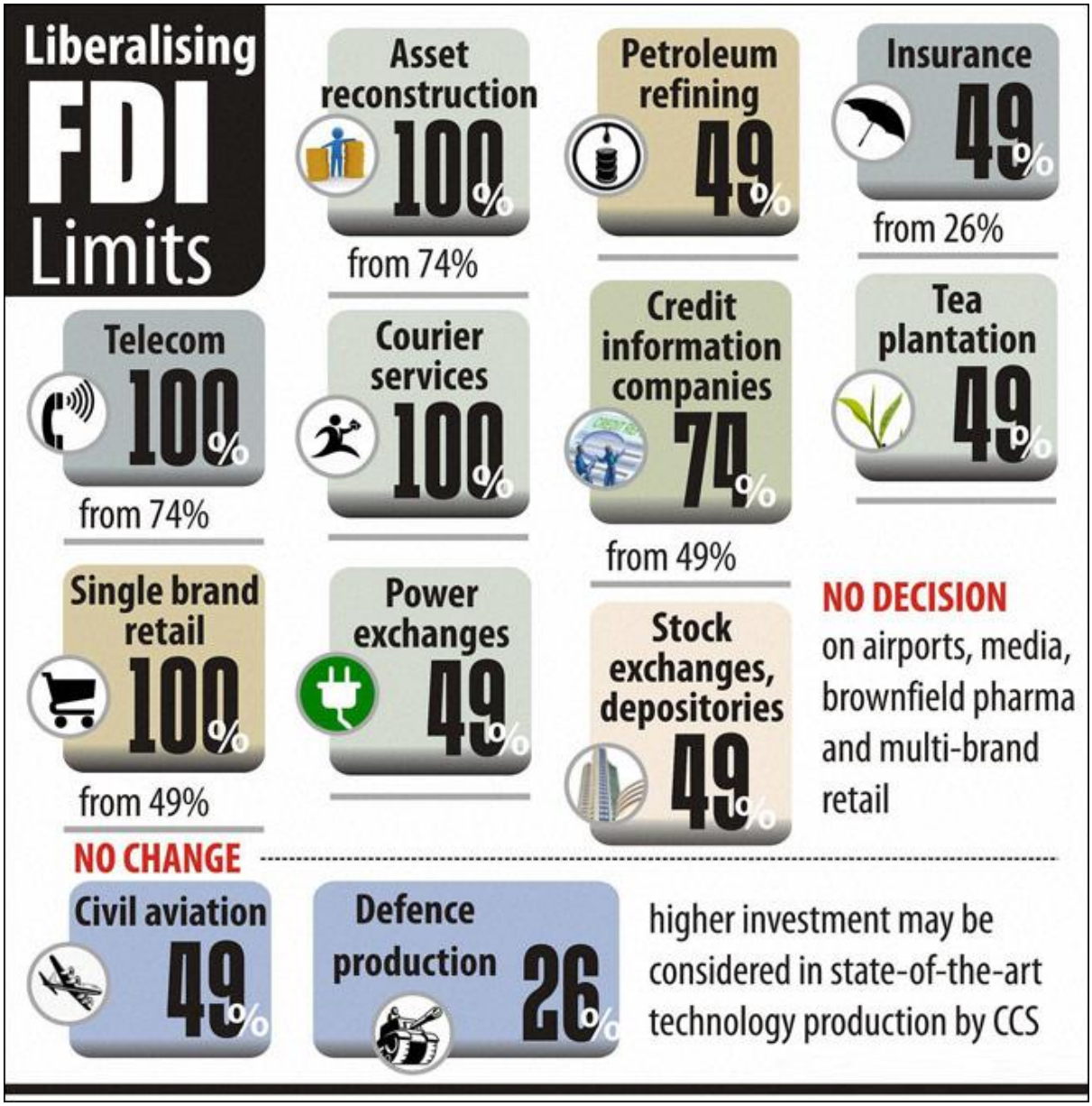
RBI said the July 16 instructions regarding the limit on overall allocation of funds at Rs 75,000 crore under LAF stands withdrawn. The changes in LAF will come into effect from 24th July 2013. The new norms on CRR will be effective from the first day of the next reporting fortnight, from July 27, 2013.

VII. RELAXING OF FDI

UPA government has set off another round of economic reforms with big bang reforms in foreign direct investment caps. Stepping into a political minefield, the government has changed FDI limits in as many as 12 sectors. The Government on 16th July 2013 liberalised FDI limits in twelve sectors, including telecom and defence.

Paving way for fresh investments in telecom companies, the government cleared 100 per cent FDI in telecom sector. To boost the sagging economy, the government also raised FDI in defence sector from 26 per cent to 100 per cent. But the hike comes with some conditions. 100% will only be allowed with state-of-the art technology transfer

FDI in 4 other sectors - gas refineries, commodity exchanges, power trading and stock exchanges have been allowed via the automatic route.



Source: http://indiatoday.intoday.in/story/government-foreign-direct-investment-defence-telecom/1/291640.html

In the contentious insurance sector, it was decided to raise the sectoral FDI cap from 26% to 49% under automatic route under which companies investing do not require prior government approval. A Bill to raise FDI cap in the sector is pending in the Rajya Sabha.

It was decided to allow 49% FDI in single brand retail under the automatic route and above that through the Foreign Investment Promotion Board (FIPB). In case of PSU oil refineries, commodity bourses, power exchanges, stock exchanges and clearing corporations, FDI will be allowed up to 49% under automatic route as against current routing of the investment through FIPB.

The decisions taken on 16th July 2013 were based on recommendations of Mayaram Committee which had suggested changes in investment caps in about 20 sectors, but the meeting approved only in 12.

In basic and cellular services, FDI was raised to 100 per cent from current 74 per cent. Of this, up to 49 per cent will be allowed under automatic route and the remaining through FIPB approval.

A similar dispensation would be allowed for asset reconstruction companies and tea plantations. FDI of up to 100 per cent was allowed in courier services under automatic route. Earlier, similar amount of investment was allowed through FIPB route. In credit information firms 74 per cent FDI under automatic route would be allowed.

RBI extends restriction on co-operative banks for loan against gold coins.

The Reserve Bank of India has extended the restriction on advance against gold on co-operative banks as well, a move to curb the demand for gold on 7th June 2013.

In a notification, the RBI said while granting advance against the security of specially minted gold coins sold by banks, state/central co-operative banks should ensure that the weight of the coin/coins does not exceed 50 grams/customer.

Also the amount of loan to any customer against gold ornaments, gold jewellery and gold coins (weighing up to 50 grams) should be within the Board approved limit.Earlier, similar restrictions were imposed on commercial banks.

The RBI's latest move comes after government raising import duty on gold to 8% from 6%.

The central bank has also advised banks not to sell gold coins, finance minister P Chidambaram said on 6th June 2013. RBI has also imposed restrictions on gold imports by banks.

Surge in gold imports has become a cause of concern for both the government as well as the RBI as it is putting pressure on the current account deficit, which is around 4.8% of the GDP in 2012-13.

In the first two months of the current fiscal there has been significant spurt in gold imports as the average foreign buy of the precious metal stood at 152 tonnes in April and May. The monthly average import in 2012-13 was 70 tonnes.

The increase in gold import is because of slowdown in its prices in the international market.

RBI moves to limited capital controls to save rupee

With the rupee drifting down to a lifetime low of 61.44 to the dollar on 14th Aug 2013, despite measures to tighten liquidity and push up interest rates, the Reserve Bank of India (RBI) on Wednesday changed track, choosing to defend the currency by moving towards capital controls. The central bank put restrictions on the amount of foreign exchange Indian companies and individuals can invest, remit or spend overseas in an attempt to curb dollar outflows from the country. Indian companies can now send out only 100% of their net worth as overseas direct investment (ODI), way below the current cap of 400%, under the automatic route. The restrictions however not imposed on the Navaratna public sector entities ONGC and Oil India, the RBI said in a release.

The RBI also capped remittances abroad by resident individuals to $75,000, down sharply from $200,000 allowed earlier under the liberalised remittance scheme. Further, Indian residents cannot invest in real estate abroad. Individual remittances abroad totalled about $3 billion during 2012-13.

To encourage banks to collect more dollars through non-resident rupee deposits and foreign currency non-resident deposits, the RBI exempted banks from maintaining the cash reserve ratio and the statutory liquidity ratio on incremental NRI deposits with a tenure of three years or more.

With the rupee has depreciated by 13% since April 2013 and having fallen despite measures initiated by the central bank since mid-July, economists believe that the RBI is readying long-term initiatives. "The policy is not aimed at tackling any immediate situation, but should be construed as a safeguard against a more difficult situation," observed Samiran Chakraborty, MD and head of research, Standard Chartered Bank.

ODI by Indian corporates was $300 million in April-May FY14. In FY13, Indian firms invested $7.1 billion overseas, according to the RBI's August monthly bulletin. The central bank did soften the blow, saying genuine investment plans, beyond the limits imposed, could be considered under the approval route.

Import Duty on Gold increased to 10%

India, the world's biggest consumer of gold, raised import duties for the third time in 2013 to curtail the current account deficit and stem volatility in the rupee.

The government has increased the customs duty to 10% from 8% on the yellow metal, a move that helped the rupee edge up against the dollar but will make the commodity costlier by about Rs 600/10 gram.

Customs duty on platinum has been raised to 10% from 8%, and on silver to 10% from 6%. The government also raised the excise duty on gold and silver bars.

"The basic purpose of enhancing the duty was to curb the import of gold," Revenue Secretary Sumit Bose told reporters.
The higher taxes on precious metals would fetch the exchequer an additional Rs 4,830 crore.

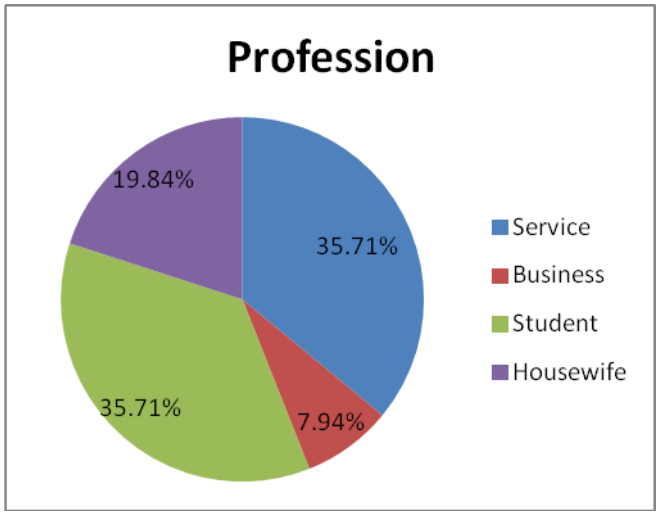
The increase in import duties on precious metals is part of a series of steps announced by Finance Minister P Chidambaram on Monday to restrict the current account deficit to 3.7% of GDP in FY14 and ensure its full and safe financing.

Source: Economic Times

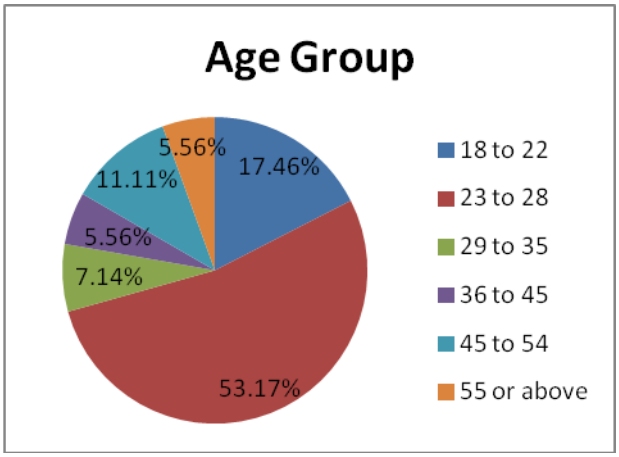
Chidambaram on 12th Aug 2013 said the government's plan is to restrict gold imports to 850 tonnes in the current financial year, compared with 950 tonnes in 2012-13. Gold imports stood at about 335 tonnes in the April-June quarter.

"This is as much a red line as the fiscal deficit. We will do all to ensure that it is not breached. The current account deficit will be contained and fully and safely financed," he had said, unveiling his plan to contain CAD.

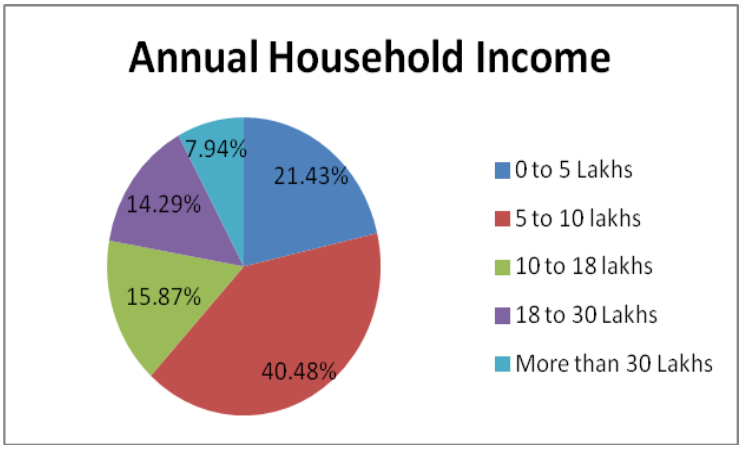
VIII. Data Findings and Analyses



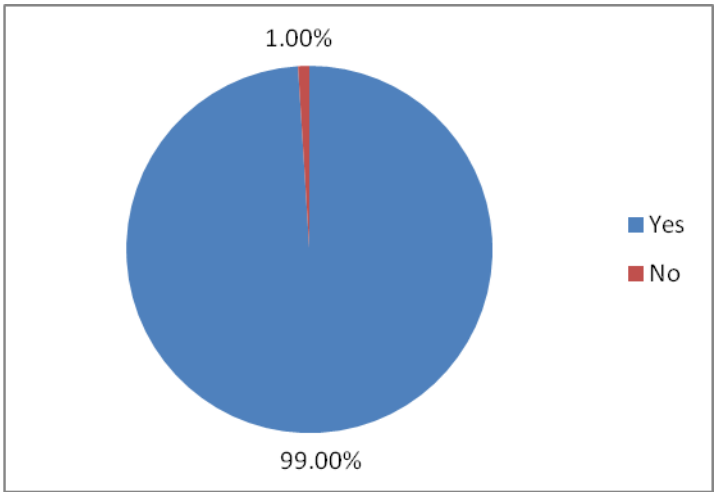
Respondents consist of around 35% of students with similar percentage of service class individuals, 19.84% consists of housewives and 7.94% consists of businessmen.



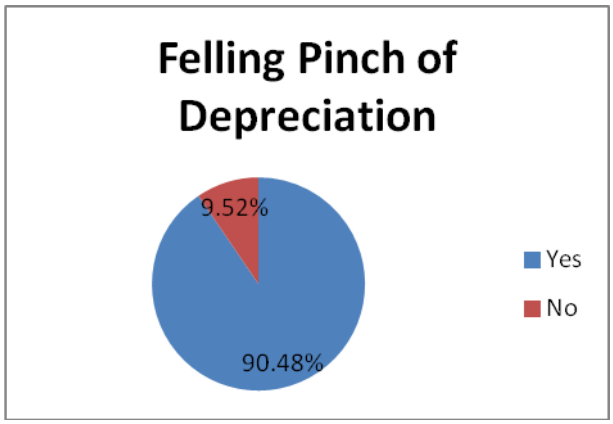
Respondents consists of maximum of people who lies between 23 to 28 years of age, 17.46% lies in between 18 to 22 years of age, 11.11% of people lies between 45 to 54 years of age, 7.14% of respondents were in between 29 to 35 years of age, 5.56% of people lies in between 36 to 45 years of age with similar percentage of people lies in the age group of 55 and above.



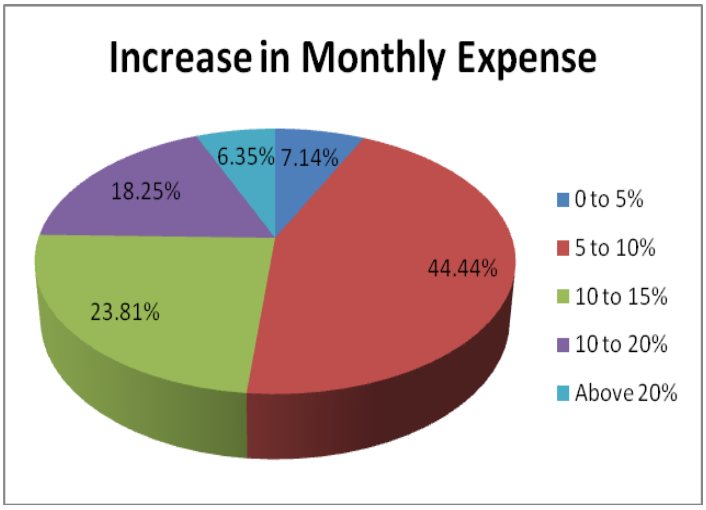
40.48% of people have annual household income of around 5 to 10 lakhs, 21.43% of people have 0 to 5 lakhs of annual house hold income, 14.29% has annual household income of 18 to 30 lakhs, and 15.87% of respondents have annual income of 10 to 18 lakhs while 7.94% of people have annual household income of more than 30lakhs.



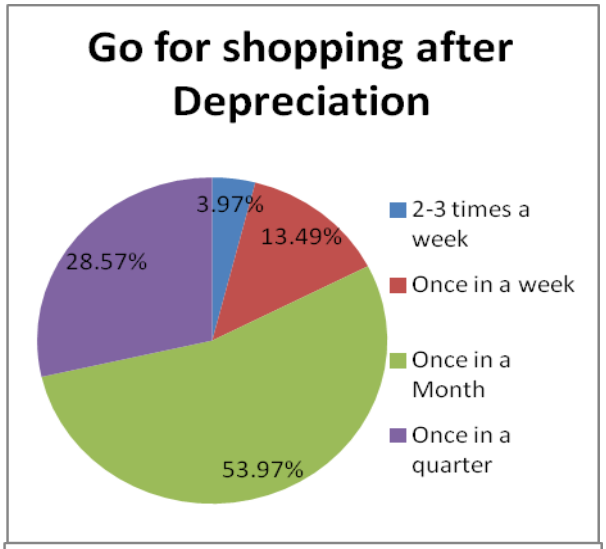
99% of respondents are aware of rupee depreciation.

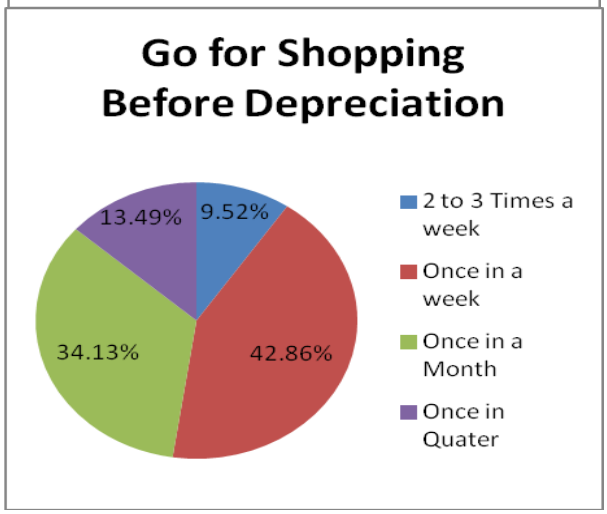


Whereas 90.48% of respondents have started feeling pinch of rupee depreciation.

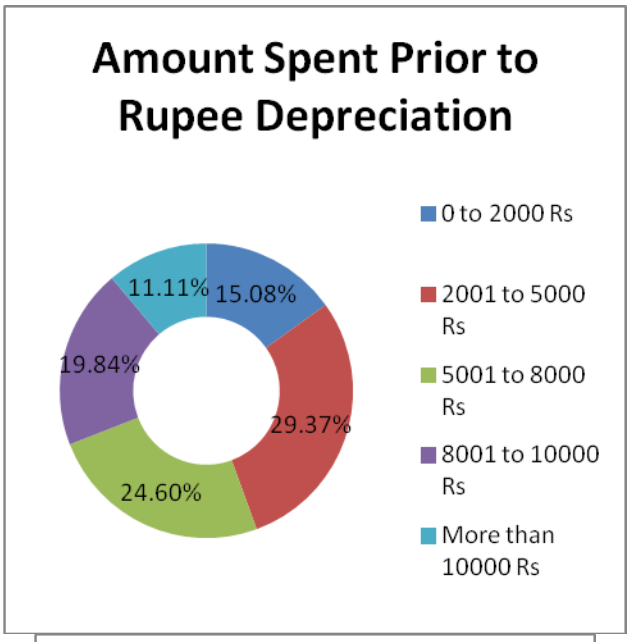


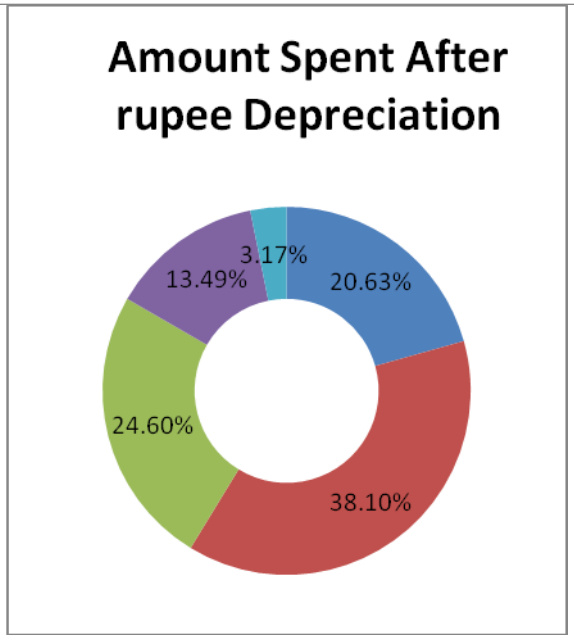
44.44% of respondents have said that their monthly expenditure has been increased by 5 to 10% , 23.81% people have said that there is an increase of around 10 to 15% in their monthly expense. 18.25% of respondents have said that monthly expense has been increased by 15 to 20%, while 6.35% of respondents said that their monthly expense has been increased by more than 20%.



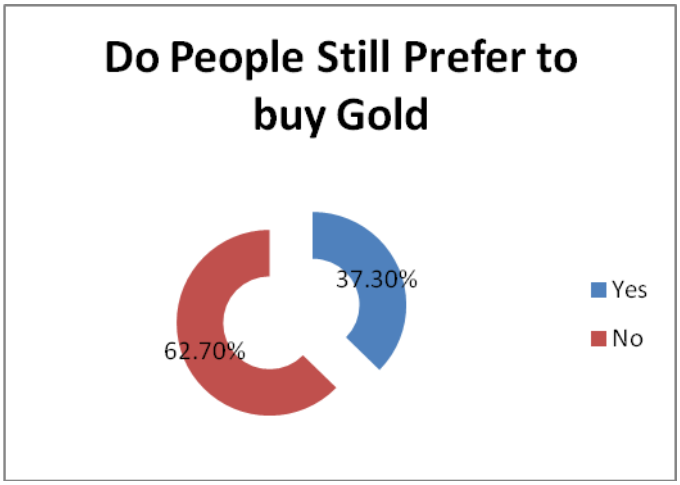


There were 9.52% of respondents which use to go for shopping 2-3 times in a week which has been reduced to 3.97% post rupee depreciation. There were 42.86% of respondents which use to go for shopping before depreciation which has been decreased to 13.49%. While there is an increase in respondents who go for shopping once in a month from 34.13% to 53.97%.

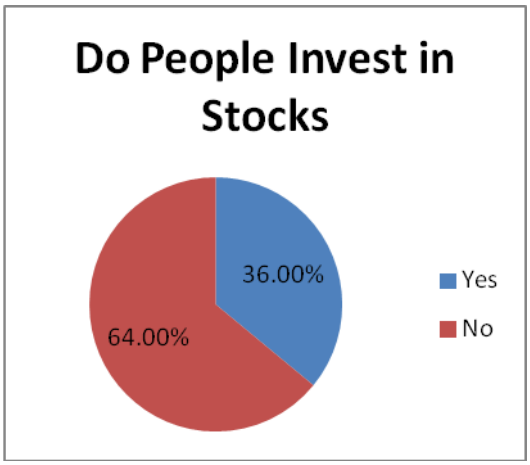




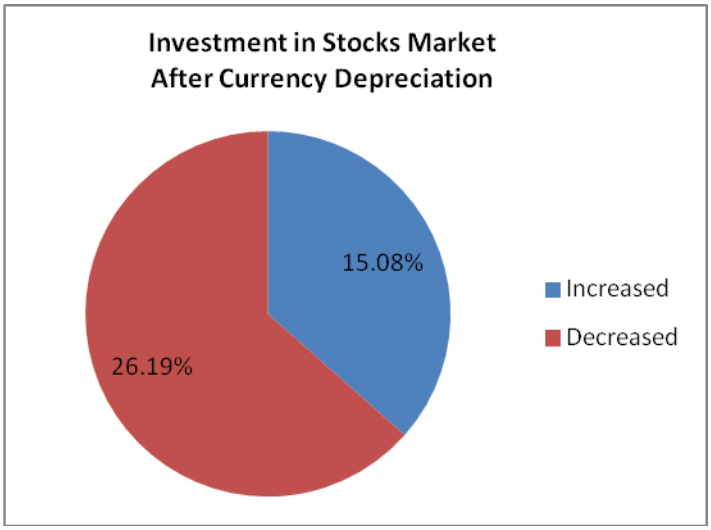
The amount spent on shopping of around 0 to 2000Rs was done by 15.08% of respondents which has been reduced to 3.17%. the amount spent of 2001 to 5000Rs were done by 29.37% which has been increased to 38.10%, respondents remained constant in number who spend 5001 to 8000Rs before and after rupee depreciation, while there is a decrease in relative percentage from 19.84% to 13.49% of those people who used to spent 8000 to 10000Rs .



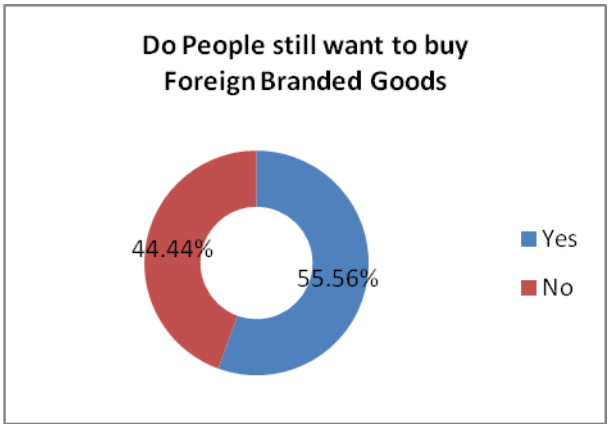
There are 37.30% of respondents who still want to buy gold even after rise in price and government restrictions.



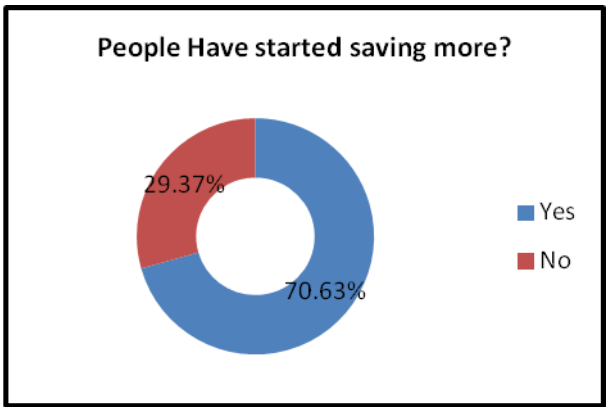
There were 36% of respondents who invest in stock market.



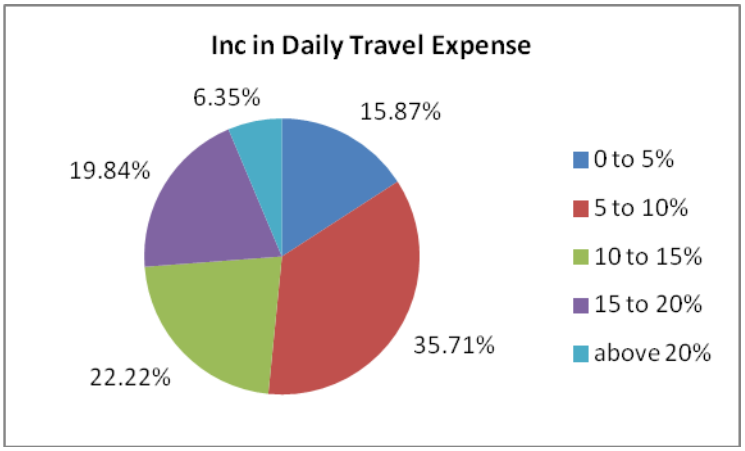
Out of the people who invest in stock market there are 26.19% of people whose exposure towards stock market has been decreased while 15.08% people said that it has been increased.



There are 55.56% of respondents who still want to buy foreign branded goods even after their prices have been increased.



There are 70.63% of people who have started to save more after rupee depreciation.



IX. Analysis and Findings

- Out of total number of people surveyed 40.48% of people have annual income between 5-10 lakhs, 21.43% have annual income between 0-5 lakhs, 15.87% of people have 10-18 lakhs of annual income and rest has more than 18 lakhs per annum of income.
- While 99% of people surveyed are aware of rupee depreciation and out of these more than 90% of people have started feeling the pinch of currency depreciation. The monthly expenditure of around 44% of people has increased by 5-10%, while the expense of around 10-15% has been increased for more than 23% of people surveyed, while about 18% of people have said that their daily expense has been increased by 10-20%.
- Out of above 44% of people whose daily expense has been increased by 5-10% have been severely affected by currency depreciation which is visible by the change in their shopping pattern. Around 44% said that they used to go shopping once in a week before currency got depreciated but now they go once in a month to shop and 16% of people said that they use to go for shopping once in a month and now they go once in a quarter this might be because of increased prices of goods.
- Those who use to shop once in week almost 76% amongst them now go to market for shopping only once in month, Also those who used to shop once in a month 41% amongst them now goes only once in a quarter to shop in market, this shows that because of increased prices of goods due to currency depreciation in the market.
- Out of people who go once in week for shopping, 35.71% used to spend 5000-8000 Rs. And out of these 90% have reduced their shopping expense to 0-5000Rs. 33.33% used to spend 2000-5000 Rs. And 16.6% of people used to spend between 0-2000Rs.
- While Total of 62% of people surveyed have said that they now do not want to buy gold because of higher import duty imposed on it, because of several duties imposed on it by government, government increased import duty to check the high current account deficit.
- 36% of respondents have said that they invest in stock markets, out of these 55.5% have said that their exposure towards stock market has been reduced, while around 44% of them have said that their exposure towards stock market has been increased, while those who said their exposure towards stock market has been increased it might be possible that they are investing in defensive sectors like IT, Pharmaceutical, FMCG, or since stock market is going down, so few stocks are turning more attractive.
- For those whose exposure towards stock market has increased after currency depreciation 55% out of them have said that they have more disposable income with them now as show by their shopping pattern as earlier they used to spend 2000-5000 Rs and now they spend 5000-8000 Rs. Also 43.75% out of people who said that their exposure to stock market has increase now prefer to buy gold because of their increased income from stock market.
- Out of total people surveyed 55.56% people have said that they still prefer to buy foreign branded goods and 44.44% have said that they don't want to buy foreign branded goods after currency depreciation which led to the increase in price of these goods. Out of total people who said that they still want to buy foreign branded goods 55.71% of them go for shopping only once in month and 41.4% of people lies in the bracket of 2000-5000 Rs of expenditure on their every shopping visit.
- 70.63% of respondents have said that they have started to save more as compared to spending, Out of which 31.4% are service class people, 5.61% are businessman, 37.07% are students and 24.71% are housewives. Also out of total respondents who have started to save more 45% has 5-10 lakhs on annual household income, 20.22% has 0-5 lakhs of income annually, while only 9% of respondents has annual house hold income of more than 30 lakhs rupees.`
- 35.71% of people have said that their daily travel expense have increased by 5-10% out of which 33.3% are service class people who need to travel to their office and 55% of them are students who need to go to their college, 22.22% of the respondents have said that their bill has increased by 10-15% while around 19% of people have said that their daily travel expense has been increased by 15-20%.
- 57% of the respondents have agreed to the fact that high inflation is kicking in because of currency depreciation and around 39% has strongly agreed to this fact, since due to currency depreciation prices of raw material to make goods are increasing due to which manufacturers are transferring their cost to end consumers.
- 34.13% of respondents have agreed to the fact that they now have to pay higher EMIs, while around 18% of people have strongly agreed to this fact, while 44% of respondents are neutral about it, increased EMIs are because of increased lending rates by commercial banks due to liquidity tightening measures taken by RBI.
- Because of increased value of dollar crude oil import is getting costlier day by day for oil marketing companies due to which petroleum price is increasing here and this fact is agreed by 27% of people while 53% of respondents have strongly supported this fact.
- 26% of people agreed that they have been affected by costlier foreign travel while 55.56% have strongly agreed that their foreign travelling experience is getting costlier, this is because airlines are increasing prices of the flight services due to high crude and Brent prices.
- Around 31% of respondents have agreed that their stock market investment is giving them poor return while 21.43% of people are strongly affected by poor stock market returns due to bearish run of stock market.
- Around 23% of respondents have agreed that they have to pay more amount for their foreign education while around 57% of people are strongly affected by higher foreign education cost, dis is simply because of

depreciation of rupee now they have to pay more to foreign universities.

- Because of rupee depreciation economic growth of our country will be affected and will take a downturn, this fact has been agreed by 49% of respondents while 38% have strongly agreed to this, this is because of costlier imports and slow consumption story in the country industrial production has been decreased.
- Because of currency depreciation there would be an upturn in unemployment rate; this fact has been agreed by 20% while 39% have strongly supported this statement, since earnings of companies have been reduced so the employment rate has also been decreased.

X. Literature Review

A research by Fitch rating agency showed the Impact of Rupee Depreciation on Indian Investment-Grade Corporates.

Another set of research by Luis-Felipe Zanna in 2006 told Fighting against currency depreciation, macroeconomic instability and sudden stops also In this paper they showed that, in the aftermath of a currency crisis, a government that adjusts the nominal interest rate in response to domestic currency depreciation can induce aggregate instability in the economy by generating self-fulfilling endogenous cycles.

Sumanjeet Singh in his research in April 2009 showed Depreciation of the Indian Currency: Implications for the Indian Economy, This paper studies the real implications of the depreciation of the rupee on the Indian economy and shows that in the long run, the Indian economy has more to lose and less to gain with weaker rupee.

Amol Agarwal in 2011 studied Rupee Depreciation: Probable Causes and Outlook This paper reviews the probable reasons for this depreciation of the rupee and the outlook for the same. It also reflects on the policy options to help prevent the depreciation of the Rupee; STCI primary dealers Ltd.

Susannakurian1, August 2013 Dollar after being stable for a long time now is climbing back up against the rupee. Recession is less in India, then why dollar is moving up when rupee must be strong.

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Prevention of Oxidative Stress Caused by Anti-tubercular Drugs Using Aqueous Extracts of *Daucus carota* and *Moringa oleifera*

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ABSTRACT- The antioxidant effect of aqueous extracts of *Daucus carota* root and *Moringa oleifera* leaf were investigated in anti-tubercular drugs (isoniazid, INH and rifampicin, RMP) induced oxidative stress. The test control rats were administered with INH (27mg/kg) and RMP (54mg/kg) for 4 weeks to induce oxidative stress. Rats were pretreated with doses of 100mg/kg and 200mg/kg of aqueous extracts of *Daucus carota* and *Moringa oleifera* respectively for 4 weeks then INH and RMP were administered for another 4 weeks. Rats were also co-administered with 100mg/kg and 200mg/kg of the extracts plus INH and RMP for 4 weeks. The effect of the extracts on oxidative stress was determined by monitoring the serum malondialdehyde (MDA) concentration. Pretreatment and co-administration of *Daucus carota* and *Moringa oleifera* aqueous extracts significantly ($P<0.05$) reduced serum MDA levels compared with the test control. The co-administration of the extracts with the anti-tubercular drugs had a more profound effect in reducing serum MDA concentration compared with pretreatment with the aqueous extracts of *D. carota* root and *M. oleifera* leaf. *Moringa oleifera* leaves and *Daucus carota* roots may afford anti-oxidant effect in anti-tubercular drugs- induced oxidative stress.

Index Terms: anti-tubercular drugs, *Daucus carota*, malondialdehyde, *Moringa oleifera*, oxidative stress

1. INTRODUCTION

Anti-tubercular drugs-induced hepatotoxicity is a potential adverse effect of the currently used anti- tuberculosis regimens and occurs in about 9% of patients treated for active tuberculosis (TB)[1,2]. The most effective anti- tuberculosis therapy (standard therapy) is a combination of isoniazid (INH), rifampicin (RMP), and pyrazinamide (PZA) for eight weeks followed by INH and RMP for a further 4-7 months[3]. However, there is a large evidence for toxicity of these standard drugs in humans[4,5,6], with hepatotoxicity being the most serious effect[7]. The rate of hepatotoxicity has been reported to be much higher in developing countries (8 – 30%) compared to advanced countries (2 -3%) with a similar dose schedule[8]. Hepatotoxicity complicates the treatment of 5 – 10% patients treated for active TB[9]. Isoniazid hepatotoxicity is considered idiosyncratic, not as a result of hypersensitivity or allergic reaction, but rather is most probably caused by toxic metabolites[10,11]. The predominant metabolic pathway of INH metabolism is acetylation by the hepatic enzyme N-acetyl transferase 2 (NAT 2)[12]. It is acetylated to acetylisoniazid and then hydrolysed into acetylhydrazine and isonicotinic acid. Acetylhydrazine is either hydrolysed to hydrazine or acetylated into diacetyhydrazine[11,13]. The major metabolic

pathway of rifampicin is desacetylation to desacetylrifampicin and separate hydrolysis produces 3 – formylrifampicin[14,15]. The pathogenesis of INH and RMP – induced damage may involve oxidative stress in the liver mitochondria associated with mitochondrial permeability alterations and increased apoptosis of the hepatocytes, and therefore mitochondrial redox changes have been suggested as crucial events in apoptotic liver cell injury in INH- RMP.

Different parts of the carrot plant were used in Indian traditional medicine for the treatment of a broad spectrum of ailments such as inflammation, leprosy and worm infections[16]. When taken daily, carrots can lower cholesterol and blood pressure[17,18]. Intake of foods rich in carotenoids may be beneficial to blood sugar regulation[19]. Carrots may help slow the ageing process and reduce the risk of many diseases including cancer, heart diseases, cataracts, stroke, high blood pressure, osteoporosis, bronchitis and urinary tract infections[20].

The Moringa tree has great use medicinally both as preventive and treatment, and virtually every part of the tree (bark, roots, fruit, flowers, leaves, seeds, and gum) can be used medicinally. Studies have indicated that the plant possesses antiplasmodial activity[21], radioprotective capacities[22], thyroid hormone regulatory properties[23], hypocholesterolemic action[24], hypotensive[25] and antifungal effects[26,27]. It is also effective as antitrypanosomal[28], antiulcer[29,30], diuretic[31], anti-inflammatory and antispasmodic[32]. Moringa flowers have been shown to possess, antitubercular, antibacterial and depressant property[33]. Aqueous root extracts shows inhibitory effect on central nervous system[34]. The present study was undertaken in an attempt to evaluate the antioxidant effects of *Daucus carota* and *Moringa oleifera* against INH and RMP-induced oxidative stress.

II. MATERIALS AND METHODS

a. Animals

Wistar albino rats weighing 100-130g were obtained from the Animal House, Department of Biological Sciences, Bayero University, Kano. The animals were housed in cages in a room where a 12-hour light/dark cycle was maintained. They were allowed free access to water and feed (a product of Grand Cereals and Oil Mills Ltd) throughout the experimental period.

b. Drugs

Isoniazid tablets BP (300mg) Microlabs Ltd, India and rifampicin capsules BP (300mg) Maxheal Pharmaceuticals, India were used for the research.

c. Preparation of Extracts

Leaves of moringa plant were obtained from the Botanical garden of Biological Sciences Department, Bayero University, Kano Nigeria. They were washed, shade-dried and pulverized into a powder. A known weight of the powder was soaked overnight in distilled water, filtered and the residue dried. The residue was weighed and concentration of the filtrate was determined from the difference in weight.

Carrots roots were purchased from a local market, washed and grated into smaller pieces. They were dried and pulverized into powder. The powder (20g) was soaked in 200cm^3 of distilled water overnight and filtered. The residue was allowed to dry, weighed and subtracted from the initial weight of the powder to determine the concentration of the filtrate. The filtrates were stored in the refrigerator and used for the experimental work.

d. Experimental Design

Thirty six (36) wistar albino rats were divided into 12 groups of three rats each. Group 1 were the normal rats while group 2 served as the test control administered with INH (27mg/kg) and RMP (54mg/kg) only for 4 weeks to induce liver damage. Groups 3 and 4 were pretreated with 100mg/kg and 200mg/kg of extracts respectively for 4 weeks, then administered with INH (27mg/kg) and RMP (54mg/kg) for another 4 weeks. For groups 5 and 6, same doses of the extracts and drugs were administered concurrently, thirty minutes apart for 4 weeks. The remaining six groups were used for a similar set of experiment using *Daucus carota* aqueous extract. Blood samples were collected 24 hours after the last administration and concentration of serum malondialdehyde (MDA) was estimated.

e. Estimation of Serum MDA

This was done using the method of Hunter *et al.* (1963)[35] as modified by Gutteridge and Wilkins (1982)[36].

f. Statistical Analysis

All results were expressed as mean$\pm$SD for each group. Data were analysed with student's t – test. P values of less than 0.05 ($P<0.05$) were considered significant.

III. RESULTS

The effect of pretreatment and co-administration of *Moringa oleifera* and *Daucus carota* extracts on the level of serum MDA in rats treated with anti-tubercular drugs is presented in Table 1. Anti-tubercular drugs exerted a significant ($P<0.05$) increase in serum MDA concentration in group 2, whereas both pretreatment and co-administration with varied doses of aqueous extracts of *Moringa* and *Daucus carota* caused significant ($P<0.05$) decreases in serum MDA levels. The co-administration of the extracts showed more profound effect in reducing serum MDA concentration compared to pretreatment.

Earlier investigations have shown that oxidative stress is the major mechanism of INH-RMP induced hepatotoxicity in experimental rats[37,38]. RMP is a potent inducer of cytochrome P-450 system which mediates generation of toxic metabolites of drugs and their covalent binding to hepatic macromolecules[39], while INH is believed to mediate hepatotoxicity through the production of toxic metabolites[11,40]. In the present study, free radicals formed either by the reaction of metabolites with oxygen or by the interaction of

superoxide radicals with H_2O_2, seem to initiate peroxidative degradation of membrane lipids rich in polyunsaturated fatty acids. This leads to formation of lipid peroxides which in turn give products like MDA that cause loss of integrity of cell membrane and damage to hepatic tissue. In rats treated with INH and RMP alone, the increase in MDA indicates enhanced peroxidation leading to a failure of the antioxidant defence mechanism to prevent formation of excess free radicals. Moringa extract combined with anti-tubercular drugs significantly prevented lipid peroxidation.

Numerous studies showed the elevation of a variety of detoxification and antioxidant enzymes and biomarkers as a result of treatment with moringa or with phytochemicals isolated from moringa[41,42,43].

Being an excellent source of nutrients, minerals, vitamins, etc moringa has been described as a nutritional dynamite. The combination of antioxidant enzymes and phytochemicals found in moringa coupled with the plant's outstanding nutritive value may have been responsible for the protective effect exerted in the prevention of oxidative stress attributed to antitubercular drugs. Antioxidant and free radical scavenging activities of moringa leaf extract has been reported[44], a fact which has been substantiated in this study. Thus it can be concluded *Moringa oleifera* leaves afford antioxidant properties in oxidative stress caused by antitubercular drugs.

Carrot is an excellent source of vitamin A and a very good source of vitamin C; therefore it may be useful in reducing oxidative stress on the body cells. Being an excellent source of several antioxidant compounds such as phenolic compounds that play an important role in antioxidant properties of carrots and the other hydroxycinnamic derivatives such as dicaffeoylquinic acids in the extract may exert some strong antioxidant activities along with chlorogenic acid[45].

Carotenes in the carrot extract include b-carotene, a-carotene, g-carotene, lycopene, cryptoxanthin, leutin and many partly degraded carotenoids such as abscisic acid, trisporic acid, -apocarotenoids, e.g. violaxanthin[46]. Some of the above active principles have the potential to minimize the deleterious effects of free radicals including the peroxy radicals [47]. This confirms that carrot extract could effectively protect tissues against the free radical mediated oxidative stress as evidenced by significantly decreased MDA levels in serum.

Table 1: Effect of pretreatment and co-administration of aqueous extracts of *Moringa oleifera/Daucus carota* and antitubercular drugs on serum MDA concentration.

Groups	**Dose of extract (mg/kg)**	**Serum MDA (µmol/L)**	
		Moringa oleifera	***Daucus carota***
Group 1 (Normal)	-	0.13±0.04	0.13±0.04
Group 2 (Test control)	-	0.66±0.16[a]	0.67±0.16
Group 3	Pretreatment 100mg/kg	0.33±0.12[b]	0.23±0.04[a]

Group 4	Pretreatment 200mg/kg	0.13 ± 0.04^{b}	0.27 ± 0.16^{b}
Group 5	Co-administration 100mg/kg	0.13 ± 0.04^{b}	0.17 ± 0.09^{b}
Group 6	Co-administration 200mg/kg	0.23 ± 0.05^{b}	0.17 ± 0.09^{b}

a = significant increase ($P<0.05$) as compared with the normal control group.

b = significant decrease ($P<0.05$) as compared with the test control group.

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Efficacy, Hope, Optimism and Resilience at Workplace – Positive Organizational Behavior

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Abstract- This paper will attempt to define positive organizational behavior and outline the role of self-efficacy, hope, optimism and resilience in maintaining positive behavior in an organization. Recent researches and findings by famous psychologists are stated at relevant points to relate the four core-constructs to the positive organizational behavior (POB). The focus of the paper is also towards giving practical suggestions for creating a workplace that is conducive to being confident, hopeful, optimistic, resilient and promotes a sense of well-being.

I. Positive Organizational Behavior

It 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 (Luthans, 2002a, p. 59). Luthans has argued that the inclusion criteria for POB are being theory and research based, measurable, developmental, and manageable for performance impact in the workplace[1]. Wright (2003) argued that the mission of POB must also include the pursuit of employee happiness and health as viable goals in themselves.

Both individual and organizational performance is improved by developing good qualities like *self-confidence, hope, optimism and resilience*. When combined, these four positive psychological resources have been demonstrated theoretically and empirically to be a higher-order core factor that Luthans and colleagues termed as psychological capital or PsyCap, Luthans F, Youssef (2004).

II. Self-Efficacy

It is the first and most theoretically developed and researched POB construct. Stajkovic and Luthans (1998b) define confidence (or self-efficacy) as the "individual's conviction about his or her abilities to mobilize the motivation, cognitive resources, and courses of action needed to successfully execute a specific task within a given context[2]."

Self-efficacy, a key element in Bandura's(1977b, 1978b) social learning theory refers to one's belief in one's capability to perform a specific task. Self-efficacy arises from gradual acquisition of complex cognitive, social, linguistic, and/or physical skills through experience (Bandura, 1982). Self-efficacy has three dimensions – *Magnitude, Strength* and *Generality*. *Magnitude* applies to the level of task difficulty that a person believes he or she can attain. *Strength* refers to whether the conviction regarding magnitude is strong or weak. *Generality* indicates the degree to which the expectation is generalized across situations.

Self-efficacy vs self-esteem: Self-esteem is a global construct of one's evaluation and belief of overall worthiness, whereas self-efficacy is one's belief about a task-and context specific capability. Self-esteem is aimed at any aspect of one's current self, whereas self-efficacy is a current assessment of one's future success at a task.

Self-efficacy vs. attribution/locus of control: Another construct that is often confused with self-efficacy comes from attribution theory, specifically locus of control. Bandura has argued that locus of control attributions are causal beliefs about action-outcome contingencies, whereas self-efficacy is an individual's belief about his or her abilities and cognitive resources that can be marshaled together to successfully execute a specific task.

Self-efficacy affects learning and performance in three ways (Bandura, 1982):

1. *Self-efficacy influences the goals that employees choose for themselves*. Employees with low levels of self-efficacy tend to set relatively low goals for themselves. Conversely, an individual with high self-efficacy is likely to set high personal goals. Research indicates that people not only learn but also perform at levels consistent with their self-efficacy beliefs.
2. *Self-efficacy influences learning as well as the effort that people exert on the job*. Employees with high self-efficacy generally work hard to learn how to perform new tasks, because they are confident that their efforts will be successful. Employees with low self-efficacy may exert less effort when learning and performing complex tasks, because they are not sure the effort will lead to success.
3. *Self-efficacy influences the persistence with which people attempt new and difficult tasks*. Employees with high self-efficacy are confident that they can learn and perform a specific task.

Sources of Self-Efficacy

Since self-efficacy can have powerful effects on organizations, it is important to identify its origin. Bandura (1997) has identified four principal sources of self-efficacy: *past performance, vicarious experience, verbal persuasion, and emotional cues*[3].

Past performance: Employees who have succeeded on job-related tasks are likely to have more confidence to complete similar tasks in the future (high self-efficacy) than employees who have been unsuccessful (low self-efficacy).

Vicarious experience: Seeing a coworker succeed at a particular task may boost your self-efficacy.

Verbal persuasion: This involves convincing people that they have the ability to succeed at a particular task. The best way for a leader to use verbal persuasion is through the Pygmalion effect. The Pygmalion effect is a form of a self-fulfilling

prophesy in which believing something to be true can make it true.

Emotional cues: A person who expects to fail at some task or finds something too demanding is likely to experience certain physiological symptoms: a pounding heart, feeling flushed, sweaty palms, headaches, and so on. Edwin Locke and Gary Latham suggest that goal-setting theory and self-efficacy theory complement each other. When a leader sets difficult goals for employees, this leads employees to have a higher level of self-efficacy and also leads them to set higher goals for their own performance.

Selection/Promotion Decisions

Organizations should select individuals who have high levels of self-efficacy. These people will be motivated to engage in the behaviors that will help them perform well in the workplace. A measure of self-efficacy can be administered during the hiring/promotion process.

Training and Development

Organizations should consider employee levels of self-efficacy when choosing among candidates for training and development programs. If the training budget is limited, then greater return on training investment can be realized by sending only those employees high in self-efficacy. These people will tend to learn more from the training and, ultimately, will be more likely to use that learning to enhance their job performance.

Goal Setting and Performance

Organizations can encourage higher performance goals from employees who have high levels of self-efficacy. This will lead to higher levels of job performance from employees, which is critical for many organizations in an era of high competition.

III. Hope

Snyder et al. (1991) defines hope as "a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-oriented energy) and (b) pathways (planning to meet goals)." This meaning of hope consists of both the "willpower" (agency) and the "waypower" (pathways). Importantly, considerable research over the past several years indicates it has a very positive impact on academic achievement, athletic accomplishment, emotional health, the ability to cope with illness and other hardships.

There is a direct work-related impact of hope. For example, Snyder and colleagues, in an ongoing survey of U.S. firms, have found that those with higher-hope human resources are more profitable, have higher retention rates, and have greater levels of employee satisfaction and commitment[4]. A field study we recently conducted found that managers with higher hope levels had correspondingly higher performing work units, better retention rates, and more satisfied employees[5]. Moreover, a recent comprehensive study focused on hope across different types of jobs and industries found more hopeful sales employees, mortgage brokers, and management executives had higher job performance, and the management executives also produced more and better quality solutions to a work-related problem[6].

IV. Optimism

Cranny et al. used the term happiness to refer to optimism. Scheier and Carver defined optimism as a set of generalized positive outcome expectancies. According to their conceptualization, people who generally expect that things will go their way and believe that they will have more good outcomes than bad, are dispositionally optimistic.

It is a major construct in positive psychology. There is a positive impact of optimism on physical and psychological health which leads to academic, athletic, political and occupational success. By the same token, pessimism is known to lead to passivity, failure, social estrangement, and, in its extreme, depression and mortality.

There have been only a small number of studies investigating the influence of optimism on performance or work-related behaviors. Strutton and Lumpkin found that the optimism-performance relationship was moderated by the type of coping strategies used to deal with stress in the workplace. They showed that optimistic individuals used more problem-focused coping strategies and that they outperformed pessimistic individuals in the work environment[7]. This finding was replicated with a group of teleworkers in a study by Norman, Collins, Conner, and Martin. The participants in the Norman et al. study who were more optimistic and used more problem-focused coping reported a greater number of positive psychological and work-related outcomes as compared to the predominantly pessimistic individuals who used more emotion-focused coping strategies[8]. Several other researchers have investigated the relationship of optimism to performance in other areas such as academics. The results of the studies gave overwhelming support for the hypothesis that optimism and academic performance were positively and significantly related to one another. As a result, it is believed these findings may be generalized to the work environment.

The importance of optimism to the human species is shown by Martin Seligman's work (Seligman, 1991) in analyzing USA political speeches using his CAVE technique - Content Analysis of Verbatim Explanations - where he analyzed the nomination acceptance speeches of candidates for the USA presidential elections. In the twenty-two presidential elections from 1900 to 1984, Americans chose the more optimistic-sounding candidate eighteen times. In all elections in which an underdog pulled off an upset, he was the more optimistic candidate[9].

Optimism in the Workplace

Optimism could be a very positive force in the workplace. For example, optimists may be motivated to work harder; be more satisfied and have high morale; have high levels of aspiration and set stretch goals; persevere in the face of obstacles and difficulties and make attributions of personal failures and setbacks as temporary, not as personal inadequacy. There are some jobs and career fields where optimism would be especially valuable (e.g., sales, advertising, public relations, product design, customer service, and in the health and social services fields). Moreover, there has been recognition given in leadership theory to the importance of optimism.

Optimism and Well-Being

Optimism is a major contributor to employee well-being[10, 11]. It affects our personal growth, our sense of purpose in work, our relations with others, our pride in our accomplishments, and our general level of happiness in work[12]. These attitudes in turn contribute to personal satisfaction, good health, and work fulfillment[13].

V. Resilience

The capacity to "bounce back" from adversity or even dramatic positive changes is particularly relevant in today's turbulent business environment. As a component of positive organizational behavior, resiliency is viewed "as the capacity to rebound or bounce back from adversity, conflict, failure or even positive events, progress and increased responsibility[14]." Organizational resilience is the ability and capacity of a workplace to withstand potential significant economic times, systemic risk, or systemic disruptions by adapting, recovering, or resisting being affected and resuming core operations or continuing to provide an acceptable level of functioning and structure.

Resilience is not a trait that people either have or do not have. Resilience involves behaviors, thoughts, and actions that can be learned and developed in anyone. Resilience is tremendously influenced by a person's environment.

Factors Promoting Resilience: A Theoretical Model

Kumpfer (1999) describes a model for identifying and managing the factors influencing resilience. Her model has six main components: *stressors*, *environmental contexts*, *person-environment transactional process*, *internal resiliency factors*, *resilience process*, and *adaptation and re-integration*. These components are outlined below[15].

Stressors: stress arises not from the situations people encounter, but from people's perceptions that they are not able to deal with the situation they encounter in a way they deem satisfactory. When people encounter a demanding situation, they evaluate the nature and intensity of the demand, the resources available for dealing with the demand (i.e., their own skills and other people they can draw on for help), and the likely consequences that will result, especially if the demand is not dealt with satisfactorily. Stress results from a person's appraisal that the demands outweigh their available coping resources and negative consequences are likely to result.

Environmental contexts: some situations are more demanding than others, and are hence more likely to overtax one's resources for dealing with the situation satisfactorily. Wolpe (1969) identified three categories of situations in which people predictably feel overtaxed: intensely unpleasant events, situations where there is ambiguity about what is expected, and situations where the consequences are uncertain[16]. Typically, people do not develop extensive coping repertoires for dealing with these types of situations, and therefore often experience stress when engaged in these three types of environments.

Person-Environment Transactional Process: Two people can be in the same situation, and experience differing degrees of stress because they have differing skills and resources for dealing with those particular demands. In cases where there is a good match between a person's knowledge and skills, and the demands of the workplace they are in, stress levels likely will be low and vice-versa. A resilience outcome will be more likely when people have the resource base for dealing with the demands they face, and when there is time between periods of intense demand for people to recover.

Internal Resiliency Factors: Personal agency is related to many constructs in the literature, some of which include: self-directedness, self-confidence, self-efficacy, internal locus of control, hopefulness, and optimism. Kumpfer(1999) notes that people who possess these qualities tend to be more persistent and have greater determination, both of which influence resiliency.

Resilience Process: People who believe that they can influence their world, and that their own actions are largely responsible for the experiences they encounter, tend to have greater ability to bounce back from unexpected adversity.

Adaptation and Reintegration: People who have adequate repertoires for dealing with the demands they face, and an ability to bounce back from the challenges they encounter, tend to be more flexible and adaptable, qualities which most career theorists and career practitioners see as essential for success.

Creating Resilient Workplaces

Ultimately, it is the responsibility of those in leadership roles (managers and supervisors) to create a workplace climate that fosters well-being and facilitates resilience. Intense and unpleasant demands tend to overload people, especially when the demands are unrelenting and there is insufficient time to regain balance. Even when people are coping well and stress levels are low, prolonged over-demand can lead to burn out and a subsequent negative impact on workers as well as the economy of an organization (Hiebert, 2006)[17]. It is managers who are charged with making sure that workplace demands are reasonable and that employees have the appropriate skill and knowledge for dealing with the demands they face.

VI. Conclusion

Self-efficacy (beliefs about one's ability to accomplish specific tasks) influences the tasks employees choose to learn and the goals they set for themselves. Self-efficacy also affects employees' level of effort and persistence when learning difficult tasks. Four sources of self-efficacy are past performance, vicarious experience, verbal persuasion, and emotional cues. Managerial and organizational implications of self-efficacy in the workplace include hiring and promotion decisions, training and development, and goal setting.

In human resource management, hope may play an important role in selection, especially for certain types of jobs and because it is learned and statelike (can change) rather than a stable trait, it can be enhanced by training and development to improve on-the-job performance and retention of valuable employees.

Leaders who understand the organizational and psychological constructs of power, influence, modeling, and culturalization are well suited to foster optimism. In the face of negative or adverse events, individuals and cultures with optimistic explanatory styles are typically highly motivated, task oriented, socially interactive and supportive, resilient, able to persevere, less prone to stress and depression, able to make

effective decisions, and solution focused. With this range of positive organizational influences, taking the time to adopt optimistic explanatory styles within an organization would likely produce efficient, effective and successful work forces.

Personal agency is a central ingredient in resiliency. Resiliency is the ability to bounce back when faced with an unexpected challenge. Resiliency comes in people, but in some contexts it is easier to be resilient, while others make it more difficult. It is in our own personal best interest for each of us to take steps to create a wellness-oriented workplace that fosters resiliency. It is important for all people at all levels of an organization to develop a resilient personal and professional identity. The intrapersonal factors identified by Kumpfer (1999) are all personal characteristics that can be cultivated and enhanced. It is in everyone's best interest to take charge of that part of their own personal and professional development.

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New Approach for Evaluating EFLM (An Eclectic Developed Checklist)

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Abstract- Nothing is more certain to guarantee disastrous teaching than an unprepared teacher is. As a part of preparing the teacher is to provide an evaluation checklist enabling him to be aware of the textbook he is using. A particular feature of the book may be inappropriate to the situation in which she/he is using it or there may simply be a feature of the book she/he dislikes and wishes to adapt. For a teacher, thus, to know the appropriateness or otherwise of the book and may wish to adapt it and make it suitable for his/her local setting, a checklist is needed to provide him with an evaluation scheme enabling him to make his/her right judgments. To evaluate the appropriateness and efficacy of a textbook is to know the principles on which the textbook has been designed and how it meets the objectives that it aims to achieve. To help evaluating a textbook, the paper has provided an eclectic evaluation checklist.

Firstly, some evaluation models and twelve evaluation checklists have been scrutinized. Secondly, they have been compared to one another. Thirdly, the common salient features have been highlighted. Fourthly, the latest checklist by Babii and Ansary has been taken as the main base to develop a new suitable eclectic developed evaluation checklist.

Moreover, the paper deals with the question of evaluating ELT materials in terms of the definition, the types, the criteria and the techniques used in such evaluation. In this case, the paper will review some textbooks evaluation models and some textbooks evaluation checklists arriving at the researcher's eclectic, developed checklist.

The paper will try to explore how each evaluation tackles /deals with the issue of evaluation and how the researcher's project differs in its aspects from those aforementioned. In other words, the paper will be trying to present its own developed EFLTM evaluation checklist.

Index Terms- Evaluation, EFLTM, Evaluation Checklist

I. INTRODUCTION

Language instruction has five important components: students, a teacher, materials, teaching methods and an evaluation system. What is the importance of materials in language instruction? What is the purpose of materials in teaching a language? Can a teacher teach English without a textbook?

Allwright (1990) argues that materials should teach students to learn, that they should be resource books for ideas and activities for instruction/learning, and that they should give teachers notions for what they do. Allwright's point of view is against constructing materials for teachers to use. He shows that textbooks are so inflexible to be used directly as instructional materials. He feels that an instructional material ties the teacher and may mislead him or become a hindrance rather than a help.

O'Neill (1990), in contrast, argues that materials may be suitable for students' needs, even if they are not designed especially for them, that textbooks make it possible for students to review and prepare their lessons, that textbooks are efficient in terms of time and money, and that textbooks can and should allow for adaptation and improvisation. O'Neill's point of view highlights two ideas: the importance of instructional textbooks and the flexibility they should have. He states the need for adaptation when necessary.

Allwright (1990) emphasizes that materials control learning and teaching, whereas O'Neill (1990) emphasizes that materials help learning and teaching. It is true that in many cases, teachers and students rely heavily on textbooks, and textbooks determine the components and methods of learning. Textbooks control the content, methods and procedures of learning. Students learn what is presented in a textbook, and the way a textbook presents topics is the way students learn it.

The educational philosophy of the textbook influences the class and the learning progress. Therefore, in many cases, materials are the centre of instruction and one of the most important influences on what goes on in the classroom.

Theoretically, experienced teachers can teach English without a textbook. However, it is not easy to do it all the time, though they may do it sometimes. Many teachers do not have enough time to make supplementary materials, so they just follow the textbook. Textbooks, therefore, take on a very important role in a language class, and it is important to select a good textbook.

Thus, the textbook is often considered the main source of information and the most common teaching and learning materials. Therefore, the student's success or failure with English often depends on the type of the course book and the teaching materials used.

II. BACKGROUND OF THE STUDY

The Role and Design of Instructional Materials

Materials play an important role in the process of teaching/learning. In this concern, Richards (2001) points out that those teaching materials are a key component in most language programmes. Whether the teacher uses a textbook, institutionally prepared material, or his/her own materials, instructional materials generally serve as the basis for much of

the language input that learners receive and the language practice that occurs in the classroom. In the case of inexperienced teachers, materials may also serve as a form of teacher training as they provide ideas on how to plan and teach lessons as well as formats that teacher can use.

To be creative in using textbooks in the language classroom, one must define the roles of textbooks. The definition of the roles of a textbook slightly varies from a theorist to another. Allwright (1982), for example, assumes that the roles of teaching materials have to do with what to teach and who uses them. O'Neill (1982), on the other hand, entrusts a differing role to textbooks, arguing that the use of a published textbook as a basis on which to pattern the unpredictable interaction is necessary to classroom language learning. Swan (1991) states that good textbooks build bridges across teaching language components which the creative movement of textbooks is possible and even easy. Swan's point of view reveals the communicative role as well as the creative movement of textbooks.

Cunningsworth (1995: 7) briefly summarizes the role of materials in language teaching as:

- a resource for presenting materials
- a source of activities for learner and communicative interaction
- a reference source for learners on grammar, vocabulary, pronunciation, etc.
- a source of stimulation and ideas for classroom activities
- a syllabus
- a support for less experienced teachers who have to gain confidence

The Role of Textbooks in the TEFL Classroom

Teaching language consists of certain components, but the essential constituents to EFL programmes and classroom are the textbooks and the instructional materials that are used by language constructors.In the same respect, Hutchinson and Torres (1994) suggest that the textbook is an almost universal element of English language teaching. Millions of copies are sold every year and numerous aid projects have been set up to produce them in various countries. It seems that no teaching learning situation is complete until it uses a relevant textbook. Sheldon (1988: 37), as a well-known theorist in evaluation, agrees with this observation and furthermore he suggests that textbooks not only "represent the visible heart to any ELT programme but also offer considerable advantages-for both the students and the teacher-when they are being used in ESL/EFL classroom".

Haycroft (1998), for example, suggests that one of the primary advantages of using textbooks is that they are psychologically essential for students since their progress and achievement can be measured concretely when they use them.

Sheldon (1988) also points out, that students often harbor expectations about using a textbook in their particular language classroom and programme and believe that published materials have more credibility than teacher-generated or "in house" materials.

It is worth mentioning that more recent authors have criticized textbooks for their inherent and culture biases. Researchers such as Porreca (1984), Florent and Walter (1989), (Larke 1990) or Carrel and Kowitz (1994), and Renner (1997) have demonstrated that many EFL/ESL textbooks still contain rampant examples of gender bias, sexism, and stereotyping.

Badaroos (1988) points out that the materials that teachers use to implement the programme have to be designed according to the learners' level. In other words, they must be relevant to the student's level and interest.

Undoubtedly, the role of textbooks in TEFL is very vital. They may have defects and biases. Then, the role of the teacher is to adapt and supplement the textbooks.

The Role of Teacher in the TEFL Classroom and With Materials

Teachers are a key factor in the successful implementation of curriculum changes and particularly in textbook. Exceptional teachers can often compensate for the poor-quality resources and materials they have to work from. However, inadequately trained teachers may not be able to make effective use of teaching materials no matter how well they are designed. Richards (2001: 99) suggests that teachers may vary according to the following dimensions:

- language proficiency
- teaching experience
- skill and expertise
- training and qualification
- morale and motivation
- teaching style
- beliefs and principles

Teachers also play an important role in evaluating and assessing the EFL/ESL materials used from time to time. A teacher can complement, supplement and adapt the materials when necessary. When heavy foreign cultural bias exists in the content of TEFLMs, the teaching of the set requires a tactful teacher to manage the whole situation and make the needed changes or amendments.

Defining Evaluation of Textbooks

According to Hutchinson and Waters (1987), textbook evaluation is basically a straight forward, analytical matching process i.e. matching needs to available solutions. They divide the evaluation process into four major steps:

- Defining criteria
- Subjective analysis
- Objective analysis
- Matching

Sheldon (1987), on the other hand, argues that evaluation is rather more emotive and controversial for teachers. He defines evaluation of textbook as a matter of judging the fitness of something (textbooks/materials) for a particular purpose (teaching in an EL situation for example). Tomlinson (1998) states that the term "materials evaluation" refers to attempts to measure the value of materials.

Lynch (1997) defines evaluation as a systematic attempt to gather information in order to make judgments or decisions. In this concern, evaluative information can be both qualitative and quantitative in form and can be gathered through different methods such as observation or the administration of pencil-and-paper test.

Cunningsworth (1995) and Ellis (1997) suggest that textbook evaluation helps teachers move beyond impressionistic assessments and it helps them to acquire useful, accurate,

systematic and contextual insights into the overall nature of textbook. Litz (2005), on the other hand, states that "evaluation textbooks" assists educators in identifying the particular strengths and weaknesses in textbooks already in use.

In the researcher's point of view, textbook evaluation is a matter of examining and checking the ready-written in hand material/textbook to know the appropriateness or otherwise of this textbook for a particular context. In this concern, the process of evaluation can take four stages:

- Defining the principles/criteria of designing materials in addition to the features of the situation it is applied in and of students it is applied for
- Defining the criteria on which the evaluation will be based on: a checklist, a framework, etc.
- Matching both criteria using a valid, reliable, practical instrument of collecting data such as a questionnaire
- Analyzing the findings that will help the evaluator decide to what extent the course book/material is suitable for the user.

Criteria for Evaluating ELT material

Power (2003) suggests thirty criteria for evaluating ELT materials/textbooks:

1- Learners' needs
2- Ordering and pacing of syllabus
3- Maintenance of interest-suitable (perhaps for captive learners)
4- Type of course, exam based, intensive, vacation-fixed period or continuous intake
5- Age group-suitable for maturity-level and motivation of learners
6- Time scale-variety and quantity of material-suitable for length of course
7- Cultural orientation
8- Suitable for the class-size
9- Role of teachers and learners appropriate to preferred teaching and learning styles
10- Mono or multilingual
11- Narrative or topic based
12- Assumption of learner knowledge
13- Mixture of syllabus; structural; national functional; task-based
14- Right measure of authenticity i.e. suitable adapted for level
15- Appropriateness of lexis, structure for learner's level
16- Right selection of vocabulary and syntax for learners' refection and complexity
17- Range and Appropriateness of texts
18- Range and weight of skills
19- Revision technique: cyclical or linear
20- Suitability for self-access
21- Do learners' exercise, activities and task work?
22- Ease of use for teacher
23- Ease of use for students
24- Summary of items for reference
25- Visual impact
26- Accompanying aids: charts, cassettes, etc.
27- Dated or modern language
28- Metalanguage
29- Teacher's' Book
30- Course or part course book

Types of Evaluation

There are two main types of evaluation: formative and summative. Formative evaluation is an on-going, in-course evaluation and contributes to the modification of the course, if necessary.Summative evaluation, on the other hand, is the end-of-course evaluation and it helps the teacher to find out if the objectives are really achieved and if the methods and internals have been useful for this purpose to achieve the objectives.

The purpose of summative evaluation is not to provide feedback for on-going modification. The curriculum changes whenever there is a change in one element of the curriculum (objectives, methodology, content) there must be a change in the evaluation system too.

Cunningsworth (1995) and Ellis (1997) cited in Litz (2005) have suggested that there are three different types of material evaluation. They argue that the most common form is probably the "predictive" or "pre-use" evaluation that is designed to examine the future or potential performance of a textbook.

The other types of textbook evaluation are the "in-use "evaluation designed to examine material that is currently being used and the "retrospective" or "post-use" (reflective) evaluation of a textbook that has been used in respective institution.

Regarding TEFLMs evaluation, on-progress evaluation is recommended and it is achieved through teacher's questions and workbook exercises/tasks. It can be also of great help for checking students's progress. In addition, the end-of-course evaluation can be achieved by final tests or end-term-tests.

The Time for Evaluation

Students' needs and interests are changeable by the time. A textbook works successfully today, it may not be so tomorrow. In relation to evaluation, it is said that evaluating materials in-use is a need to be applied from time to time: on-going evaluation or end-in evaluation.

Evaluation is one of the four components of a curriculum. Objectives, content and methodology are the other three components of the curriculum. When we construct TEFL materials, we are supposed to administer an evaluation before handling the materials for use. Moreover, while and at the end of the course, the evaluation is needed too. In general, an evaluation is to be led when we feel that some problems pop up or shortcomings are discovered and we want to know the origin of such problems.

The Method of Evaluation

Trochim (2003) suggests a method of evaluation and calls it "the evaluation cycle." This evaluation cycle consists of four stages: formulating questions, collecting data, analyzing the data and drawing conclusions.

Formulating the questions refers to identifying objectives and designing stakeholders. It also refers to defining evaluation goals or research questions. In short, formulating questions tries to answer two questions:

- Why is one carrying out this evaluation?
- What information does one need?

There are some common objectives for evaluation:

- determining the effectiveness of a particular intervention

- finding out how well students are learning
- identifying improvements which could be made to a specific course, learning activity or learning process
- satisfying internal or external auditing requirements
- demonstrating value to stakeholders (which might include project founders)
- reflecting on professional practice in a structured way
- building evidence for a portfolio (e.g. career development, teaching fellowship)
- producing guidelines for colleagues (internal and external) who might want to carry out a similar innovation
- generating data for a research study or publication
- investigating an issue of personal, intellectual or professional interest

This question to the two answers should lead to a list of key stakeholders in the evaluation process. The stakeholders may include lecturers, learning technology specialists or a support staff or future employers, future clients or managers and founders.

The second stage is "collecting data". This stage refers to identifying resources; e.g. students or the involved group. In this stage, the evaluator is supposed to choose a data collection strategy. Moreover, the time of collecting the data has to be identified, whether it is after, before, or during a learning activity. This stage tries to answer three questions:

- Who can provide us with data?
- How can data be collected?
- When can data be collected?

The third stage refers to "analyzing the data and how it can be analyzed". It includes selecting appropriate analysis techniques, bearing in mind the nature of the data collected and the evaluation goals. It may include a questionnaire, an interview or an observation.

The fourth stage refers to "analyzing the data" collected previously. It reflects an implication for own practice; draw recommendations or lessons for others. It considers the community of implementation and finally, considers the ability to identify dissemination opportunities.

Ways of Evaluating TEFL Materials

EFLTM evaluation can be achieved by different ways and a variety of bases. Each evaluator looks at materials/textbooks from an angle to view his opinion and bases his/her evaluation on a particular framework.

Some evaluators base their study of evaluation on reviewing some EFLTM evaluation models, some others use already established checklists or review some checklists and develop their own one. Another group of evaluators creates or states criteria for designing an English language teaching course, then advocates or extracts a checklist. Upon the elicited checklist, the evaluator tries to examine to what extent there is a match between the criteria of designing and the items mentioned in the checklist, and then he matches both with real implementation of the course.

Murshed (2005), on the other hand, presented some evaluation models such as Davison's model (1976), Breen's and Candlin's criteria (1979), Marian's evaluation model (1980), William's scheme and checklist for evaluation(1983), Cunningsworth's model (1984), Dougill's evaluative framework and Hutchinson's model (1987) named "What's Underneath?", an interactive view of materials evaluation. After that, Murshed adapted his model in a form of a questionnaire.

III. THE STUDY

Reappraisal of Some Evaluation Models

The researcher, to avoid prolixity, is to highlight and to reappraise some models of evaluation mentioned in the previous section. Grant's model (1984) cited in Murshed (2005) shows that the evaluation procedure could be classified into two types; the pre-utility evaluation and the in-utility evaluation. The difference between the two types is that the former is applied after designing is over and before administering the material to the user whereas the later is an on-going evaluation done during the implementation of the programme.

White's model (1984), in contrast, mentioned in his book ELT Curriculum: "Designing Innovation and Management" draws up four stages for evaluation: doing preliminaries, data collection, major data collection, further data collection and Completion.

Harmer (1983) focuses his evaluation model on the learner from three dimensions to be taken into account before evaluating EFLTM. They are a description of learner's profile (age, sex socio-cultural background, their occupation, their motivation, attitude, etc), a description of learner's needs in terms of when they are likely to use English and what skills they should acquire in the language, and thirdly to consider if the type of materials is appropriate for a particular group of learners.

IV. METHODOLOGY

This study examines checklists prepared for evaluating textbooks/courses and aims at providing good foundation and base to accomplish, to what extent, a thorough review to evaluate the EFLTM and particularly textbooks in a clear definite light. Checklists include different items/statements for their purpose is to measure the appropriateness and efficacy or otherwise of the textbook under discussion.

The researcher's main focus is to lead his evaluation on finding out the suitability or otherwise of CECY. This will be done by examining and reappraising some already-established checklists and, finally, arriving at a composite/eclectic developed evaluation checklist.

Here are some evaluation checklists in a chronological order:

1- Chastain, k. (1971). *The Development of Modern Language Skills*: Theory to Practice (pp. 376-384). Philadelphia: The center for curriculum Development, Inc.
2- Tucker, C.A (1975). *Evaluating Beginning Textbooks*. English Teaching Forum, 13, 355-361.
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9- Skierso, A. (1991). *Textbook Selection and Evaluation.* In M. Celce-Murcia (Ed). Teaching English as a second or foreign language (pp. 432-453). Boston, MA: Heinle and Heinle publishers
10- Ur, P. (1996). *A Course in Language Teaching*: Practice and Theory (pp. 184-187) Cambridge: Cambridge University Press.
11- Garinger, D(2000). *Textbook Evaluation ELT Journal.*
12- Ansary, H. and Babaii, E. (2002): *Universal Characteristics of EFL/ESL Textbooks: A Step Towards Systematic Textbook Evaluation.* TESL Journal

V. ANALYTICAL DISCUSSIONS AND FINDINGS

Reappraisal of Some of Evaluation Textbook Checklists

The checklists of evaluating the text books will be analyzed in this section and to arrive at a new eclectic evaluation checklist that can be used for evaluating textbooks in EFL/ESL situations. To begin with, Chastin (1971) focuses his evaluation checklist on the development of the language skills. His evaluation pays great importance for language skills as they are very basic foundations of the language. To Chastin, good textbooks care mostly for language skills and how they are applied successfully in textbooks. Language skills maintain the learner's language and help him to have control over the language he is studying/learning.

Tucker's checklist (1975), (Appendix D), introduces a system that has three components:

- a set of criteria claimed to be "consistent with the basic linguistic, psychological, and pedagogical principles"
- a rating scheme which provides a method for judging the comparative weightings of a textbook's merits and
- a chart/graph which provides a visual comparison between the evaluator's opinion of the book and a hypothetical idea model, hence facilitating a quick and easy display of the evaluator, judgment

Tucker's checklist/scheme consists of two types of criteria; internal criteria that are language related and external criteria that give a broader view of the book. The internal criteria are divided into three criteria: Pronunciation, Grammar and Content criteria. Under pronunciation criterion; the presentation of pronunciation requires attention to: (1) completeness of presentation which refers to the coverage of sound and supra segmental features (2) appropriateness of presentation which concerns whether or not students are from a single language background, whether or not students are kids or adults, and all this affecting the type of presentation, and (3) adequacy of practice which deals with both the quality and quantity of practice. Quality, here, refers to practice in a context i.e. practising sounds in words, and developing words in sentences, and so on.

Under grammar criterion; (1) adequacy of pattern inventory deals with how much and how well structure would be presented, (2) appropriate sequencing refers to the organization of grammar content and its gradation from simple to difficult and (3) adequacy of drills and "patterns display" criterion refers to student's desire and interest and how much practice is required to achieve that.

Under content criteria, the functional load is maintained. Moreover, the input and output are stiffed to arranging techniques. Thirdly, content choice must be appropriate to the user's context, culture, environment and situation.

The second part of the scheme states criteria about the textbook in broader/overall term. It refers to the authenticity of language used in the content. It also refers to the availability of supplementary materials, also how adequate the teacher is, how competent the author is and the durability, price and value as well. However, this scheme worked successfully, yet to be developed, some more criteria are to be added, replaced or changed.

Cowle's checklist (1976) points out that no textbook or set of materials has all the answers and no review can foresee all the situations in which they might be used. This checklist is an attempt to bring together considerations connected to evaluation of textual materials in a comprehensive format that is easy to use. Cowle's includes in his checklist the communicative competence as he claims that the communicative competence still awaits definition in the evaluation of textual materials. Thus, the term "free expression" has been retained in the current checklist, although it may appear overly simplified to some.

Three years later, Daoud and Celce-Murcia (1979) presented a developed evaluation checklist. They divided it into three main headings. They highlighted the importance of the textbook and its content and the researcher's manual to be included in EFLT material evaluative checklist.

Under the "Textbook" heading, five components are stated: subject matter, vocabulary and structures, exercises, illustration and physical make up. In each of heading, some items are presented by a five-scale response each "Excellent, Good, adequate, weak and totally lacking". This scheme is more practicable than the previous one. It pays attention to evaluation for selection and analysis for implementation.

Cunningsworth's checklist (1984) touches upon the importance of relating materials to the course objectives to assess all processes. To him, the textbook is considered good/acceptable if it could satisfy and match the objectives of the materials i.e. while designing and implementation.

Sheldon's checklist (1988) is very extensive and tries to assess/measure all aspects of content including such diverse factors as graphics and physical characteristics to authenticity and flexibility. Sheldon's checklist produces suggested course book criteria. He considers designing and evaluating course books/textbooks are dependable in other terms "they are two sides for one coin". The feedback deduced from using the checklist for evaluation helps much in reviewing the course. It is

worthy to quote a version (1987: 241) in which he appreciates his checklist. He states "I would like to present what I think is a bell-jar, summary of common-core factors that reviewers, teachers, learners, and educational and administrational advisers most frequently use in deciding whether or not a textbook is chosen"

On the issue of assessment and evaluation, Sheldon (1987) shows the importance of assessment. He comments, "It is clear that course book assessment is fundamentally a subjective, role of thumb activity, that no neat formula, grid or system will ever provide a definitive yardstick", (p. 245). Sheldon's checklist even includes units criteria and how they are organized; horizontally or vertically and the advantages and disadvantages of this organization, it presents criteria for material, some criteria for learner, some criteria for teacher and some others focus on the context (classroom, society)in which the three components interact.

Both Skierso (1991) and Chall Conrad (1991) utilized Bloom's Taxonomy of the Cognitive Domain to assess the processes and skills that textbooks require for learners to perform. The rating of a textbook will directly reflect the level of the skill that the textbook demands. For example, a book that uses synthesis and analysis would rate higher than one that demands only comprehension.

Both Chall and Conard have adapted Bloom's Taxonomy to create a "Question Complexity Rating Scale". They use this to evaluate individual questions in order to analyze the difficulty of questions and to display the range of cognitive skills needed by the students to complete textbook activities. These concerns highlight the increasing significance that professionals place on the process of learning and the recognition that focusing solely on outcomes often does not address all the second language learners' needs.

Ur's checklist (1996) appears to be more or less having a similar focus and an approach to EFL/ESL textbook evaluation. She includes features related to the approach such as to what extent the approach is educationally and socially acceptable to the target community. Moreover, she pays more attention to the importance of fluency in learning the language skills rather than accuracy because fluency helps learners develop their own learning strategies and to be independent in their learning.

Garinger's checklist (2000) reflects a new criterion which is not mentioned in the previous checklists. It reflects concerns of teacher choosing textbooks. To Garinger, selecting particular items to create a personal evaluation index is the best method for ensuing that the realities of each individual learning situation are addressed. This checklist, as he claims, was created to evaluate textbooks being used in a variety of community-based ESL programmes in a local setting. To create his personal checklist, he reviewed the previously published checklists, then selected the salient common features that he felt among all and added some features which he felt their need to his local setting. This checklist consists of two main parts: "Practical consideration" is representing the pedagogic part and "Language related Consideration" is representing the theoretical part. Garinger criticizes his textbook evaluation checklist by confessing that his checklist is personal for local settings in ESL programmes.

The last checklist to be reviewed is the checklist prepared by Babii and Ansary (2002) entitled "Universal Characteristics of EFL/ESL Textbooks: A Step Towards Systematic Textbook Evaluation". Babii and Ansary attempt a study to indirectly explore whether or not a de facto consensus exists at all over what makes a good/standard EFL/ESL textbook a good/standard textbook. "This is an attempt to possibly locate some theory-neutral, universal and broad characteristics of EFL/ESL textbooks and to draw up, as such, some guidelines for the generation and/or systematic evaluation of EFL/ESL text books.

Babii and Ansary's checklist (2002) has been framed into four broad groups. Each group is preceded by a criterion. Under each criterion, sub-criteria are listed. They concern "approach, content presentation, and physical make-up and administration concerns". Under "approach" criterion, the textbook requires to be based on the nature of language (Krashen's theory), the nature of learning and how the theory can be put to applied use.

Content presentation criterion refers to stating purposes and objectives for the total course and the individual units. It also includes how and to what extent criteria of selections are achieved. Content presentation aims at measuring how satisfactory the syllable is to the teacher and students.

As a fact, the content of the textbook may be satisfactory but suffers from physical making-up. Therefore, this universal checklist took into consideration the importance of this criterion and included some items such as:

- appropriateness of size and weight,
- attractive in the layout,
- how durable the textbook is,
- if it is of high quality of edifying and publishing and
- the appropriateness of title

Under "administrative concerns criterion", (1) macro-state policies refer to whether the textbook meets the policy of the authority. (2) "Appropriate for local situation" includes the appropriateness of the content of the textbook to the culture, religion, and (3) the appropriateness of the price.

Undoubtedly, no evaluation checklist can satisfy all evaluative situations nor it can be applied for any textbook evaluation. Even the newest/latest checklist published by Babii and Ansary (2002) claimed to be "a Universal Checklist" for EFL and ESL situation still awaits for some adaptations and reduction.

The Present Study Checklist: The Eclectic Evaluation Checklist

This checklist is an adaptation of the "Universal Checklist" developed by Ansary, H. and Babaii, E. (2002) who based their checklist on ten previous textbooks evaluation checklists between 1971 and 1996. The present checklist evaluated the ten checklists in addition to two more checklists done between 1997 and 2005. The items of the checklist of the study are stated below:

(NB. Items in italic are new criteria for this checklist)

I - Approach

A - Dissemination of a vision (approach) about

- the nature of language
- the nature of learning
- how the theory can be put to applied use

II- Content presentation

A - Stating objectives

- for the total course
- for individual units
- for individual lessons

B – Selection and its rationale

- Coverage
- Grading
- Organization
- Sequencing

C – Satisfaction of the syllabus

1- To the teacher

- Providing a guide book (TB)
- Giving advice on the methodology:
  1- giving theoretical orientation
  2- key to the exercises
- Supplementary materials

2- To the student

- Piecemeal, unit by unit instruction
- Graphics (relevant, free from unnecessary details, colourful, etc)
- Periodic reviews
- Workbook
- Exercises:
  1- in the classroom
  2- homework
  3- sample exercise with clear instructions
  4- varied and copious
- Periodic test sections
- Appropriate audio, visual and audio-visual aids

III- Suitability to Students'

- *situation*
- *area*
- *culture*
- *self background*
- *religion*
- *level of competence*
- *age*
- *interest*
- *gender*

IV- Author/Constructor

- *communicative competence in both (English and Arabic)*
- *Native of the country (Yemen) and expert in L1(English or expert of English language*
- *Awareness of learners' culture*

V- Physical Make Up

- appropriate
- Attractive
- Durable
- Clear printing
- *Suggestive*
- Interesting
- Effective

IV- Nature of Content

- *Authenticity from varied fields*
- *Relevant to macro and micro community/policy*
- *Balance of the two cultures (target students and target language)*
- *Promote fluency*
- *Promote improvisation*

As it has been mentioned earlier that the checklist of the present study solely is based on Babii and Ansary's checklist, in this section the paper is going to highlight the new criteria added as well as the replaced one. Babii and Ansary's "administrative concerns" criterion has been replaced by a criterion that has relation to the author. Its importance is felt because of its effect on the content. "The burden culture", the poison of culturally biased TEFLMs, is generated due to the author's unawareness of local culture where the textbook is to be applied.

Two criteria have been added to Babii and Ansary's checklist: suitability for student/Yemeni context and nature of content. "Suitability for student" criterion has been added due to the importance of the material to match student's concerns because the student is the cornerstone of the whole process. Under this criterion, some student's concerns are included such as situation, environment, culture, self-background, religion, level of understanding, age, interest, and gender. "Nature of content" criterion has been added because if the content is biased, student's acquisition will be spoiled. The content is supposed to have some authentic texts from various fields, to be relevant to macro and micro policy of the community, to balance the two cultures (student's and target language), to promote fluency rather than accuracy and to be able to promote improvisation.

VI. CONCLUSION

More or less, if TEFL materials are designed for a group of learners, they may/may not work appropriately with another group. One of the main objectives of this research is to provide a kind of scale/measurement tool i.e. an evaluation checklist to help a better judgment. The present checklist claims to be more suitable for evaluating EFL textbooks as being the latest and eclectic checklist.

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Impact of Employee Productivity Analysis on Service Quality Telecom Industry

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Abstract- With the emergence of concept of enhanced profits within existing setup, it is mandatory to study the impact of employee productivity analysis on the Service Quality. Now a days this analysis is becoming an integral part of every industry especially Service Related. In Telecom Industry, employee productivity analysis is playing a vital role while judging the Profitability of business as well as Services to be offered. This paper discussed the Positive as well as Negative Impacts of Employee Productivity Analysis on Service Quality in Telecom Industry with respect to Indian Market.

Index Terms- Employee Productivity Analysis , Service Quality and Employee relations

I. Introduction

Telecom Industry is gaining an important role in development of the Indian Market. In the current cost optimization scenario, it has become essential to put focus on the factors contributing to the same. Employee Productivity is one of the key areas where all the industries are now concentrating. The biggest challenge is doing the same is to be achieve the balance between Profitability and Service Quality. In Telecom Industry with new technologies emerging every day, Telecom Operators needs to cope with the same and need to build on the existing setup also. Productivity Analysis is mainly confined to judge the performance of the employees with optimum resource utilization. Due to Human Element involvement in the Productivity Analysis it has direct impact on the Service Quality as well. In Telecom Industry, Service Quality is the agreement done by the Service Provider with the Customer to offer best and time bound services at all the instances and anywhere.

II. Employee Productivity Analysis

Organizations commonly regard profits as a key measure of their success. Using profits as a measure may seem to imply that the organization will benefit more if costs such as salaries and depreciation for capital reinvestment are reduced. However, lowering salaries to increase profits tend to lead to conflicts in relationship between employees and management. Minimizing capital investment often has a negative impact on the efficiency of operations, and eventually affects profits. Therefore, increasing profits by reducing such expenses is only short term measure. The only viable way to increasing profits in a sustainable manner is to increase the economic pie or value added through higher productivity. This can be done with better cooperation from employees, higher investment in capital, and optimal use of capital. In return for employee's efforts, organization should share the additional wealth generated in the form of higher wages and improved benefits. This will reinforce and encourage them to further improve their performance. To sum up, productivity is key to sustaining profits in the long sun. Productivity is a measurement or calculation between inputs and outputs. Inputs are the amount of time and effort spent working, while outputs are the results. If the outputs are equivalent to the inputs, the worker is considered productive. Productivity gains are vital to the economy because they allow us to accomplish more with less. Capital and labor are both scarce resources, so maximizing their impact is always a core concern of modern business. Productivity enhancements come from the technology advances such as computers and internet, supply chain and logistics improvements and increased skills levels within the workforce. Productivity is directly linked with employee morale. When employees are happy at the work they have more motivation, which increases productivity. Poor morale causes employee to be disengaged. A study done by the Corporate Executive Board says that because employee engagement is down there has a 5% decrease in the productivity. If employees are not given the proper resources to do their jobs easily and efficiently, their productivity will suffer. Some more behaviors which hinder the employee productivity are Micromanagement i.e. Micromanaging and peeping to every minute thing an employee does will lower his confidence and thus disinterest him, Closed room meetings for long hours i.e. Having meetings without scheduling and exceeding the time of scheduled meeting , will change the day planned by the employee, Irrational thinking i.e. Irrational though and unrealistic , poorly defined goals and objectives without logic will again hinder the productivity. QuoStar Solutions, a technology consulting services, states that innovative technology is one way that employer can boost productivity. Having automated, electronic processes for certain task can free up employee time so that they can maximize their efficiency with other tasks. Some important elements to hike the productivity are Strong defined goals and objectives, Motivation, Employee Engagement, Strategic Rotation, Humanly Human resource practices, Refresher Sessions, Innovating and strong technology with proper resources. In addition to this having ICARE Attitude will increase productivity and is the key to success for an employee and an employer. I- Integration, C- Collaboration, A- Accountability, R-Responsibility, E-Excellence. Productivity Analysis is a prerequisite for improving productivity. As Peter Drucker, who is widely regarded as the pioneer of modern management theory, said "Without productivity objectives, a business does not have direction. Without productivity analysis, a business does not have control."

III. SERVICE QUALITY

What is Quality ? (Quality is free but it is not a Gift)

The global market is becoming more competitive every day. Companies continually search for new ways to gain an edge over their competitors around the globe. Global competition and deregulation in a number of industries is forcing companies to turn to quality in order to survive. WELCH says'' Quality is our best assurance of customer allegiance, our strongest defense against foreign competition, and the only path to sustained growth and earnings." As per DEMING: Perhaps the most important reason for pursuing quality is that quality pays. Research shows a relationship between quality, market share and return on investment. Higher quality yields a higher return on investment (ROI) for any given market share. Quality also pays in the form of customer retention – customer defections represent a significant cost to the companies. Adopting quality principles strongly correlates to corporate stock and earnings appreciation. Quality is one of the core components of value in the S-Q-I-P model. While price and image are communicators, product and service quality define offering in the value proposition. Factors Influencing Change in Quality Perceptions are Modern communications permits and in some cases encourage customers to shift their patronage from one producer to another, Global Competition has resulted in increased choice and has raised customer expectations of what constitutes acceptable quality, Technology – Marketing is a contest for consumer's attention and the Internet is now competing for that attention as the number of Internet users worldwide continues to rise. DEMING's 14 Point Philosophy on Quality is quite exhaustive and thoroughly constructed and says: Constancy of Purpose, Adopt to new Philosophy, Cease dependence on mass inspection, End the practice of Awarding Business on the basis of Price alone, Improve constantly and forever the system of production and service, Institute Training, Institute Leadership, Drive Out Fear, Break Down barriers among Staff, Eliminate Slogans, Exhortations and Targets, Eliminate Work Quotas, Remove Barriers to Pride of Workmanship, Institute a Vigorous Program of Education and Self Improvement, Put Everyone to work on the Transformation.

What is Service Quality ?

Customers also form perceptions of quality during the service transaction – how effectively and efficiently the service was delivered and the speed and convenience of completing the transaction. Finally, customers evaluate support activities that occur after the transaction that is post sale services. Thus Service Quality can be defined according to both what and how a product or service is delivered. GRONROOS distinguishes this as Technical Quality and Functional Quality. Technical Quality is concerned with the outcome of the delivered product or service. Customers use service quality attributes such as reliability, competence, performance, durability, etc. to evaluate technical quality. Functional Quality is how Technical Quality is transferred to the consumer. Service Quality attributes such as responsiveness and access would be important in helping the customer judge the functional quality of the service encounter. Cardinal Principles of Service Quality as ZEMKE RON (2002) are : Listening precedes action, Reliability is key, Flawless execution of the "basics", Pay attention to service design, Perform service recovery well, Surprise customers, Practice " fair play" , Promote teamwork, Internal Service begets external service.

IV. POSITIVE IMPACT OF EMPLOYEE PRODUCTIVITY ON SERVICE QUALITY IN TELECOM INDUSTRY

Presently Telecom Industry is going through a phase of Business Consolidation in order to enhance the profit margins within existing setup. This effort has encouraged some of the Telecom Companies to give a serious thought on one of the key parameter in enhancing business profitability i.e. Employee Productivity Analysis. With emergence of new technologies every day, every minute, every second, all the telecom companies are requiring the Employees who know Multi Tasking thereby enhancing productivity. This is helping the TELCOS to save the cost on Employee part i.e. they are not hiring the new employees for new work instead they are training the existing teams (depending upon their area of interest, skill sets) to carry out the new work. Several Training Programs like Leadership Development, Work Life Balance etc. Most Positive Impact of this analysis is that TELCOS started finding Leaders within the team only. This gesture has inculcated Sense of Security, Belongingness and Enthusiasm among the Employees. In the initial stages, employees may face difficulty in adopting the same but in the gradual course of time; employees align themselves to the new requirement. Human Resources department is playing an important role in this transition. This is spreading a Positive Wave among the company employees to work harder and with dedication. With this model now liabilities on the TELCOS are also decreasing day by day and thereby increasing the profitability. Overall impact of this enhances the TRUST, OWNERSHIP, and BELONGINESS within the team and whole organization. TELCOS who have adopted this strategy are now emerging as a Business Leader with improved CSAT i.e. Service Quality Parameters.

V. NEGATIVE IMPACT OF EMPLOYEE PRODUCTIVITY ON SERVICE QUALITY IN TELECOM INDUSTRY

The other side of this analysis has brought a severe impact in Telecom Industry. With this analysis, Companies not doing particularly well adopted the way of JOB CUTTING. Moral Level of the employees gone down drastically thereby directly impacting Service Quality. Companies started to over pressurizing the existing employees impacting their Work Life Balance. Undue Pressure causing high unrest among the employees. Lack of Job Security, Uncertainty about the work is spoiling the overall atmosphere of the organization. The very sad part of this is that the companies are removing the employees by moderating the ratings of the employees in Yearly Performance Appraisal System. Human resources department has to play very important role in overcoming all these negative impacts. HR always acts as a bridge between the employee and the respective managements. During the discussion with the various employees of such impacted organization it was found that employees were

worried about the way in which the ratings are moderated i.e. ratings were not done on the basis of actual work done but on the requirement of that employee in the organization. As per the Employees this situation, in coordination with HR, could be handled in much better and on human grounds. Employees can be asked to leave the Job with some notice period and not on the basis of poor ratings. Thus all such negative impacts can be overcome with the help of Human Resources department and respective departmental heads.

VI. CONCLUSION

Thus from the above discussion it follows that Impact of Employee Productivity Analysis on Service Quality is going to play a critical role in the future especially for Service Industry. Positive Impacts are encouraging wherein Negative Impacts can be worked upon for betterment.This may serve as a guideline for further scope of research.

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Schwarzschild-like solution for the gravitational field of an isolated particle on the basis of 7-dimensional metric

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***Abstract*:** Schwarzschild solution is the simplest solution of Einstein's field equations. The solution was first given by Schwarzschild on the basis of 4-dimensional space-time metric or line element. But here we extended our view to the 7-dimensional space-time continuum where 3-usual space components and another 4 time components on the basis of the four fundamental forces of nature. In this write-up especially particular attention is given to the solution of Einstein's field equations on the basis of seven dimensional metric $g_{\mu\nu}$. Using 7-dimensional metric we got the Schwarzschild-like solution of Einstein's field equations for the gravitational field of an isolated particle. The solution gives us some new interesting results and which gives new physical interpretation of the gravitational field of that isolated particle.

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Index Term: 7-dimensional space-time continuum, 4-time components, changing speed or constant, Schwarzschild-like solution

I.INTRODUCTION

Einstein's original field equations representing the law of gravitation in empty space [1-3]

$$R_{\mu\nu} = 0 \qquad (1)$$

The solution of above equations merely consists of finding the line element for interval in empty space surrounding a gravitating point particle which ultimately corresponds to the field of an isolated particle continually at rest at the origin. The solution was first given by Schwarzschild [4, 5].

In the absence of any mass point the space-time would be flat so that the 4-dimensional line element in spherical polar co-ordinates would be expressed as

$$ds^2 = -dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + c^2 dt^2 \qquad (2)$$

But the velocity of light c is taken to be unity in order to use as astronomical unit. Therefore equation (1) becomes,

$$ds^2 = -dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + dt^2 \qquad (3)$$

The presence of the mass point would modify the line element. However since mass is static and isolated, the line element would be spatially spherically symmetric about the point mass and is static. The most general form of such a four dimensional line element may be expressed as

$$ds^2 = -e^{\lambda} dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + e^{\nu} dt^2 \qquad (4$$

Where λ and ν are functions of r only; since for spherically symmetric isolated particle the field will depend on $r$alone and not on θ and ϕ.

Finally the line element due to static, isolated gravitating mass point is found

$$ds^2 = -\left(1-\frac{2m}{r}\right)^{-1} dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + \left(1-\frac{2m}{r}\right) dt^2 \qquad (5)$$

The solution was first obtain by Schwarzschild and hence is known as Schwarzschild line element reduces to the line element of flat space-time of special relativity.

Schwarzschild solution is seen to have the following singularities

(i) TheSchwarzschild solution becomes singular at $r = 0$; but this singularity also occurs in Newton's (classical) theory.

(ii) The Schwarzschild solution again becomes singular at a distance$r$ given by $(1-\frac{2m}{r}) = 0$, i.e. $r = 2m$. This value ofris known as Schwarzschild radius. For points $0 \le r \le 2m$, $ds^2 < 0$ i.e. the interval is purely space-like. Hence there is a finite singular region for $0 \le r \le 2m$. Thus $r = 2m$ represents the boundary of the isolated particle and the solution holds in empty space outside the spherical distribution of matter (or isolated particle) whose radius must be greater than $2m$. Hence equation (5) is called the Schwarzschild exterior solution for the gravitational field of an isolated particle.

Many authors[6, 7] trying to solve the problems of gravitation on the basis of Schwarzschild solution of the line element or metric of 4-d space-time continuum.

The purpose of this article is simply to solve Einstein's field equations for the gravitational field of an isolated particle on the basis of 7-dimensional metric similar to that of Schwarzschild in 4-dimesional. Taking new idea of time [8, 9] and looking in to the extra dimension of space-time continuum already we have developed a 7-dimensional metric [10] where the 3 space components and 4-time components. The idea of 4-time components has beentaken on the basis of the 4-fundamental forces of nature which are known as Electro-magnetic, Strong, Weak and gravitational forces.

II.MATHEMATICAL FORMULATION

According to our new concept of space-time continuum [10] the physical universe is not 4-dimensional it is considered as 7-dimensional, where the time part has 4-components instead of one. The 4-time components are considered on the basis of four fundamental forces of nature. Therefore the equation (3) becomes

$$ds^2 = -dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + c^2\left[a_1(dt^1)^2 + a_2(dt^2)^2 + a_3(dt^3)^2 + a_4(dt^4)^2\right] \quad (6)$$

Since the time components [10] are

$$c^2dt^2 = \left[c_1^{\,2}(dt^1)^2 + c_2^{\,2}(dt^2)^2 + c_3^{\,2}(dt^3)^2 + c_4^{\,2}(dt^4)^2\right] \quad (7)$$

Here t^1, t^2, t^3, t^4 and c_1, c_2, c_3, c_4 aretime-components and the changing speed or constants due to the four fundamental forces viz. electro-magnetic, strong, weak, gravitational respectively. The equation (7) can be written as,

$$c^2dt^2 = c^2\left[a_1(dt^1)^2 + a_2(dt^2)^2 + a_3(dt^3)^2 + a_4(dt^4)^2\right] \quad (8)$$

Where $a_1 = \left(\frac{c_1}{c}\right)^2, a_2 = \left(\frac{c_2}{c}\right)^2, a_3 = \left(\frac{c_3}{c}\right)^2, a_4 = \left(\frac{c_4}{c}\right)^2$ and c is the velocity of light. Again c is taken to be unity in order to use as astronomical unit and therefore equation (6) becomes

$$ds^2 = -dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + \left[a_1(dt^1)^2 + a_2(dt^2)^2 + a_3(dt^3)^2 + a_4(dt^4)^2\right]$$

The most general solution of equation (3) is written as equation (4). Therefore putting the value of dt^2 from equation (8) in equation (4) we get,

$$ds^2 = -e^{\lambda}dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + e^{\nu}\left[a_1(dt^1)^2 + a_2(dt^2)^2 + a_3(dt^3)^2 + a_4(dt^4)^2\right] \quad (9)$$

In equation (9) λ and ν are functions of r only; since for spherically symmetric isolated particle the field will depend on r alone and not on θ and ϕ.

Since the gravitational field (i.e. the disturbance from flat-space time) due to a particular diminishes indefinitely as we go to an infinite distance, therefore line element (9) must reduce to Galilean line element (2) at an infinite distance from the particle.

Hence at $r \to \infty; \lambda = 0 = \nu$.

The line element in general relativity is given by

$$ds^2 = g_{\mu\nu}dx^{\mu}dx^{\nu} \quad (10)$$

Here the co-ordinates are

$$x^1 = r, x^2 = \theta, x^3 = \phi, x^4 = t^1, x^5 = t^2, x^6 = t^3 \ \&\ x^7 = t^4 \quad (11)$$

Comparing equations (9) and (10) with the help of (11) we get

$$g_{\mu\nu} = \begin{bmatrix} -e^{\lambda} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -r^2 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -r^2\sin^2\theta & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & a_1e^{\nu} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & a_2e^{\nu} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & a_3e^{\nu} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_4e^{\nu} \end{bmatrix} \quad (12)$$

i.e.

$$\left.\begin{aligned} g_{11} &= -e^{\lambda} \\ g_{22} &= -r^2 \\ g_{33} &= -r^2 \sin^2\theta \\ g_{44} &= a_1 e^{\nu} \\ g_{55} &= a_2 e^{\nu} \\ g_{66} &= a_3 e^{\nu} \\ g_{77} &= a_4 e^{\nu} \\ \& \; g_{\mu\nu} &= 0 \; for \mu \neq \nu \end{aligned}\right\} \quad (13)$$

For our simplicity let we consider,

$$a_4 \approx a_3 \approx a_2 \approx a_1 = 1$$

Then equation (8) becomes

$$dt^2 = \left[(dt^1)^2 + (dt^2)^2 + (dt^3)^2 + (dt^4)^2 \right] \quad (14)$$

And equation (9) becomes

$$ds^2 = -e^{\lambda} dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta d\phi^2 + e^{\nu}\left[(dt^1)^2 + (dt^2)^2 + (dt^3)^2 + (dt^4)^2 \right] \quad (15)$$

And the determinant of $g_{\mu\nu}$ is

$$g = \left| g_{\mu\nu} \right| = -e^{\lambda + 4\nu} r^4 \sin^2\theta \quad (16)$$

Also $g^{\mu\mu} = \dfrac{1}{g_{\mu\mu}}$ and $g^{\mu\nu} = 0$ for $\mu \neq 0$

i.e.

$$\left.\begin{aligned} g^{11} &= -e^{-\lambda} \\ g^{22} &= -\frac{1}{r^2} \\ g^{33} &= -\frac{1}{r^2 \sin^2\theta} \\ g^{44} &= g^{55} = g^{66} = g^{77} = e^{-\nu} \\ \& \; g^{12} &= g^{23} = \ldots\ldots = 0 \; as \mu \neq \nu \end{aligned}\right\} \quad (17)$$

Now the equation (16) can be written as

$$|g| = e^{\lambda+4\nu} r^4 \sin^2\theta$$

$$\Rightarrow \sqrt{|g|} = e^{\frac{\lambda+4\nu}{2}} r^2 \sin\theta$$

$$\left.\begin{aligned}
&\therefore \log\sqrt{|g|} = \frac{\lambda+4\nu}{2} + 2\log r + \log\sin\theta \\
&and\ \frac{\partial}{\partial r}\left(\log\sqrt{|g|}\right) = \frac{1}{2}\frac{\partial\lambda}{\partial r} + 2\frac{\partial\nu}{\partial r} + \frac{2}{r} \\
&again\ \frac{\partial^2}{\partial r^2}\left(\log\sqrt{|g|}\right) = \frac{1}{2}\frac{\partial^2\lambda}{\partial r^2} + 2\frac{\partial^2\nu}{\partial r^2} - \frac{2}{r^2} \\
&\frac{\partial}{\partial\theta}\left(\log\sqrt{|g|}\right) = \cot\theta \\
&\frac{\partial^2}{\partial\theta^2}\left(\log\sqrt{|g|}\right) = -\cos ec^2\theta \\
&and\ \frac{\partial}{\partial\phi}\left(\log\sqrt{|g|}\right) = 0
\end{aligned}\right\} \quad (18)$$

If μ, ν, σ are different suffixes we can now easily get the following possible cases

$$\left.\begin{aligned}
&\Gamma^{\mu}_{\mu\mu} = \frac{1}{2}g^{\mu\mu}\frac{\partial g_{\mu\mu}}{\partial x^{\mu}} = \frac{1}{2}\frac{\partial\left(\log g_{\mu\mu}\right)}{\partial x^{\mu}} \\
&\Gamma^{\nu}_{\mu\mu} = -\frac{1}{2}g^{\nu\nu}\frac{\partial g_{\mu\mu}}{\partial x^{\nu}} \\
&\Gamma^{\nu}_{\mu\nu} = \frac{1}{2}g^{\nu\nu}\frac{\partial g_{\nu\nu}}{\partial x^{\mu}} = \frac{1}{2}\frac{\partial\left(\log_{\nu\nu}\right)}{\partial x^{\mu}} \\
&\Gamma^{\sigma}_{\mu\nu} = 0
\end{aligned}\right\} \quad (19)$$

Hence we get the following independent non-vanishing 3-index symbols,

$$\left.\begin{aligned}
&\Gamma^1_{11} = \frac{1}{2}\frac{\partial\lambda}{\partial r};\ \Gamma^1_{22} = -re^{-\lambda};\ \Gamma^1_{33} = -r\sin^2\theta e^{-\lambda} \\
&\Gamma^1_{44} = \Gamma^1_{55} = \Gamma^1_{66} = \Gamma^1_{77} = \frac{1}{2}e^{\nu-\lambda}\frac{\partial\nu}{\partial r} \\
&\Gamma^2_{33} = -\sin\theta\cos\theta \\
&\Gamma^2_{12} = \frac{1}{r};\ \Gamma^3_{13} = \frac{1}{r};\ \Gamma^3_{23} = \cot\theta \\
&\Gamma^4_{14} = \Gamma^4_{15} = \Gamma^4_{16} = \Gamma^4_{17} = \frac{1}{2}\frac{\partial\nu}{\partial r} \\
&\Gamma^5_{14} = \Gamma^5_{15} = \Gamma^5_{16} = \Gamma^5_{17} = \frac{1}{2}\frac{\partial\nu}{\partial r} \\
&\Gamma^6_{14} = \Gamma^6_{15} = \Gamma^6_{16} = \Gamma^6_{17} = \frac{1}{2}\frac{\partial\nu}{\partial r} \\
&\Gamma^7_{14} = \Gamma^7_{15} = \Gamma^7_{16} = \Gamma^7_{17} = \frac{1}{2}\frac{\partial\nu}{\partial r}
\end{aligned}\right\} \quad (20)$$

And all others are zero.

We have

$$R_{\mu\nu} = \frac{\partial}{\partial x^{\nu}}\Gamma^{\beta}_{\mu\beta} - \frac{\partial}{\partial x^{\beta}}\Gamma^{\beta}_{\mu\nu} + \Gamma^{\alpha}_{\mu\beta}\Gamma^{\beta}_{\alpha\nu} - \Gamma^{\alpha}_{\mu\nu}\Gamma^{\beta}_{\alpha\beta}$$

Gives us

$$R_{11} = 2\frac{\partial^2\nu}{\partial r^2} + 4\left(\frac{\partial\nu}{\partial r}\right)^2 - \frac{1}{r}\frac{\partial\lambda}{\partial r} - \frac{\partial\lambda}{\partial r}\frac{\partial\nu}{\partial r} \quad (21)$$

$$R_{22} = \left[e^{-\lambda}\left(1 + 2r\frac{\partial\nu}{\partial r} - \frac{r}{2}\frac{\partial\lambda}{\partial r}\right) - 1\right] \quad (22)$$

$$R_{33} = \left[e^{-\lambda}\left(1 + 2r\frac{\partial\nu}{\partial r} - \frac{r}{2}\frac{\partial\lambda}{\partial r}\right) - 1\right]\sin^2\theta \quad (23)$$

$$R_{44} = R_{55} = R_{66} = R_{77} = -\frac{1}{2}e^{\nu-\lambda}\left[\frac{\partial^2\nu}{\partial r^2} + 2\left(\frac{\partial\nu}{\partial r}\right)^2 - \frac{1}{2}\frac{\partial\nu}{\partial r}\frac{\partial\lambda}{\partial r} + \frac{2}{r}\frac{\partial\nu}{\partial r}\right] \quad (24)$$

Obviously equation (23) is a mere repetition of equation (22).

Thus the only Einstein's field equations for empty space to be satisfied by λ and ν are

$$2\frac{\partial^2\nu}{\partial r^2}+4\left(\frac{\partial\nu}{\partial r}\right)^2-\frac{1}{r}\frac{\partial\lambda}{\partial r}-\frac{\partial\lambda}{\partial r}\frac{\partial\nu}{\partial r}=0 \quad (25)$$

$$\left[e^{-\lambda}\left(1+2r\frac{\partial\nu}{\partial r}-\frac{r}{2}\frac{\partial\lambda}{\partial r}\right)-1\right]=0 \qquad (26)$$

$$\frac{1}{2}e^{\nu-\lambda}\left[\frac{\partial^2\nu}{\partial r^2}+2\left(\frac{\partial\nu}{\partial r}\right)^2-\frac{1}{2}\frac{\partial\nu}{\partial r}\frac{\partial\lambda}{\partial r}+\frac{2}{r}\frac{\partial\nu}{\partial r}\right]=0 \qquad (27)$$

Dividing equation (27) by $e^{\nu-\lambda}$ and then subtracting equation (25) from the resulting equation, we get

$$\frac{4}{r}\frac{\partial\nu}{\partial r}+\frac{1}{r}\frac{\partial\lambda}{\partial r}=0$$

$$\Rightarrow\frac{\partial}{\partial r}(4\nu)+\frac{\partial}{\partial r}(\lambda)=0$$

$$\Rightarrow\frac{\partial}{\partial r}(4\nu+\lambda)=0$$

Integrating we get

$4\nu+\lambda=A$

Where A is constant of integration which may be set equal to zero, without any loss of generality, since at $r\to\infty, \lambda=0$ and $\nu=0$. Hence,

$\lambda=-4\nu$

Substituting this in equation (26) we get

$$e^{4\nu}\left(1+4r\frac{\partial\nu}{\partial r}\right)=1$$

$$\Rightarrow\frac{\partial}{\partial r}\left(re^{4\nu}\right)=1$$

Integrating we get

$re^{4\nu}=r+B$

B being constant of integration,

i.e. $e^{4\nu}=1+\frac{B}{r}=1-\frac{2m}{r}$ (28)

$$e^{\nu}=\left(1-\frac{2m}{r}\right)^{\frac{1}{4}}\cong\left(1-\frac{m}{2r}\right) \quad \text{approximately}$$

Here we have put $B=-2m$. This is done in order to facilitate the physical interpretation of m as the mass of the gravitating particle. Thus the line element due to a static, isolated gravitating mass point, the equation (15) becomes,

$$ds^2=-\left(1-\frac{2m}{r}\right)^{-1}dr^2-r^2d\theta^2-r^2\sin^2\theta d\phi^2+\left(1-\frac{m}{2r}\right)\left[(dt^1)^2+(dt^2)^2+(dt^3)^2+(dt^4)^2\right] \quad (29)$$

Considering equation (14) and putting in above equation (29) we get,

$$ds^2=-\left(1-\frac{2m}{r}\right)^{-1}dr^2-r^2d\theta^2-r^2\sin^2\theta d\phi^2+\left(1-\frac{m}{2r}\right)dt^2 \quad (30)$$

III. CONCLUSIONS

In equation (30) the Schwarzschild-like solution becomes singular at a distance r is given by $\left(1-\frac{m}{2r}\right)=0$ i.e. $r=\frac{m}{2}$.

For points $0\le r\le\frac{m}{2}$, $ds^2<0$ i.e. the interval is purely space-like. Hence there is a finite singular region for $0\le r\le\frac{m}{2}$. Thus $r=\frac{m}{2}$ represents the boundary of singular region inside the spherical distribution of matter.

In equation (30) the term $\left(1-\frac{2m}{r}\right)=0$ i.e.r=$2m$the region $\frac{m}{2}<r\le 2m$ represents where $dt^2$is not zero. This region is time-like and very interesting i.e. time is there and meaning is that in that region still the four fundamental forces are interacting. Thus $r=2m$known as Schwarzschild radius represents the boundary of the isolated particle and the solution holds in empty space outside the spherical distribution of matter whose radius must be greater than $2m$.

So the equation (30) holds for both interior and exterior solution.

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Implementation of decision tree algorithm c4.5

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Abstract-Data classification is a form of data analysis that can be used to extract models describing important data classes. There are many classification algorithms but decision tree is the most commonly used algorithm because of its ease of implementation and easier to understand compared to other classification algorithms**.**C4.5 is one of the most effective classification method. In this paper we are implementing this algorithm using weka data mining tool using publicly available datasets of different size. This paper also gives insights into the rate of accuracy it provides when a dataset contains noisy data, missing data and large amount of data.

I. INTRODUCTION

In the past, to extract information by data analysis was a manual and pain staking process because much domain knowledge was required, and understanding of statistical approach is also needed. However such approach will become inappropriate while facing the rapidly growing sizes and dimensions of the data. A community of researchers devoted themselves to the field called "data mining" to solve automating data analysis problem and discover the implicit information within the huge data (Giordana and neri,1995).Data classification is one of data mining techniques used to extract models describing important data classes. Some of the common classification methods used in data mining are: decision tree classifiers, Bayesian classifiers, k-nearest-neighbor classifiers, case-based reasoning, genetic algorithms, rough sets, and fuzzy logic techniques. Among these classification algorithms decision tree algorithms is the most commonly used because of it is easy to understand and cheap to implement. Most Decision tree algorithms can be implemented in both serial and parallel form while others can only be implemented in either serial or parallel form. Parallel implementation of decision tree algorithms is desirable in-order to ensure fast generation of results especially with the classification/prediction of large data sets, it also exploits the underlying computer architecture (Shafer et al, 1996). But serial implementation of decision algorithm is easy to implement and desirable when small-medium data sets are involved. In this paper we will implement c4.5 the most common decision tree algorithm using weka, serially.

II. IMPLEMENTATION OF C4.5 ALGORITHM

In order to classify our data, first we need to load the dataset. This will be done in wekaexplorer window. Here, we have loaded wheather dataset having 14 instances and 4 attributes. On the basis of information contained in this dataset, weka enable us to make a decision whether or not to play a particular game on the basis of the wheather conditions. As shown in the figure given below weka explorer contains various tabs at the top of the window. User can choose one of them according to his task.

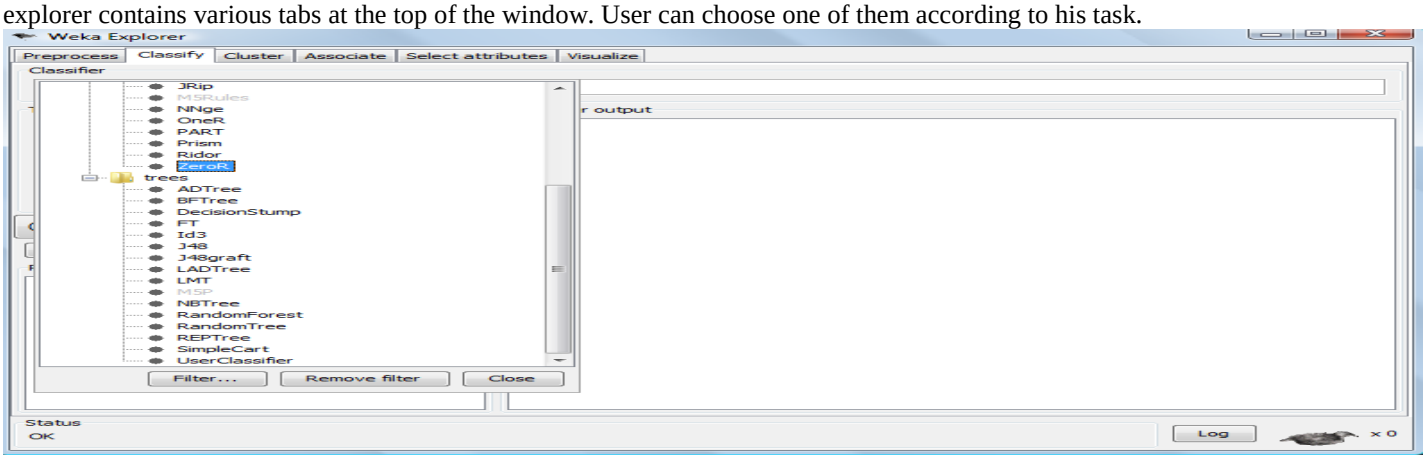

Figure1: classification panel

As per our research is concerned we need to click on classify tab. This window consists of various classifiers like bays, functions, lazy, meta and tree etc. available in weka. We first click on trees, then choose J48 (c4.5 is termed as J48 in weka software) which results in following figure.

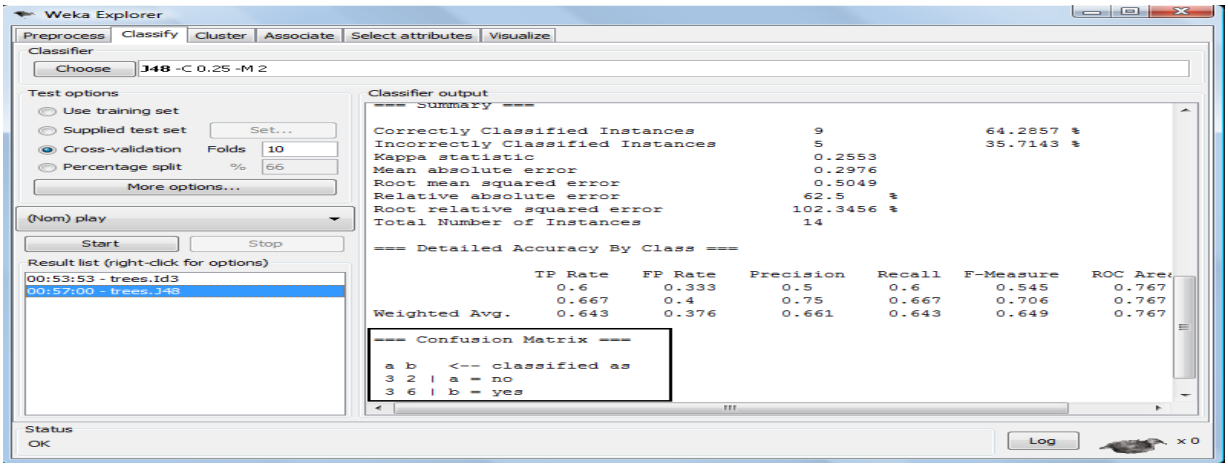

Figure2: Weka run information for C4.5

The name of the classifier listed in the text box right beside the choose button. The text after j48 represents parameter setting. These are default parameters which states that the confidence factor for pruning is 0.25, to use binary splits and restrict the minimum no. of instances in a leaf to 2 which means grow the tree fully. We can set these parameters according to our convenience too. After setting parameters we choose one of the test methods as four are given here. Finally click on the start button to build decision tree. The right hand side window shows classifier output, which shows some text and numeric values which is not easy to interpret. We will discuss it later. So let us look at graphical representation of this tree by choosing visualize tree option. In this way weka grow decision tree applyingc4.5 algorithm of data classification technique in data mining.

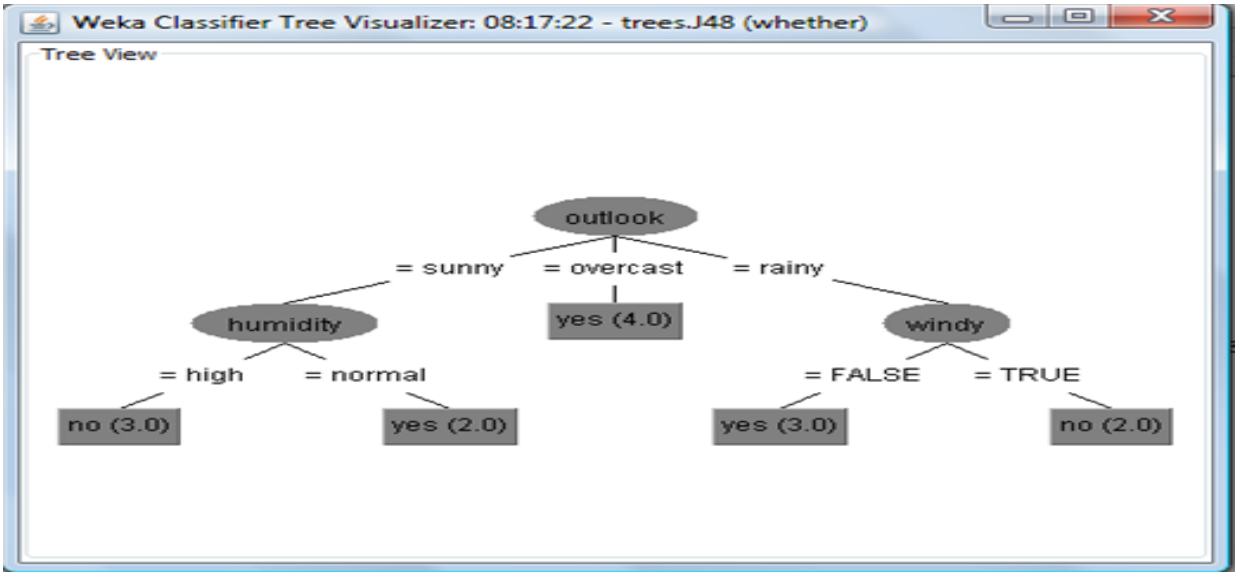

Figure3:Graphical representation of decision tree using C4.5

III. ACCURACY EVALUATION

The accuracy of a classifier is the percentage of test set tuples that are correctly classified by the classifier. There are four accuracy evaluation methods in weka, termed as test methods. In this paper we have used 10 fold cross validation method due to its low biasness. For estimating the accuracy of c4.5 we have taken different datasets of different size.

3.1 Effect of noisy data

Data that contains errors due to human mistakes, expert's misjudgment in classifying training examples etc. When noisy datasets are applied to c4.5 algorithm, it still provides greater accuracy as it employs tree pruning methods which avoid noise from data. The obtained accuracy rates are shown in the table below.

Table1: Effect of noise

Dataset	Accuracy rate (%)
Bank_class	65

Iris	86
Cardata	82
Soybean	83

3.2 Effect of missing data

Applying a dataset having some missing values in it results in producing good results. No doubt noise effects its performance but there are certain decision tree algorithm that are not even able to handle missing values in a dataset.

Following table shows the results obtained by applying missing values to c4.5. This table signifies that as the rate of missing values increases the rate of accuracy starts falling down.

Table2: Effect of missing values

Missing value rate (%) for dataset iris	**Accuracy rate (%)**
4	96%
16	94%
20	90%

3.3Effect of scalability

Finally c4.5 is applied with large datasets to check how efficiently it performs with large amount of data. It provides good accuracy in this case also. For this we have taken 2 datasets of varying size.

Table3: Effect of scalability

Datasets	**Instances**	**Accuracy rate**
Cardata	1728	92%
mushroom	2074	88%

IV. CONCLUSIONS AND LIGHTS TO THE FUTURE

In this paper we first show implementation of c4.5 decision tree algorithm. After that rate of accuracy it provides when dataset contains noise, when there is some missing data in a dataset and when a dataset contains number of instances in it. The experimentalresults show that c4.5 provides greater accuracyin each above said case.In this study we focused on serial implementation of decision tree algorithm which ismemory resident, fast and easy to implement. In future we will go for its parallel implementation which is comparatively complex and evaluate how much accuracy this algorithm provides in that case.

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Total Quality management (TQM) and Continuous Improvement as Addressed by Researchers

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Abstract- Total quality Management as a philosophy seeking to integrate all organizational functions in all areas of productions and services become an important attractive research field. It encourage Researchers to address many topics related to Total Quality management and Continuous improvements. Each has his own approach. Each reveals findings and results. This paper is a comparative analysis of some of the researchers approaches concerning Total quality Management Applications, Models, principles and aims.

Index Terms- Applying Total Quality Management - Baldrige Model - E- learning frame work – Kirkpatrick models

VII. Introduction

Researchers in the field of Total quality management are usually seeking to find models and theories for continuous improvement. Here is an analysis some work produced in this field, to prove that, all targets and aims are achieved by relying on the same base and principles. Terms may differ from researcher to another, but the result is produced from the same ground.

I. Research Elaborations

1. **Comparison between Total Quality Management (TQM) Framework for e-learning based on EFQM and Kirkpatrick models** - by *Jeanne Schreurs – Universiteit Hasselet, Diepenbeek,Belgium- (2006)* and **Applying Total Quality Management in Academics-** *by Dheeraj Mehortra (March 2010)*:-

Jeanne Schreurs identifies the EFQM Excellence model as "a famous quality Management tool", which has been translated to be useful in e-learning quality Management. She describes how she developed the e-learning stakeholder model. She presented the Kirkpatrick model of e-learning and developed Kirkpatrick-EFQM self-assessment framework.

To take the challenge to support and enhance quality management in e-learning, Jeanne Schreurs defined quality, and find the way to assess it, and embed it in the existing operational procedures of the learning organisation. She could determine the kind of quality management system which has to be implemented. She focused in her paper on the assessment of quality.

Schereurs argues that the way to become an excellent learning department is by balancing and satisfying the needs of all stakeholders. The subject which is asserted by Dheeraj Mehrotra (March ,2010) in his paper about applying Total quality Management in academics. Where he explains four pillars of Total Quality Management.

He argues in principle number 1 "Synergistic relationships" how essential is the focus on suppliers and customers- which are relevant to stakeholders in Jane Schereurs paper- as well as the teamwork and collaboration.

Schereurs maintains the strategy of continuous learning , innovation and improvement to achieve excellence. This correlate with principle number 2 by Dheeraj Mehrotra (March ,2010) which is "Continuous improvement and self-evaluation"; where continual improvement of personnel abilities is highlighted as well as the win-win approach in Total quality Management .

Believing in Deming rule by Dheeraj Mehrotra (March ,2010) that "no human being should ever evaluate another human being" and that we should have a self-evaluation as part of improvement process; Jane Schereurs reveals the EFQM model as a tool of quality assessment which enable the organisation to identify its strengths and weaknesses , benchmark with other organisations , and identify areas for improvement.

As the fourth principle of Total quality management in academic by Dheeraj Mehrotra (March ,2010) is Leadership, and the insists of top management success responsibility ; Schereurs guarantees leadership, Policy and strategy , resources , and processes as enabler criterion of the EFQM Model in the E-learning Organization . She recommends the result criterion to be Client satisfaction, People satisfaction, impact on society, and impact on the company's success.

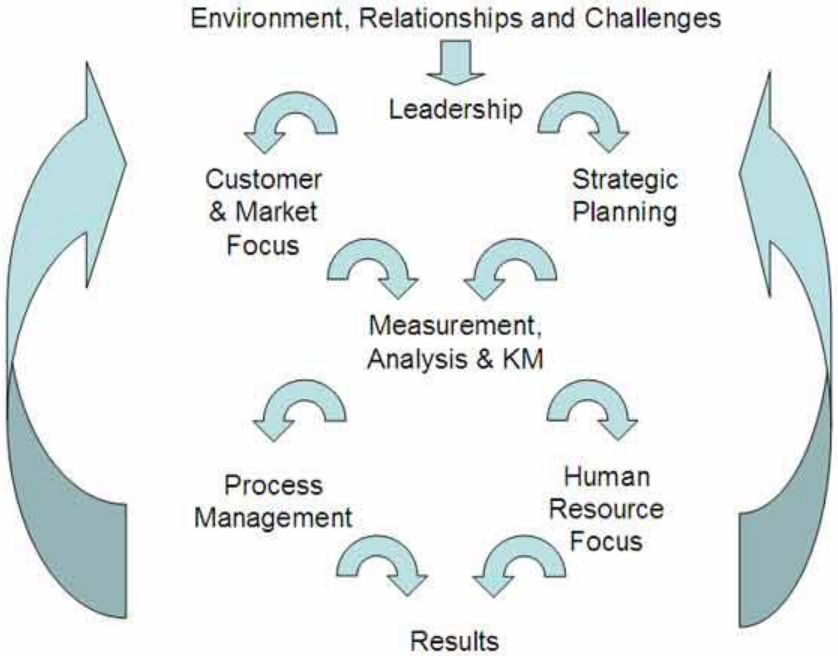
Schereurs discussed Kirkpatrick Evaluation model, to prove that it is self-evaluation model, which is composed of four levels of quality evaluation. Then, she merged the EFQM total quality model (TQM) for e-learning with Kirkpatrick model to have a "Kirkpatrick-EFQM self-assessment framework", through which, the internal stakeholders of the company shall assess the quality of e-learning activity.

Thus, when we compare the two studies, we can realise that, following the four principles of introducing Total quality management to academics, can guarantees having new assessment models to assure total quality management, and to uphold the continuous improvement for both traditional and virtual learning.

2. **Baldrige Model by** *Denis Leonard and Bill Denney,2007* **and Total quality Management (TQM) Principles by** *Kurram Hashmi, 2010***:-**

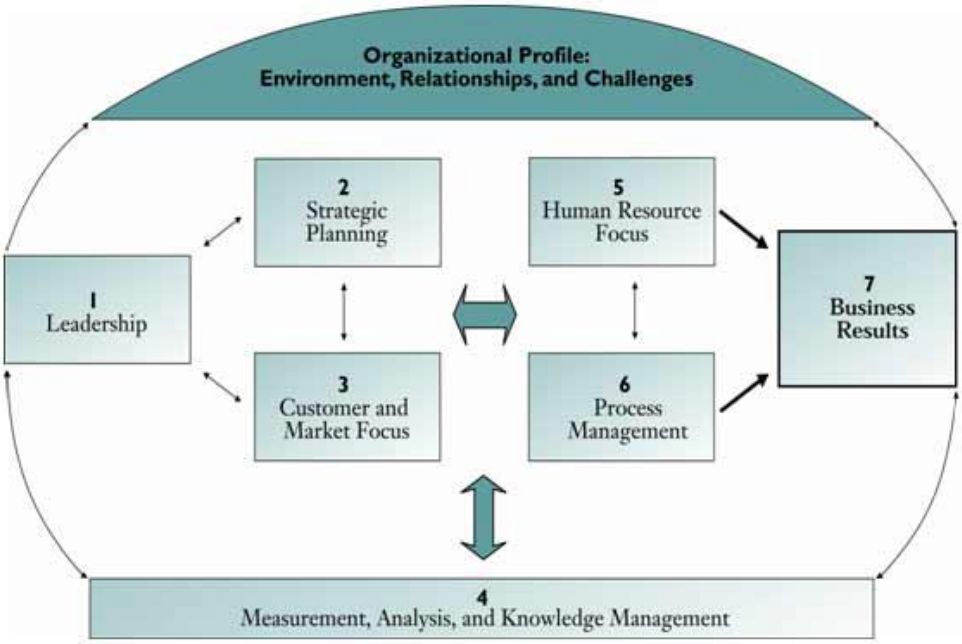
If we look back to the mid of 1990's we can find the "Baldrige Model" where the strategic flow starts with leadership

and ends with results. Through the figure below (fig.1), we realise that, Organizations will never make large improvement, unless senior leadership is actually engaged, to get a wave of reactions all over the organization, to achieve continuous improvement .



(fig.1) Baldrige Leadership flow

While the traditional Baldrige model (Figure 2) shows the link from the leadership triad (leadership, planning, and customer focus) to the results triad (staff, processes, and results) and how measurements affect both, as well as, giving a basic view of how all the pieces fit together, to assert that, It's a systems view of the criteria and how they penetrate the entire organization.



(fig.2) Baldrige Model

The Education Criteria in baldrige model, maintained by "Denis Leonard and Bill Denney" in paper about "Aspects of Baldrige – Valuable perspectives" – Published in *Quality Digest's Quality Insider*, July 2007, are a set of questions about seven critical aspects of managing and performing as an organization:

1. Leadership
2. Strategic planning
3. Customer focus
4. Measurement, analysis, and knowledge management
5. Workforce focus
6. Operations focus
7. Results

These questions work together as a unique, integrated performance management framework. Answering the questions helps to:-

- align resources;
- identify strengths and opportunities for improvement;
- improve communication, productivity, and effectiveness; and
- achieve strategic goals.

As a result,

- ever-improving value is delivered to students, other customers, and stakeholders, which contributes to organizational sustainability.
- Organization's overall effectiveness and capability is improved.
- Organization improves and learns.
- Workforce members learn and grow.

In other hand, Khurram Hashmi (March 16,2010),in his paper "Introduction and Implementation of Total quality Management" guarantees that Total Quality Management is mainly concerned with continuous improvement in all work starting from strategic planning and decision making till the executive work elements. Also, he argues that the key principles of TQM are:-

1- Management Commitment:-
   - Plan (drive , direct)
   - Do (deploy, support ,participate)
   - Check (review)
   - Act (recognize, communicate, revise)

2- Employee empowerment:-
   - Training
   - Suggestion scheme
   - Measurement and recognition
   - Excellence teams

3- Fact based decision making
   - SPC (statistical Process Control)
   - DOE,FMEA
   - The 7 statistical tools
   - TOPS (Ford 8D –team –oriented problem solving)

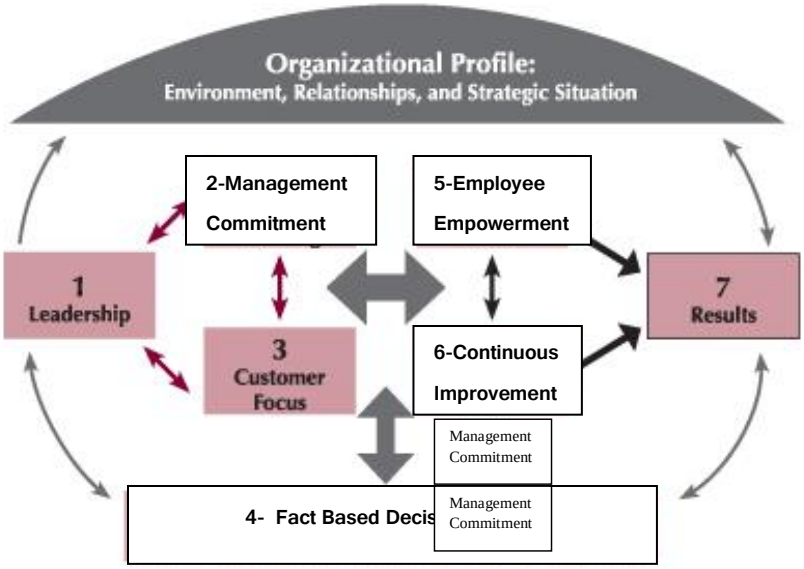
4- Continuous improvement:-
   - Systematic measurement and focus on CONQ
   - Excellence team
   - Cross functional process management
   - Attain, Maintain, improve standards

5- Customer focus:-
   - Supplier partnership
   - Service relationship with internal customer
   - Never compromise quality
   - Customer driven standards

II. FINDINGS

Total quality Management principles and baldrige model and theTQM frame work for e-learning based on EFQM and Kirkpatrickmodels , all have the same target to chieve, while each claims different approach, starting from the same base of principles.

If we draw a figure for the previous principles of Total quality Management we will have the following (fig.3) which is similar to Baldrige model.



(fig.3) Principles of TQM

III. Conclusion

In spite of the different approaches to address Total Quality Management(TQM) implementations and applications, researchers insists that to achieve excellence , top management should be involved in the application of quality. They strongly believes that all functions, all employees should participate in the improvement process. They reveals the importance of evaluation to achieve continuous improvement.

Theories and models in the field of Total Quality Management start from the same base of principles and end to same results (the importance of teamwork and continuous improvement…etc) but in different approaches.

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Lead contamination and its potential risks due to seafood consumption from Sentani Lake, Papua, Indonesia 2013

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Abstract-This research aimed to investigate lead (Pb) contamination in aquatic habitat and assess the potential health risks of seafood consumption from Sentani Lake, Papua. Water column, sediment, bivalve, pelagic and benthic fishes samples were collected in one time collection. Furthermore, estimated weekly intake (EWI) and potential health risks were determined using target hazard quotient (THQ) equation. Results revealed the concentration of Pb in water column, sediment, bivalve, pelagic and benthic fishes were ranged from 0.13 to 1.87 mg L^{-1}, 1.24 to 3.84 mg kg^{-1} dw, 0.43 to 2.76 mg kg^{-1}ww, 0.27 to 2.78 mg kg^{-1}ww and 1.39 to 3.55mg kg^{-1}ww, respectively. The magnitude of EWI values of Pb in bivalve, pelagic and benthic fishes showed that consumption per week for body weight of 60 kg for the local people were found to be in the range of 0.49 to 3.16 mg/kg bw and 1.13 to 10.71 mg/kg bw and 5.84 to 11.93 mg/kg bw, respectively. In addition, the magnitude values of target THQ for water column, bivalve, pelagic and benthic fishes were in the range of 0.005 to 0.035, 0.006 to 0.038, 0.004 to 0.039 and 0.021 to 0.051, respectively. All those levels have not exceeded the limit standard or < 1 for potential health risks which mean safe for consumption.

Index Terms- Benthic fishes, Bivalve, Estimated weekly intake, Sediment, Target hazard quotient, Pelagic fishes and Water column.

I. INTRODUCTION

Heavy metals like chromium, copper, zinc, nickel and lead are some of the major components of the industrial wastes, which along with other products from industrial operations are discharged into the aquatic environment. Direct disposal waste into the aquatic contributed a major pollutant level which may generate a threat to human health surround the niece.[1] These substances are toxic to aquatic life [2, 3]. Metals have the tendency to accumulate in various organs of the aquatic organisms, especially fish, which in turn may enter into the human metabolism through consumption causing serious health hazards [4]. Chromium, lead, mercury, zinc, copper and nickel are among the most harmful metallic pollutants. Bioaccumulation of these metals is known to adversely affect liver, muscle, kidney and other tissues of fish, disturb metabolism and hamper development and growth of fish [5-7]. Coastal areas and estuaries are particularly sensitive to metal contamination from anthropogenic sources and in the last few decades the study of space–time distribution and variation of metals has been extensively researched [8].

Prior to the advent of lead pollution, atmospheric deposition contributed an insignificant fraction of the lead accumulated in lake sediments relative to the supply from the catchment [9]. The main source of lead contamination are smelting works, application of waste water treatment sludge's to soil, transportation, rain, snow, hail and other, approximately 98% of lead in the atmosphere originates from the human activates [10]. Lead can be taken in by eating food, drinking water or breathing air children and to lesser extent, adults can also be exposed by ingesting soil. Present day lead pollution is an environmental hazard of global proportions. A correct determination of natural lead levels is very important in order to evaluate anthropogenic lead contributions [11].

The metals from anthropogenic sources mainly occur in the labile fraction and may be taken up by organisms as the environmental parameters change [12]. The Gulf of Thailand has been a major marine resource for Thai people for a long time. However, recent industrialization and community development have exerted considerable stress on the marine environments and provoked habitat degradation. [13]. This case also may occur anywhere else at the similar circumstances like in Sentani lake. There was no any research have been done before relate the health risks assessment in the study area of concern, this study will be beneficially give a valid data relate the potential health effect of Pb contamination in the site and assist the local and province decision maker to set and monitor the trend of the accumulation pollutant and hazard produced.

II. MATERIAL AND METHODS

2.1 Study Area

This research was commenced in Sentani Lake which is located in the middle of Abepura city, Papua Province, Indonesia. Sentani Lake is an important drinking water sources and main food protein source such as bivalve, various fishes and other aquatic seafood which are become daily consumption by local people along Sentani Lake and in the city of the regency. Some fishes even are sold out to the next district around Sentani district itself. Here some interesting daily activities seen at the two mouths of the Sentani Lake like weekend fishing and boating among dwelling along the lake.

2.2 Sample collection for water column and sediment

For Lead analysis, we collected four kinds of samples from the study aquatic tract such as; water column, sediment for the depth of 10 cm, bivalve and fishes. Water samples were collected at twelve varied stations at a depth of 30 cm below the water surface in high density glass bottles. Then, sediment at the top 10cm of the bottom samples were collected at the same stations where water sample collected using the Eickman bottom sampler device [7]. Those samples were kept in polypropylene containers (20g) for Pb analysis and in glass bottles (at least 150 g) for texture analysis. Then, The quotient analysis method served as screen level estimation of risk. The Aquatic Ecological Risk Assessment model was used to analyze exposure and ecological effects and to estimate community level risk and target hazard quotient was used to estimate the health risks [14].

2.3 Sample Collection for bivalve and fish

Bivalves were collected at the aquatic track stations where water and sediment samples collected. Approximately 15-20 bivalves with the size in the range of 4-6 cm in length for *Anadara trapecia* were collected. The tissues were immediately cut off and placed into polyethylene sample bags and kept in an ice box with the temperature of 4ºC before being transported to laboratory and put into a freezer (-20oC). Soft tissue of bivalve were removed and cut in section of small pieces at the end the homogenized representing samples were frozen prior being analyzed. Biota (pelagic and benthic) fishes were collected with hook-and-line to complement dock sampling efforts. At the same stations of each of these two species of fish chosen were collected (a total of 24 fish). They were placed in labeled polypropylene Falcon tubes, stored in ice and immediately transported to the laboratory. To assess the risk of population exposure, the whole fishes were used but by taking into account the conditions of consumption. Since these two species are widely distributed and consumed. At each site, three random subsamples of water column, sediment and aquatic biota were collected to ensure sample representativeness on the site. All samples were kept cool on the study field. During their transportation to the laboratory, precautions (cold storage on ice, complete filling containers, use of plastic materials for storage, avoidance of undue agitation) were taken to minimize any kind of disturbances[15, 16].

2.4 Laboratory quality control

All collected samples were analyzed at certified Chemical Laboratory in South Sulawesi Province, Indonesia. Standard reference material (SRM 1643e) for water was used to have an accuracy in procedures of analyses. Here calibrations were done using three replicate samples for water from the U.S. Department of Commerce, National Institute of Standard and Technology (NIST), with three samples of blank. In addition, DROM-2 (fish muscles) was obtained from National Research Council Canada. All analyses of parameters were done by three replicates. Their certified and measured values are shown in Table 2, below:

Table 1. Laboratory analytical results of certified reference materials for water and fish.

Parameter	Water (SRM 1643e)		Fish (DORM-2)	
Lead (Pb)	Certified values µg L^{-1}	Measured Values µg L^{-1}	Certified values mg kg^{-1}	Measured Values mg kg^{-1}
	19.63±0.21	20.12±0.38	0.065±0.007	0.072±0.010

Both of measured values for the SRM recovery percentage were > 90

2.5 Provisional tolerable weekly intake (PTWI)

Health concerns of water and biota consumers in study area need to be assessed in relation to relevant guidelines. The provisional tolerable weekly intake (PTWI) guideline was recommended by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) showed appropriate safe exposure levels, which were used to estimate the amount of contaminants ingested over a lifetime without appreciable risks [13]. In case of Pb, the provisional tolerable weekly intake (PTWI) guidelines recommended for Pb in a level of 4 µg/kg bw (FAO, 1996) is used in this analyses, the weekly intake of Pb depends on the Pb concentration in food and the daily food consumption. In addition, the human body weight can influence the tolerance of pollutants. Estimated weekly intake was calculated by using the formulation below:

$$EWI = (CPb \times ConsR) / BW \quad (1)$$

Where; EWI is estimated weekly intakes ; CPb is Pb concentration in water, bivalve and fish; ConsR is the weekly consumption of water, bivalve and fish from Sentani lake, Indonesia (water 14 L per week, then Bivalve 68.6 g/week and fish about 252 g/week, and BW is the human body weight (base on 60 kg adult).

2.6 Target hazard quotient (THQ)

The methodology for estimation of target hazard quotient (THQ) although does not provide a quantitative estimate on the probability of an exposed population experiencing a reverse health effect, but it offers an indication of the risk level due to pollutant exposure. This method was available in US EPA Region III Risk based concentration table (US EPA, 2000) and it is described by the following equation:

$$THQ = \frac{EF \times ED \times FIR \times C}{RFD \times BW \times TA} \times 10^{-3} \quad (2)$$

Where EF is exposure frequency (365 days/year); ED is the exposure duration (70 years), equivalent to the average lifetime; FIR is the food ingestion rate (fish: 36 g/person/day; bivalve: 9.80 g/person/day (FAO, 2005); C is the metal concentration in

seafood (µg g^{-1}); RFD is the oral reference dose (Pb = 0.004 µg g^{-1}/day) (US EPA, 1997, 2000); WAB is the average body weight (60 kg), and TA is the averaging exposure time for non-carcinogens (365 days/ year x ED).

III. RESULTS AND DISCUSSION

3.1. Lead Concentration in Water

Various level of lead concentration in the twelve stations is mostly affected by the purpose of the area use with its pollutant point sources. The maximum mean Pb level concentration in bivalve, pelagic and benthic fishes were attained values at (2.76, 2.78 and 3.55) mg kg^{-1} ww, respectively. This may be attributed to the huge amounts of sewage, vehicles and home industrial wastewater discharged into the Lake [17]. The high levels of Pb in water can be attributed to vehicles, industrial, urban and agricultural discharge [1, 18]. In an urban waste water study conducted in the United Kingdom by Rule et al. Pb was observed in the waste water generated from industrial, commercial, private sectors as well as from municipal waste with the highest average concentration detected in the waste water of new (<5 years old) private housing (0.375 µg/L). The monthly concentrations of lead in water samples remained below the WHO standard of 50 µg $L^{-1}$and the total mean concentration of Pb 0.04 µg L^{-1} was considerably lower during the study. Study in Keenjhar revealed the monthly variation of lead in water samples from Keenjhar Lake during 2003 shown a maximum level of lead concentration was about 0.235 µg L^{-1}. In addition, the monthly variation during 2004, with a maximum lead concentration of 0.225 µg L^{-1}[19].

3.2. Lead Concentration in Bivalve and Fishes

The present results show that Pb concentrations in bivalve, pelagic and benthic fishes organs are closely associated with Pb content of water in Sentani Lake. This obviously may be generated to the abundance of Pb into water by the similar pattern. A remarkable relationship between Pb concentrations in aquatic organisms and water as well as sediment were observed by Ibrahim and El-Naggar in Damietta Branch of the River Nile [20]. The sequences of the magnitude of Pb concentration in aquatic habitat from Sentani Lake were Benthic fishes > Shrimp > Pelagic fishes, with the maximum values were (14.74 > 12.57 > 11.01) mg/kg ww), respectively. Phillips also reported a higher amount of lead and cadmium in mollusks higher than those in water. None of the species analyzed
in this study were found to contain level of lead concentration above the proposed permitted concentration.

However, it is different with the study in Newark bay, concentrations of lead measured in all reaches of the estuary were found to exceed sediment quality criteria (250 mg/kg) and predicted toxic effects values (110 mg/kg). The highest lead concentrations in the estuary were located adjacent to petroleum refineries, paint and pigment formulating plants, and other industrial areas. These results indicate that lead contamination of superficial sediments in Newark Bay may pose a significant threat to aquatic biota [6].

Table 2. Lead concentration and accumulation in water column, sediment, bivalve and fishes from Sentani Lake, Papua Indonesia 2013

Stations	Location	Lead (Pb)				
		Water column (mg L^{-1})	Sediment (15 cm depth) ng kg^{-1}dw)	Biota (mg kg^{-1}ww)		
				Bivalve (Anadara trapecia)	*Pelagic fish (pilchard)*	*NBenthic Fish Plectropomus leopardus)*
		n= 3	n=6	n=3	n=3	n=3
St 1	Upstream, about 10 km from S	0.30	2.42	1.39	2.16	3.40
St 2	Upstream, 8 km from S7	0.27	2.65	1.50	2.21	3.55
St 3	Upstream, 6 km from S7	0.24	2.34	1.31	1.67	3.13
St 4	Close to river mouth in the west	1.14	2.74	1.67	1.74	2.56
St 5	At river mouth in the West	1.36	3.15	1.21	1.95	2.55
St 6	At the community Housing	1.87	3.54	2.52	2.57	2.74
St 7	At the river mouth in the North	1.76	3.84	2.76	2.45	2.39
St 8	Close to river mouth in North	1.43	3.54	2.55	2.52	2.84
St 9	Downstream, 6 km from S6	1.32	3.55	2.52	2.55	2.41
St 10	Downstream , 8 km from S6	0.94	2.82	2.20	2.78	1.84
St 11	Downstream , 10 km from S6	0.67	2.74	1.67	1.66	1.63
St 12	Downstream, 15 km from S6	0.13	1.24	0.43	0.27	1.39

Some relevant studies presented data on cadmium and lead content in the studied fish species provide no proof of the general pollution of the Adriatic. Obtained data were tested in relation to fish length. Metal concentrations in liver decreased with the increase in fish size, whereas no significant correlation was found between trace metal levels in the muscle tissue and the length of both species [6]. Hence study in Nigeria indicated contamination of these fish foods by lead with mean values varying from 8.0 ± 0. 8 to 12.5 ± 1.6 mg/kg. The food processing technique accounted for up to seven times increase in fish lead levels, Abeokuta, Nigeria [21].

Then, Forty-seven samples collected from the villages of São Bento, Muribeca and Pati Island were analyzed for their trace metal levels using Electrothermal atomic absorption spectrometry (ETAAS). Cadmium and Lead contents detected in the samples were found to range from 0.01 to 1.04 mg kg−1 and from 0.10 to 5.40 mg kg−1, respectively [7]. In our study, most of the Pb pollutant released from vehicles, urban waste which is containing some small industrial waste mixed with the home industry and open market waste. This situation is similar with the research on Oise river that revealed the finding signature is called “urban” rather than “industrial”, because it is clearly distinct from the Pb that is found in areas contaminated by urban waste and heavy industry. [22]

Presented data on lead content in the studied fish species provide no proof of the general pollution of the Sentani Lake. Obtained data were tested in relation to fish length. Metal concentrations in liver decreased with the increase in fish size, whereas no significant correlation was found between trace metal levels in the muscle tissue and the length of both species [4, 23]. Other results indicate contamination of these fish foods by lead with mean values varying from 8.0 ± 0.8 to 12.5 ± 1.6 mg/kg. The food processing technique accounted for up to seven times increase in fish lead levels, Abeokuta, Nigeria. [24].

Elevated risk for the American robin and short-tailed shrew was due to their small foraging ranges and habit of eating earthworms, which bioaccumulations Pb. Elevated risk for the

eastern cottontail was due to vegetation accumulating Pb to levels that were considerably higher than conventional bioaccumulation models would indicate [25]. Concentrations of lead measured in all reaches of the estuary were found to exceed sediment quality criteria (250 mg/kg) and predicted toxic effects values (110 mg/kg). The highest lead concentrations in the estuary were located adjacent to petroleum refineries, paint and pigment formulating plants, and other industrial areas. These results indicate that lead contamination of superficial sediments in Newark Bay may pose a significant threat to aquatic biota[26]. Lead concentrations in the vertical direction varied between 8.4 ng/k at a depth of 0.2 m and 3.3 ng/l at 5 m. The vertical studies were inconclusive and appeared to be influenced by resuspension of bottom sediments [27].

Forty-seven samples collected from the villages of São Bento, Muribeca and Pati Island were analyzed for their trace metal levels using electrothermal atomic absorption spectrometry (ETAAS). Cadmium and lead contents detected in the samples were found to range from 0.01 to 1.04 mg kg−1 and from 0.10 to 5.40 mg kg−1, respectively. [28]. Study in Bohai, North China, Data of the next year verifies the uncertainty analysis result that with a confidence of more than 75% the risk quotients for Hg and Pb exceed the critical value. The sources, background concentration and biota assessment of heavy metals of Bohai Sea were discussed too.[29] Risks assessment study from Yangtze River, China, Health risk analysis of individual heavy metals in fish tissue indicated safe levels for the general population and for fisherman but, in combination, there was a possible risk in terms of total target hazard quotients.[30].

3.3. Estimated weekly intake (EWI) and target hazard quotient (THQ) from consuming seafood.

The provisional tolerable weekly intake (PTWI) guideline was recommended by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) showed appropriate safe exposure levels, which were used to estimate the amount of contaminants ingested over a lifetime without appreciable risks [31].

Table 3. Estimated weekly intake (EWI) for water column, bivalve and fishes consumption from Sentani Lake, Papua Indonesia 2013.

Stations	Location	EWI			
		Water column	*Bivalve (Anadara Trapecia)*	*Pelagic fish (pilchard)*	*Benthic Fish (Plectropomus Leopardus)*
St 1	Upstream, about 10 km from S	0.07	1.59	9.07	14.28
St 2	Upstream, 8 km from S7	0.06	1.72	9.28	14.91
St 3	Upstream, 6 km from S7	0.06	1.50	7.01	13.15
St 4	Close to river mouth in west	0.27	1.91	7.31	10.75
St 5	At river mouth in the West	0.32	1.38	8.19	10.71
St 6	At the community Housing	0.44	2.88	10.79	11.51
St 7	At the river mouth in North	0.41	3.16	10.29	10.04
St 8	close to river mouth in North	0.33	2.92	10.58	11.93
St 9	Downstream, 6 km from S6	0.31	2.88	10.71	10.12
St 10	Downstream , 8 km from S6	0.22	2.52	11.68	7.73
St 11	Downstream ,10 km from S6	0.16	1.91	6.97	6.85
St 12	Downstream, 15 km from S6	0.03	0.49	1.13	5.84

In the case of Pb, The provisional tolerable weekly intake (PTWI) guidelines recommended for Pb in a level of 4 μg/kg bw (FAO, 1996) is used in this analyses, the weekly intake of Pb depends on the Pb concentration in food and the daily food consumption.

Table 3 shows the estimated weekly intakes (EWIs) for Pb caused by the consume of seafood. An important aspect in assessing risk to human health from potentially harmful chemicals in food is the knowledge of the dietary intake of such substances, that must remain within determined safety margins. For Pb, the World Health Organization has established as ‘‘safe” intake level a Provisional Tolerable Weekly Intake (PTWI) of 25 g kg^{-1} bw , World Health Organization, 2003. In our case, Pb weekly intakes through the consumption of fish (Pb: 0.04–4.96 g kg^{-1} bw), bivalve (Pb: 0.05– 0.19 g kg^{-1} bw) that were lesser than tolerable weekly intake limits.

A similar scenario is encountered with the target hazard quotients (THQs). As shown in Table 4 there were no THQ values for all Pb over 1 through the consumption of either bivalve or fishes, indicating health risk was absent. Analogously, the THQs of Pb (0.002–0.18) from consumption of fish being less than 1, suggested that health risk was insignificant. The methodology for estimation of target hazard quotient (THQ) although does not provide a quantitative estimate on the probability of an exposed population experiencing a reverse health effect, but it offers an indication of the risk level due to pollutant exposure. This method was available in US EPA Region III Risk based concentration table [10].

Table 4. Hazard quotient (HQ) and **t**arget hazard question (THQ) for water column, sediment, bivalve and fishes from Sentani Lake, Papua Indonesia 2013.

Stations	Location	THQ			
		Water	*Bivalve Anadara Trapecia*	*Pelagic fish(pilchard*	*Benthic (Plectropomus Leopardus)*
St 1	Upstream, about 10 km from S	0.006	0.021	0.032	0.051
St 2	Upstream, 8 km from S7	0.005	0.023	0.033	0.053
St 3	Upstream, 6 km from S7	0.006	0.020	0.025	0.047
St 4	Close to river mouth in the west	0.023	0.025	0.026	0.038
St 5	At river mouth in the West	0.035	0.018	0.029	0.038
St 6	At the community Housing	0.033	0.038	0.039	0.041
St 7	At the river mouth in the North	0.020	0.041	0.037	0.036
St 8	Close to river mouth in North	0.017	0.038	0.038	0.043
St 9	Downstream, 6 km from S6	0.005	0.038	0.038	0.036
St 10	Downstream , 8 km from S6	0.007	0.033	0.042	0.028
St 11	Downstream , 10 km from S6	0.005	0.025	0.025	0.024
St 12	Downstream, 15 km from S6	0.006	0.006	0.004	0.021

Table 4 shows, the value of THQ for shrimp, pelagic fish and benthic lead consumption were ranged from 0.063 to 0.168, 0.054 to 0.165 and from 0.081 to 0.221, respectively. The highest THQ value observed in St.5 and St.6 where open market and community dwelling are located. In general, consumption of shrimp and fish is an important source of exposure to lead for humans, Svensson et al. (1995). Lipton and Gillett (1991) reported that tuna were sufficiently high in metal to warrant health concern for high-risk groups with very high consumption rates. The consumption of these contaminated fish will exceed

the risk-based concentration of zero recommended by the [10]. People consuming large amounts of contaminated seafood may have elevated concentration of heavy metals in their tissues compared to the general population who do not. Relevant finding of risks assessment study from Yangtze River, China, Health risk analysis of individual heavy metals in fish tissue indicated safe levels for the general population and for fisherman but, in combination, there was a possible risk in terms of total target hazard quotients.[18]

IV. CONCLUSION

Lead in varied parameters determined in water column, sediment, bivalve and fishes from Sentani Lake, Abepura, Papua Province Indonesia. The considerable variation in levels of lead among the different species, highlights the important role of ecological and physiological factors in concentrating Pb pollutants. From the human health point of view, Pb of THQ values (<1). This estimated THQ values seem to indicate that consumption of these fish and bivalve does not implicate an appreciable human health risk. Nevertheless, it must be remembered either that the limit value set by WHO or estimated intake does not take into account exposure from other food sources. Consequently, intake might be significantly underestimated and might be of concern, above all in the cases where the exposure is closer to the tolerable weekly intake. As a final conclusion, we suggest that more specific recommendations regarding human consumption (kind of species and frequency and size of meals) are done according to the data concerning levels of environmental pollutants in the most consumed fish and seafood species.

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Enhancing Stability of an Anti Ulser Drug through Lyophilization Technique

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Abstract- The aim of present research work was to formulate an intravenous injection of Omeprazole sodium. Omeprazole drug is very slightly soluble in water. Hence *in-situ* conversion of Omeprazole into Omeprazole sodium was opted. But Omeprazole sodium is not stable in solution form. It is stable only for 1-2 days. Hence lyophilization technology was adopted to increase the stability of Omeprazole sodium injection. The lyophilization was carried out in different batches by varying the total cycle time, freezing and holding time, primary drying and secondary drying time while keeping the quantities of all the active pharmaceutical ingredients constant.

Lyophilization was carried out in five different batches with five different lyophilization-cycles of 24.5 hours, 28.5 hours, 30.5 hours, 32.5 hours, and 35 hours respectively. Melt pack was found in Batch 1, Partial melt pack was found in batch 2, cake was sticking to the bottom of vial in batch 3, moisture content was high in batch 4, the optimized good cake was found in batch 5. lyophilization cycle of 35 hours was optimized. The optimized lyophilized product was subjected to evaluation parameters such as cake appearance, reconstitution time, pH, assay, impurities, particulate matter, water content and DSC.

After considering all product characteristics batch-5 was considered as an optimized formulation. All the evaluation parameters complies the limits as per the specification of USP. Accelerated stability studies were also conducted for a period of three months and from the results obtained, it was found that the optimized formulation was found to be stable. Finally, it was concluded that the lyophilization is a suitable technique to enhance the stability of Omeprazole sodium for intravenous injection with a single dose of 40mg/vial.

Index Terms- lyophilization, Freezing, Primary drying, Secondary dying, HPLC, DSC

I. INTRODUCTION

THE FREEZE-DRYING CYCLE:

Lyophilization is the most common method for manufacturing solid pharmaceuticals products and is central to the preservation of materials which must be dried. Thoroughly in order to ensure stability and require a gentle, easily sterilized process. To meet this requirement, a solution's lyophilization occurs in three steps: (1)freezing to convert most of the water into ice, (2) primary drying to sublime the ice, and (3) secondary drying to remove unfrozen water by desorption. To technically realize this manufacturing process, a freeze dryer is commonly constructed with two main parts: a "drying" chamber holding temperature controlled shelves is connected by a valve to a "condenser" chamber, which contains coils capable to achieve very low temperatures between -50°C and -80°C. One or more vacuum pumps in series are connected to the condenser to obtain very low pressures in the entire system. With this, the sublimed water of the primary drying stage is reconverted to ice by the condenser and thus removed from the system. However, the multitude of variables inherent in a large batch of individual vials in a complex chamber setup makes process control difficult. Understanding of the product, the thermodynamic behavior of formulations and principles of the different drying stages are of fundamental Importance to avoid product damage.

The freeze-drying process consists of three stages.
1) Freezing
2) Primary drying
3) Secondary drying

1) Freezing

Freezing is a critical step, since the microstructure established by the freezing process usually represents the microstructure of the dried product. The product must be frozen to a low enough temperature to be completely solidify. Since freeze drying is a change in state from the solid phase to the gaseous phase, material to be freeze dried must first be adequately pre-frozen. The method of prefreezing and the final temperature of the frozen product can affect the ability to successfully freeze dry the material. Rapid cooling results in small ice crystals, useful in preserving structures to be examined microscopically, but resulting in a product that is, more difficult to freeze dry.Slower cooling results in large ice crystals and less restrictive channel in the matrix during the drying process. Products freeze in two ways, the majority of products that are subjected to freeze drying consist primarily of water, the solvent and materials dissolved or suspended in the water, the solute. Most samples that are to be freeze dried are eutectics, which are mixtures of substances that freeze at lower temperature than the surrounding water. Only when all of the eutectic mixture is frozen, then the Solution is said to be properly frozen. This is called the eutectic temperature. It is very important in freeze-drying to freeze the product to below the eutectic temperature before beginning the drying process. The second type of frozen product is a suspension that undergoes glass formation during the freezing process. Instead of forming eutectics, the entire suspension becomes increasingly viscous as the temperature is lowered. Finally the products freeze at the glass transition point forming a vitreous solid. This type of product is extremely difficult to freeze dry.

Typical solutions may cool to produce a partially crystalline / amorphous matrix depending on the solution components, rates of cooling etc.

Ex. 1% NaCl will contain only 1% solids and 99% water. As the solution is cooled, ice will nucleate at approximately 0^0C. The ice crystals continue to grow, pervading the solution until virtually all the freezable water has been converted into ice. Analysis will confirm that the ice crystals are embedded within a solute rich concentrate. Of all pharmaceutical unit operations, drying process contribute the most to the manufacturing cost. Lyophilization is the most expensive of all drying operations both in capital investment and in operating expense. The high cost and commercial value per production batch demands careful attention to process design and process control. The heat input during the lyophilization process must be well controlled to insure that the product temperature does not become too high. The structure of the product deteriorates at too high temperatures and the final quality of the product becomes unacceptable.

Lyophilization stabilizes the formulation by slowing the kinetic clock of the degradation process. It alters the clock by removing the solvent component to levels that never support chemical reactions or biological growth.

2) Primary drying

After pre freezing the product, conditions must be established in which ice can be removed from the frozen product via sublimation, resulting in a dry, structurally intact product.

This requires very carefully control of the two parameters,
1) Temperature and
2) Pressure, involved in freeze-drying system.

The rate of sublimation of ice from a frozen product depends upon the difference in vapor pressure of the product compared to the vapor pressure of the ice collector. Molecules migrate from the high-pressure sample to a lower pressure area. Since vapor pressure is related to temperature, it is necessary that the product temperature is warmer than the cold trap (ice collector) temperature. It is extremely important that the temperature at which a product is freeze dried is balanced between the temperature that maintains the frozen integrity of the product and the temperature that maximizes the vapor pressure of the product. This balance is key to optimum drying.

3) Secondary drying

After primary freeze-drying is complete, and all ice has sublimed, bound moisture is still present in the product. The product appears dry, but the residual moisture content may be as high as 7-8% continued drying is necessary at warmer temperature to reduce the residual moisture content to optimum values. This process is called 'Isothermal Desorption' as the bound water is desorbed from the product. Secondary drying is normally continued at a product temperature higher than ambient but compatible with the sensitivity of the product. In contrast to processing conditions for primary dying which use low shelf temperature and a moderate vacuum, desorption drying is facilitated by raising shelf temperature and reducing chamber pressure to a minimum care should be exercised in raising shelf temperature too highly; since, protein polymerization or biodegradation may result from using high processing temperature during secondary drying.

Secondary drying is usually carried out for approximately 1/3 or 1/2 the time required for primary drying.

The general practice in secondary freeze-drying is to increase the shelf temperature and to decrease chamber pressure to the lowest attainable level. The practice is based on the reason that, the ice is no longer present and there is no concern about "melt-pack" (melt pact is a sticky liquid appearance formed due to improper sublimation of the ice during primary drying) the product can withstand higher heat input. Also, the water remaining during secondary drying is more strongly bound, thus requiring more energy for its removal. Decreasing the chamber pressure to the maximum attainable vacuum has traditionally been thought to favor desorption of water. In successful lyophilization, product should retain the physico-chemical attributes of the starting solution and the structure established during freezing. The dried cake should be uniform in structure, color and texture — ideally, a dense white cake with fine, uniform structure, showing good physical strength and friability

II. INTRODUCTION OF STOMACH DISEASE

A peptic ulcer, also known as PUD or peptic ulcer disease, is the most common ulcer of an area of the gastrointestinal tract that is usually acidic and thus extremely painful. It is defined as mucosal erosions equal to or greater than 0.5 cm. Normally, the lining of the stomach and small intestine is protected against the irritating acids produced in the stomach. If this protective lining is affected it results in the breakdown of lining and hence inflammation (gastritis) or an ulcer. Most ulcers occur in the first layer of the inner lining. A hole that goes all the way through the stomach or duodenum is called a perforation. A perforation is a medical emergency.Gastroesophageal reflux disease (GERD) is a condition in which the stomach contents (food or liquid) leak backwards from the stomach into the esophagus (the tube from the mouth to the stomach). This action can irritate the esophagus, causing heartburn and other symptoms. When refluxed stomach acid touches the lining of the esophagus it may cause a burning sensation in the chest or throat called heartburn or acid indigestion. Erosive Esophagitis is an inflammation and swelling of the esophagus, and is most often caused by acid-containing stomach contents refluxing back up into the esophagus.

Proton pump inhibitors are commonly used to treat the above mentioned diseases. Omeprazole for injection is mostly used among the proton pump inhibitors. But the solubility of Omeprazole is very less and it is very unstable in solution form. So the main objective of the research work is to increase the solubility of Omeprazole by *in-situ* conversion of Omeprazole into Omeprazole sodium and increase the stability by lyophilizing the solution form of Omeprazole sodium. Lyophilization is performed for the substances which are Thermo labile and Unstable in the solution form.

The present work was designed to address the following objectives: -

- Preformulation studies on the drug.
- Selection of the excipients for development of injectable dosage form by lyophilization techniques.

- Formulation of the injectable dosage form.
- Performing Lyophilization and study its parameters.
- Evaluation of the optimized formulation
- Perform stability studies on the optimized best formulation.

Composition per one vial

Composition	Quantity	Rationale
Omeprazole	40mg	Active
Edetate Disodium	0.4mg	Chelating Agent
Sodium Hydroxide	q.s to solubilize Omeprazole Slurry	For conversion of Omeprazole base to its Sodium salt
Water for Injection	q.s to 4ml	Solvent

Precautions taken during manufacturing

- The vehicle used i.e. sterile water for injection was free from oxygen
- Glass or stainless steel apparatus was used
- Entire manufacturing process was carried out under aseptic conditions and includes washing and sterilization of vials, rubber plugs and disinfection aluminium seals. The vials were filled in class 100 laminar air cabinets

Method of Preparation

1. Collect Required water for injection and bring down the temperature below 40°C, by nitrogen bubbling
2. Check and record the pH of WFI (Limit 5.0-7.0)
3. Add and dissolve the weighed quantity of Disodium Edetate in 80% of WFI with continuous stirring
4. To the solution of step-3, Omeprazole was added with stirring to get uniform slurry
5. 1N sodium hydroxide was prepared by using WFI separately
6. To the slurry obtained in step-3, sodium hydroxide solution obtained in step-4 was added slowly with stirring till a clear solution was obtained
7. Volume of the solution is made to 100% with Water for injection. pH was checked (limit 10.3 – 12)
8. The solution of the step-7 was filtered through 0.22µm PVDF membrane and filled into USP type 1 flint glass tubular vials (fill volume 4.0 – 4.1ml), half stoppered with slotted grey bromo butyl rubber plugs and loaded into lyophilizer.

Composition of Special diluent for reconstitution

Sl.No.	Ingredients	Qty/ml
1	Citric acid monohydrate	0.5mg
2	Polyethylene Glycol 400	400mg
3	Water for injection	q.s to 1ml

Trail Batches:

Trail batches were conducted as per below table

Formulation trials of Omeprazole sodium for injection

Constituents	Trail batches				
	I	II	III	IV	V
Omeprazole	40mg/vial	40mg/vial	40mg/vial	40mg/vial	40mg/vial
Disodium edetate	0.4mg	0.4mg	0.4mg	0.4mg	0.4mg
Sodium Hydroxide	q.s to solubilize omeprazole	q.s to solubilize omeprazole	q.s to solubilize omeprazole	q.s to solubilize omeprazole	q.s to solubilize omeprazole
Water for injection	q.s to 4ml	q.s to 4ml	q.s to 4ml	q.s to 4ml	q.s to 4ml

Lyocycle	**LYO 1**	**LYO 2**	**LYO 3**	**LYO 4**	**LYO 5**

Lyophilization Cycle

Lyophilization or Freeze drying fills an important need in pharmaceutical manufacturing technology by allowing drying of heat-sensitive drugs and biologicals at low temperature under conditions that allow removal of water by sublimation or a change of phase from solid to vapor without passing through the liquid phase. Lyophilization occurs in three steps: freezing, primary drying and secondary drying. In freezing processwater is converted into ice, in primary drying to sublime the ice is subjected to sublimation and in secondary drying process unfrozen water is removed by desorption.

During the lyophilization process the material is first frozen and then subjected to drying. To initiate the drying stage, the material in the chamber is subjected to vacuum. Heat is applied carefully to the material, and a condenser is used in the chamber to collect the water. When water is leaving rapidly, its heat of vaporization is taken away from the material and helps to keep it cool and safe.

Before carrying out lyophilization for formulation it was subjected for preliminary DSC studies and based on the DSC results obtained the suitable lyophilization cycles were designed. The glass transition temperature obtained from DSC was used to determine the freezing temperature of the formulation filled into the vials. The cycles thus designed were applied and the product obtained after lyophilization was subjected for physical examination. On the basis of the cake obtained the process variables i.e. temperature and duration of the cycle were applied. Duration taken to attain required temperature was termed as ramp temperature and the duration in which the formulation remained in the attained temperature was termed as soak temperature.

Trail 1:

In this cycle, formulation was subjected for 3.5 hours of freezing, 14 hours of primary drying and 7 hours of secondary drying. Here the freezing temperature was fixed purely based on the glass transition temperature of the formulation. The glass transition temperature of the formulation was found to be -15.78°C. Thus the formulation was frozen to a temperature of -35°C which is -15.78°C lesser than the glass transition temperature. This was carried out in order to ensure complete freezing.

Lyophilization cycle of 24.5 hours

Process & Temperature	**Ramp duration (min)**	**Soak duration (min)**	**Pressure (torr)**
Freezing (-35°C)	120	90	NA
Primary Drying			
-20°C	180	60	1.0
-5°C	210	120	0.75
10°C	120	150	0.75
Secondary Drying			
20°C	60	90	0.3
35°C	120	150	0.1

Trail 2:

In this trial formulation was subjected for 5.5 hours of freezing, 16 hours of primary drying and 7 hours of secondary drying. Here the freezing temperature was reduced to -40°C. And the duration of the steps like freezing and primary drying was increased. These changes were implemented in order to enhance the freezing of the formulation and to ensure proper drying.

- Lyophilization cycle of 28.5hrs

Process & Temperature	**Ramp duration (min)**	**Soak duration (min)**	**Pressure (torr)**
Freezing (-40°C)	150	180	NA
Primary Drying			
-20°C	180	60	1.0
-5°C	210	180	0.75
10°C	120	210	0.75
Secondary Drying			
20°C	60	90	0.3
35°C	120	150	0.1

In this trial formulation was subjected for 5.5 hours of freezing, 18 hours of primary drying and 7 hours of secondary drying. Here the freezing temperature was maintained similar to trial 2. But the duration of the steps in primary drying were increased. These changes were implemented in order to enhance proper drying of the formulation.

Lyophilization cycle of 30.5hrs

Process & Temperature	Ramp duration (min)	Soak duration (min)	Pressure (torr)
Freezing (-40°C)	150	180	NA
Primary Drying			
-20°C	180	60	1.0
-5°C	210	210	0.75
10°C	120	300	0.75
Secondary Drying			
20°C	60	90	0.3
35°C	120	150	0.1

Trail 4:

In this trial formulation was subjected for 5.5 hours of freezing, 19.5 hours of primary drying and 7.5 hours of secondary drying. Here the freezing temperature was maintained similar to trial 2. But the duration of the steps like primary drying and secondary drying were increased. These changes were implemented in order to enhance the proper drying of the formulation.

Lyophilization cycle of 32.5 hours

Process & Temperature	Ramp duration (min)	Soak duration (min)	Pressure (torr)
Freezing (-40°C)	150	180	NA
Primary Drying			
-20°C	180	60	1.0
-5°C	210	240	0.75
10°C	120	360	0.75
Secondary Drying			
20°C	60	90	0.3
35°C	120	180	0.1

Trail 5

In this trial formulation was subjected for 5.5 hours of freezing, 19.5 hours of primary drying and 10 hours of secondary drying. Here the freezing temperature was maintained similar to trial 2. But the duration of the secondary drying were increased. These changes were implemented in order to enhance the proper drying of the formulation

Lyophilization cycle of 35 hours

Process & Temperature	**Ramp duration (min)**	**Soak duration (min)**	**Pressure (torr)**
Freezing (-40°C)	150	180	NA
Primary Drying			
-20°C	180	60	1.0
-5°C	210	240	0.75
10°C	120	360	0.75
Secondary Drying			
20°C	90	120	0.3
35°C	150	240	0.1

Table 1: Evaluation parameters of all the batches

Sl.No	**Evaluation parameters**	**Batch 1**	**Batch 2**	**Batch 3**	**Batch 4**	**Batch 5**
1	Appearance	White in Color	White in Color	White in Color	White in color	White in Color
2	Moisture content %	7.45%	6.87%	6.31%	6.22%	4.1%
3	Cake formation	Melt pack	Partial melt pack	Cake sticking to the bottom of vial	Satisfactory cake	Good cake
4	Reconstitution time(sec)	37sec	32sec	29sec	22sec	19sec
5	pH(initial)	8.15	8.34	8.78	8.45	8.31
6	pH(After 24 hours)	8.16	8.33	8.79	8.47	8.33
7	Assay	96.23%	97.34%	97.28%	99.63%	99.78%
8	Particulate matter ≥10µm:Not more than 6000/vial	4356	4567	4768	4598	4362
	≥25µm:Not more than 600/vial	376	389	354	398	341
9	Related substances					

a	4-Desmethyl Omeprazole and Hydroxy Omeprazole	NMT 0.5%	NMT 0.5%	NMT 0.5%	NMT 0.5%	NMT 0.5%
b	Any unknown Impurity	NMT 0.2%	NMT 0.2%	NMT 0.2%	NMT 0.2%	NMT 0.2%
C	Total Impurity	NMT 1.5%	NMT 1.5%	NMT 1.5%	NMT 1.5%	NMT 1.5%

Figure 1: IR Spectra of Disodium Edetate

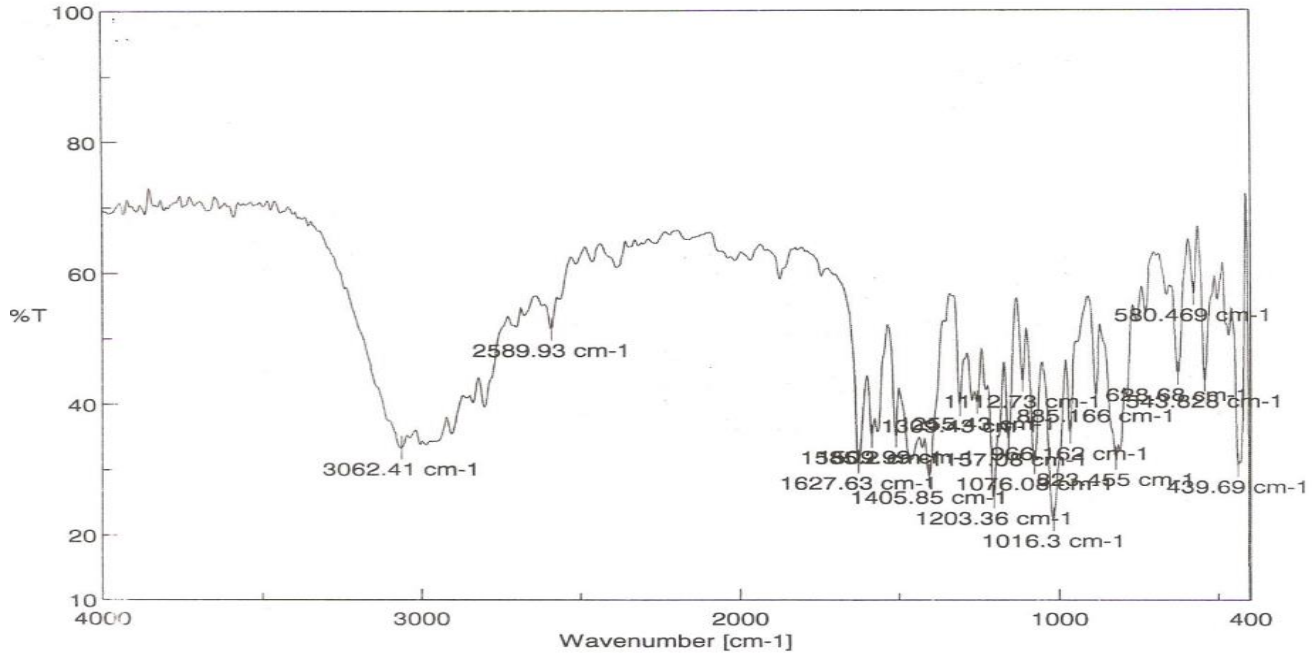


Figure 2: IR Spectra of Omeprazole

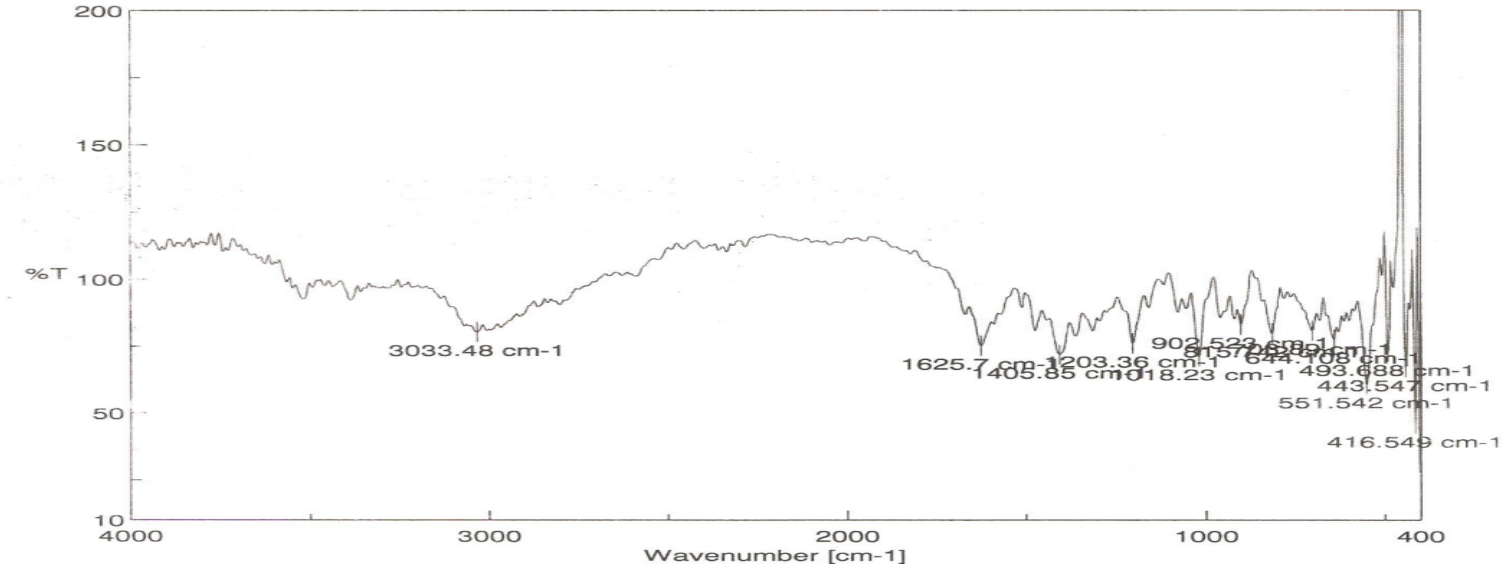


Figure 3: IR of optimized batch V

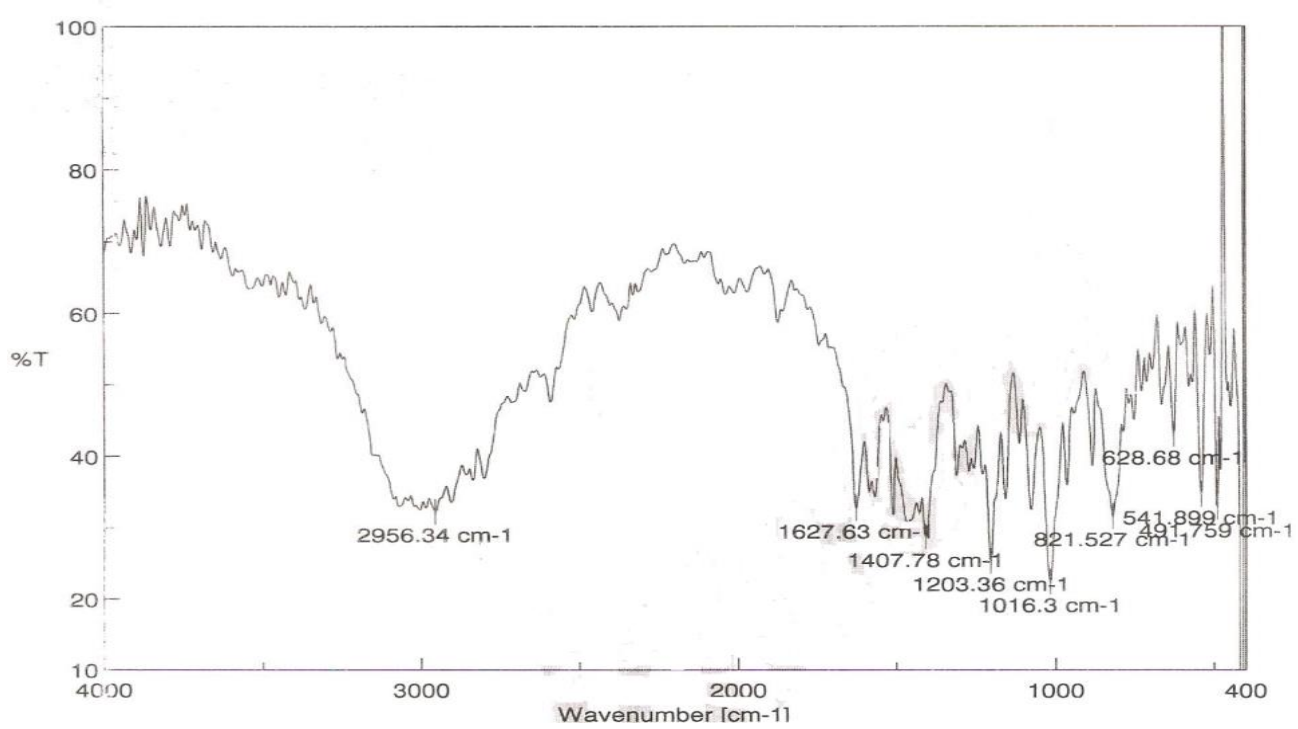


Figure 4: HPLC for Pure drug

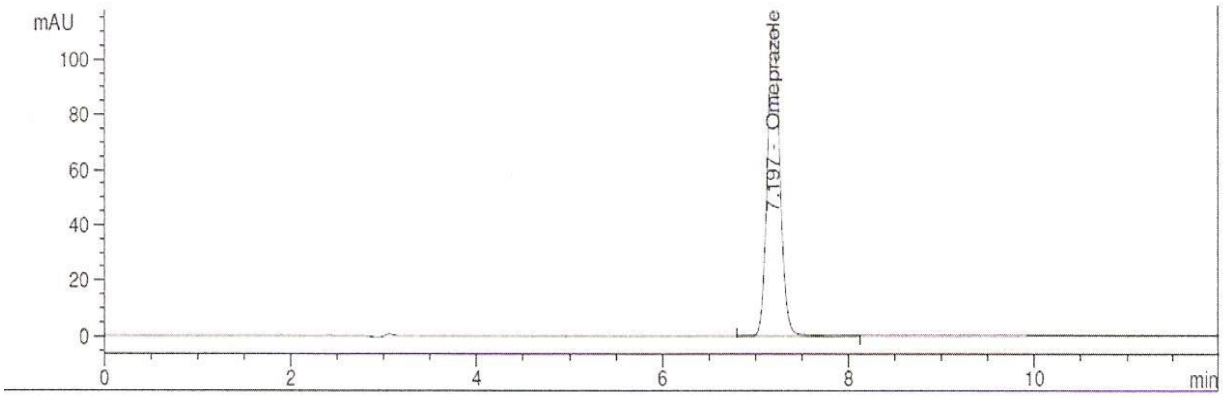


Figure 5: HPLC graph for optimized batch V

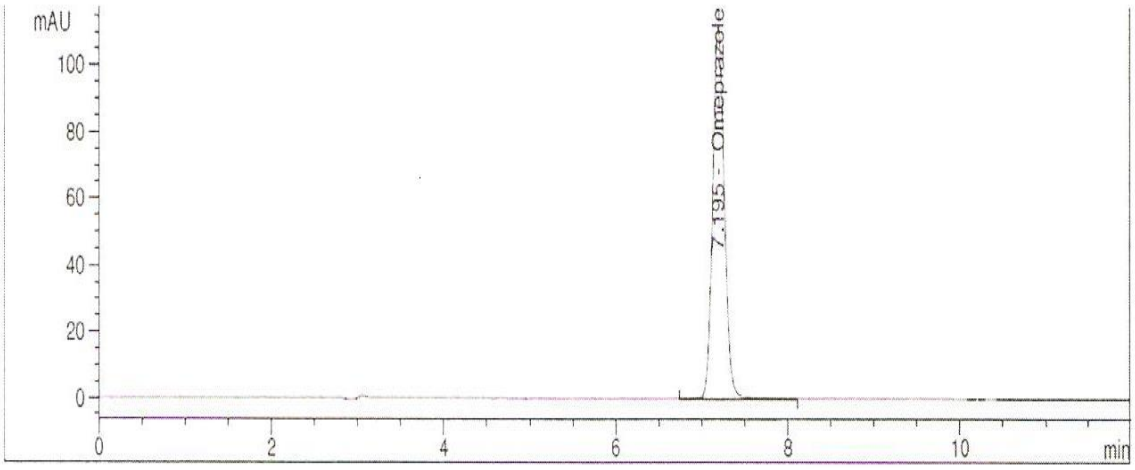


Figure 6: DSC Post-lyophilization

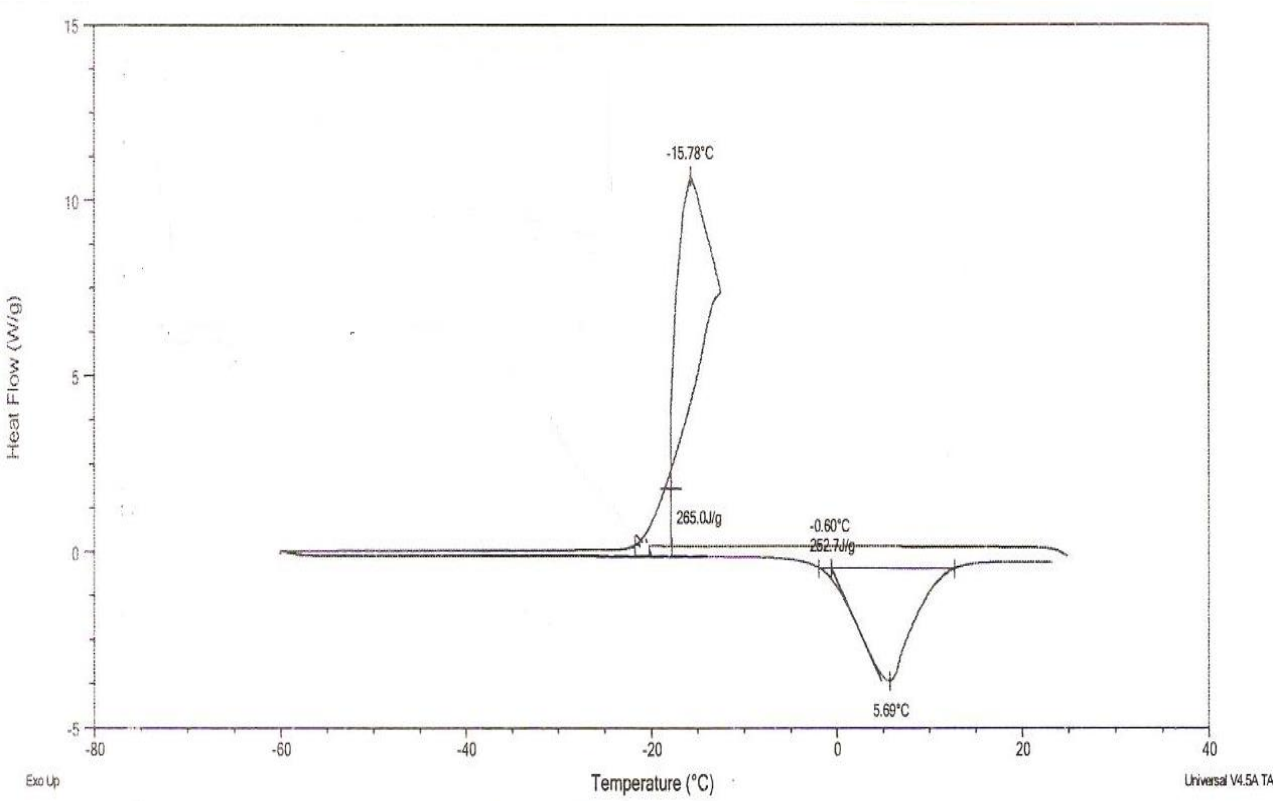


Table 2: Stability conditions: 40°C±2°C, 75%±5%RH

Sl.No	**Evaluation parameters**	**Duration**		
		First Month	**Second Month**	**Third Month**
1	Appearance	White in colour	White in colour	White in colour
2	pH	8.34	8.45	8.32
3	Reconstitution time	24sec	26sec	27sec
4	Assay	99.32%	99.84%	98.92%
5	Particulate matter ≥10µm:Not more than 6000/vial	4376	4387	4452
	≥25µm:Not more than 600/vial	342	387	329
6	Related substances			
a	4-Desmethyl Omeprazole and Hydroxy Omeprazole	NMT 0.5%	NMT 0.5%	NMT 0.5%
b	Any unknown Impurity	NMT 0.2%	NMT 0.2%	NMT 0.2%
c	Total Impurity	NMT 1.5%	NMT 1.5%	NMT 1.5%

Figure 7: First month stability HPLC peak area at 40^0C ±2^0C /75% RH for batch-V

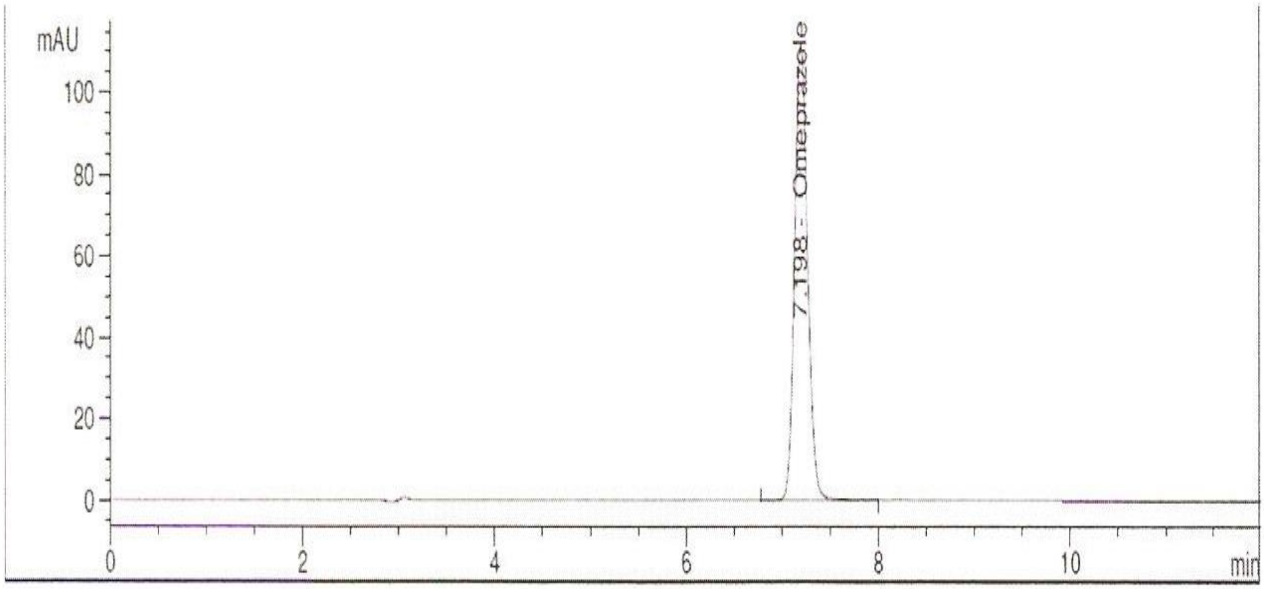


Figure 8: Second month stability HPLC peak area at 40^0C ±2^0C /75% RH for batch-V

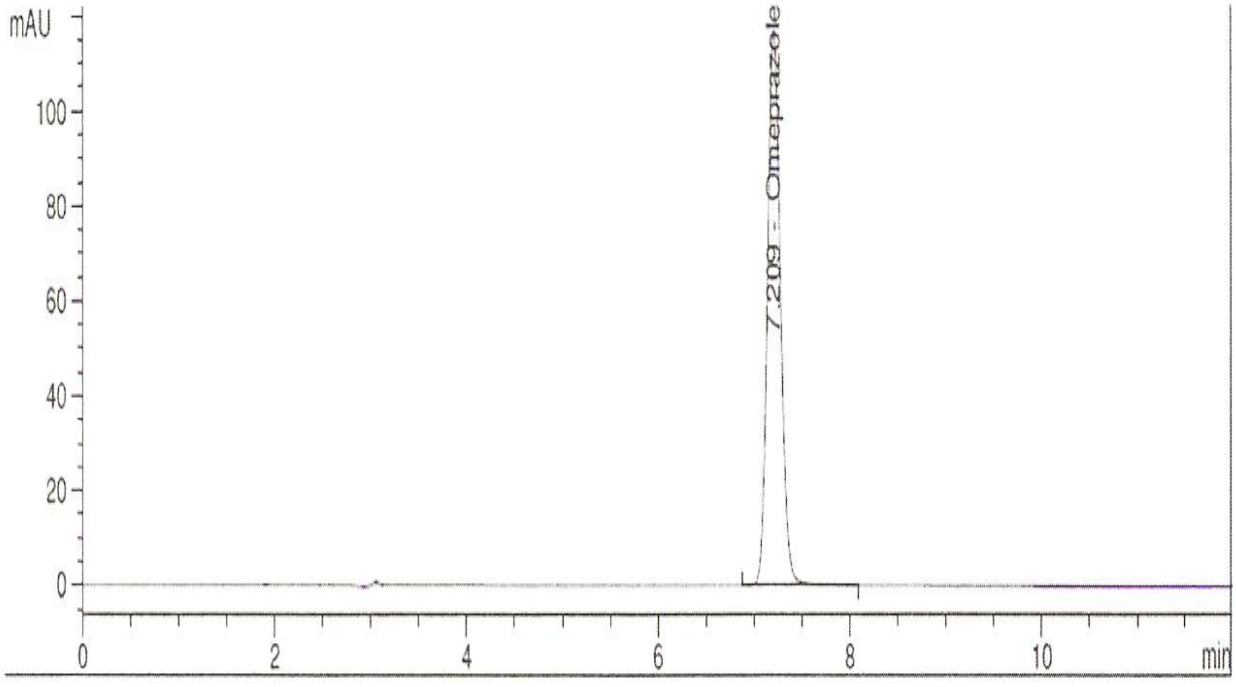
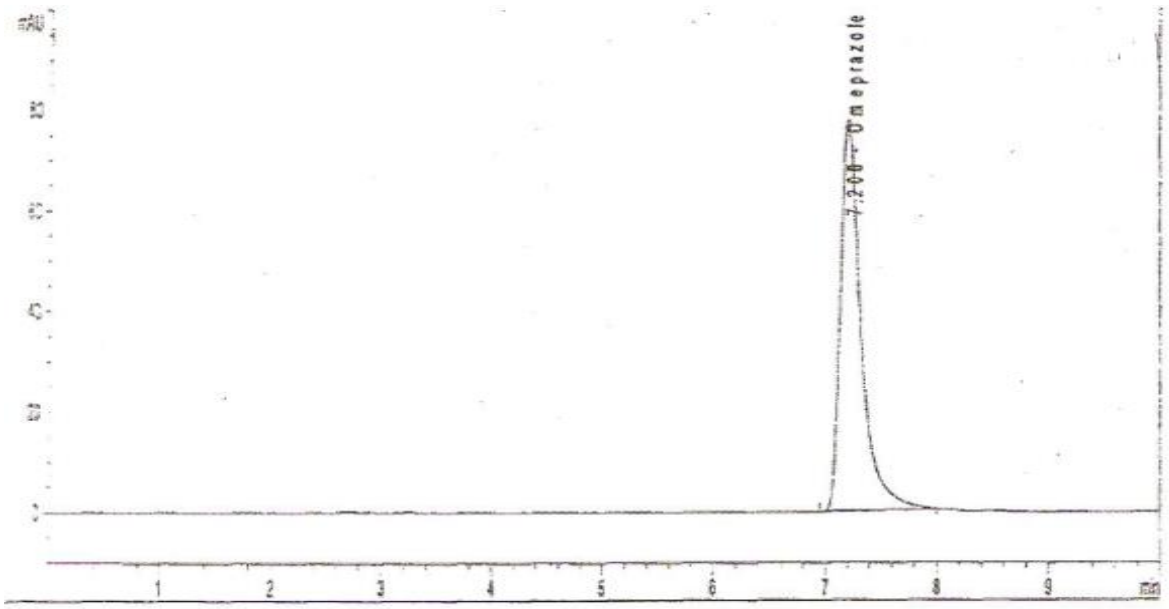


Figure 9: Third month stability HPLC peak area at 40^0C ±2^0C /75% RH for batch-V



III. CONCLUSION

The present research work was designed to develop a lyophilized injectable dosage form of an Anti-Ulcer drug Omeprazole Sodium. The drug is unstable if dispensed as liquid dosage form. Hence the present project was envisaged to overcome the drawbacks associated with Omeprazole sodium and to formulate a stable and therapeutically effective formulation by lyophilization technique which provides extended shelf life.

Based on the physicochemical properties of the drug , disodium edetate (chelating agent) and Sodium Hydroxide (Solubilizing agent), lyophilization technique was adopted to improve the cake characteristics of the lyophilized form of Omeprazole sodium Five different lyo cycle protocols were investigated sequentially to optimize the product characteristics. The batch-V of total duration of 35 hours was considered as the best formulation because it exhibited a good cake formation and the assay, pH, particulate matter and also percentage water content was found to be within the USP limits. Stability studies were conducted for the optimized formulation as per ICH guidelines for a period of three months which revealed that the formulation is stable.

From the above results, it was concluded that the lyophilization technique proves to be an advantage for development of stable injectable dosage form of Omeprazole sodium, hence our objective to develop a stable and therapeutically effective lyophilized injection of Omeprazole sodium was achieved.

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Tree Based and Energy Aware Clustering Technique Routing in Wireless Sensor Networks

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***Abstract*-** Wireless Sensor Networks (WSNs) have inherent and unique characteristics rather than traditional networks. They have many different constraints, such as computational power, storage capacity, energy supply and etc; of course the most important issue is their energy constraint. Energy aware routing protocol is very important in WSN, but routing protocol which only considers energy has not efficient performance. Cluster-head election problem is one of the basic Qos requirements of WSNs, yet this problem has not been sufficiently explored in the context of cluster-based sensor networks. Specifically, it is not known how to select the best candidates for the cluster head roles. cluster head and routing tree can be created by using residual energy of the every node in the networks. Nodes have the energy levels when sending the high priority packets in the network loss of energy will create the problem of resending the packets. This will be overcome in this paper by sending high priority packets through the normal nodes and other packets in advanced nodes. Normal nodes have higher energy level when compare to the advanced nodes so, the transmission of high priority packets very fast when compare to other nodes. In this system loss of packets will be reduced. The packets will be differentiated by clustering head in the Network.

Index Terms- Wireless Sensor Networks (WSNs), Clustering, Residual energy

I. INTRODUCTION

Wireless Sensor Networks have been noticed and researched in recent years. These networks are composed of hundreds or thousands of sensor nodes which have many different types of sensors [3]. Wireless Sensor Networks electing Cluster head is most important because electing best head reduce the congestion of packets in the Networks. Each and every node have it own energy called Residual energy i.e,these Residual energy is used to elect the cluster head and formation of routing tree in Networks[7] .We define new algorithm for cluster head election that can better handle heterogeneous energy circumstances than existing clustering algorithms which elect the cluster head only based on a node's own residual energy[8]. After the cluster formation phase,

algorithm constructs a spanning tree over all of the cluster heads. Only the root node of this tree can communicate with the sink

node by single-hop communication. Because the energy consumption for all communications in in-network can be computed by the free space model, the energy will be extremely saved, and Network lifetime is extended.. Wireless Sensor Networks can offer unique benefits and versatility with respect to low-power and low-cost rapid deployment for many applications, which do not need human supervision. The nodes in WSNs are usually battery operated sensing devices with limited energy resources and replacing or replenishing the batteries is usually not an option [1]. Thus energy efficiency is one of the most important issues and designing power-

efficient protocols is critical for prolonging the lifetime. The latest developments in time critical, low cost, long battery life, and low data rate wireless applications have led to work on WSNs [2]. These WSNs have been considered for work in certain applications with limited power, reliable data transfer, short communication range, and reasonably low cost such as industrial monitoring and control, home automation and security, and automotive sensing applications [3].One of the main reasons for the popularity of Dijkstra's Algorithm is that it is one of the most important and useful algorithms available for generating (exact) optimal solutions to a large class of shortest path problems. The point being that this class of problems is extremely important theoretically, practically, as well as educationally. It will helps to move packet's faster to destination and loss of packet is reduced because, the of lifetime. Then electing energy efficient nodes from nodes in the Networks [5].

II. Related Work

In order to enhance the network lifetime by the period of a particular mission, many routing protocols have been devised. One of these is network clustering, in which network is partitioned into small clusters and each cluster is monitored and controlled by a node, called Cluster Head (CH) and also congestion avoidance can be made . In the sensor network, sensor node can communicate with the base station directly or through the cluster head, or through other relaying nodes. In a direct communication, each node communicates directly with the base station.

When the sensor network is large, the energy for communicating with the base station is correspondingly large. Hence, some nodes far apart from the base station will quickly run out of energy [9]. The other scheme is the clustering; where the nodes are grouped into clusters and one node of the cluster send all gathered data from the nodes in its cluster to the base station. The LEACH (Low energy Adaptive Clustering Hierarchy) is a self-organizing and adaptive clustering protocol that uses randomization to distribute the energy load evenly among the sensor nodes[9], [10]. In the LEACH scheme, the nodes organize themselves into a local cluster and one node behaves as local cluster head. LEACH includes a randomized rotation of the high energy cluster head position such that it rotates among the sensors. This feature leads to a balanced distribution of the energy consumption to all nodes and makes it possible to have a longer lifetime for the entire network. PEGASIS (power-efficient gathering in sensor information systems) [11],[12] is an improvement over LEACH by making only one node transmit data to the base station in this protocol every node transmits it's data only to its nearest/neighbor node in the data fusion phase. These electing cluster heads can communicate directly with the base station (BS). Other nodes send the data, sensed from the environment to these CHs. CHs first aggregate the data from the multiple sensor nodes, and then finally send it directly to the BS. Hence the CH should be powerful, closer to the cluster-censored a less vulnerable. Enterprise Resource Planning (ERP) System implementation is both an art and science that consists of planning, implementation, and ongoing maintenance. This methodology is designed to automate the drudgery of implementation and provide organized approaches to problem solving by listing, diagramming, and documenting all steps. Structured methodologies help to standardize and systemize ERP implementation and maintenance by approaching them as an engineering discipline rather than as whims of individual software developers. It is essential to understand structured methodologies in the implementation of ERP systems. These functions and benefits need to be articulated to ensure that the ERP system performs as desired. This process is called conducting a feasibility analysis. The second feature of integrated systems is that the process of multirecording and transcribing data to update separate records is now replaced by one single input to the computer record. Therefore multiinputs relating to transactions affecting the product are replaced by one single input to the product record held in the computer. Again, imagine the challenges or controls required to facilitate timely coordination and scheduling of all the processes (manual or otherwise) to be undertaken by the different departments so that the single input to the computer system, also referred to as the single point of entry, is accomplished. By the preparation of suitable computer programs (e.g., software, applications, utilities, or combinations thereof) all the information needed by the separate departments can be produced when required. This is accomplished by processing the integrated records held on the Product Master File or in the Integrated Database. Integrated systems thus link together

systems that traditionally have been kept separate and, by their very nature, cut across the conventional departmental boundaries that normally exist in a business. The unified nature of an ERP system can lead to significant benefits, including fewer errors, improved speed and efficiency, and more complete access to information. With better access to information, employees and managers can gain a better understanding of what is going on in the enterprise so they make better business decisions. Third step of the process will be electing energy efficient nodes in the Networks. They two types of the nodes in the Network i.e., Normal nodes and advanced nodes. Normal nodes have high energy level but advanced nodes have low energy level in the Network. In this paper packets will be separated high priority packets and low priority packets [6].

III. ARCHITECTURE

A. Overview

In WSNs, ERP protocol helps the data transformation in very efficient manner the most important problem in the networks are electing clustering head and identifying energy efficient nodes. In this system clustering head election will be overcome by using and energy efficient nodes through Enterprise Resource Planning Protocol in the networks . Routing tree will be created in the network by using Dijikstra's Algorithm. This Algorithm will helps to find the minimum shortest distance in the entire network, shortest distance will helps increase the life time of the packets so, the loss of packet in the network will be reduced. Data transformation in the network will through energy efficient nodes i.e. means nodes energy will be calculated.

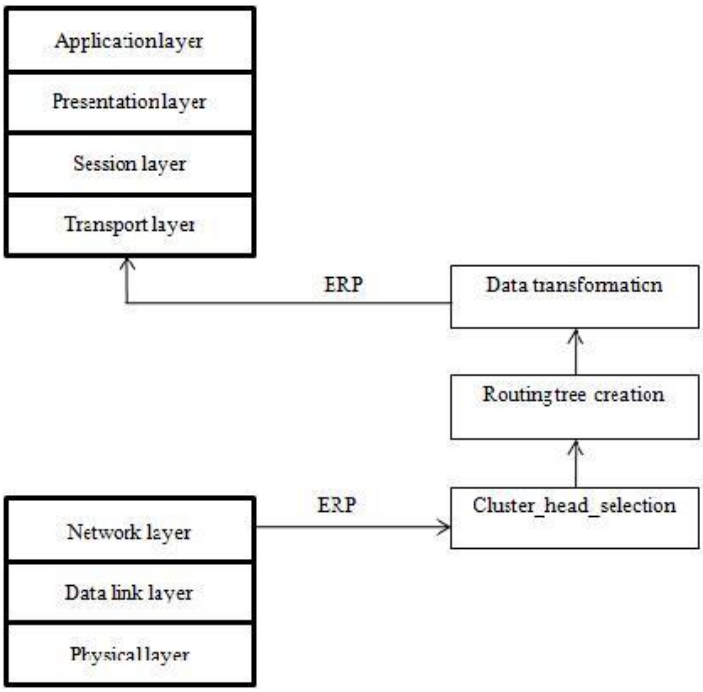


Fig 1: Structure of layered system

After calculating the energy level the packets will send through the network. Before sending packets to data transformation cluster head given priority to packets, priority helps to identify the packets to send energy efficient node or in ordinary nodes.

IV. PROPOSED SYSTEM

A. Tree based Cluster election model

In the set-up phase, each node broadcasts the Node_Residual_Msg within radio range r, which contains

residual energy of node. All nodes within the radio range of one node as the neighbors of this node. Each node receives the Node_Residual_Msg from all neighbors in its radio range and updates the neighborhood table and generates CHSV (Cluster Head Selection Value) using Formula 1.

$$CHSV_i = \frac{RE_i}{\sum All\ neighbours\ j\ of\ i (Dis_j)^2}$$

RE_i -- Residual energy of node i.
Dis_j -- Distance from node i to node j.

After clustering, in steady-state phase, cluster heads Broadcast within a radio rang r the Cluster Head Residual Msg which contains node residual energy. The cluster heads compute PSV (Parent Selection Value) by using formula 2.

$$PSV_i = \frac{RE_i}{\sum All\ neighbours\ j\ of\ i \left(\frac{Dis_j}{RE_j}\right)}$$

RE_i -- Residual energy of node i
RE_j -- Residual energy of node j
Dis_j -- Distance from node i to node j

In each cluster heads range, the node has largest PSV selected as parent node and other nodes become child of it, and send the CHILD message to notify the parent node. Finally, after a specified time, a routing tree will be constructed; whose root has the largest PSV among all Cluster heads.

B. Shortest path defining model

Shortest path will be find out by using Dijikstra's Algorithm. The Algorithm has the following steps to finding the shortest path will be:

STEP 1: Initialization

$N=\{s\}$
$D_j = C_{sj}$ for all $j \neq s$
$P_s = 0$

STEP 2: For finding the next closest node.

$$D_i = \min_{j \notin N} D_j$$

D_i→ current minimum cost from source node to node i. N→Permanently labeled nodes.

STEP 3: Updating minimum cost after node i added to N. For each node $j \notin N$:

$D_j=\min \{D_j, D_i+C_{ij}\}$
Go to step 2.

V. ENERGY EFFICIENT ROUTING IN WIRELESS SENSOR NETWORKS

All proposed clustering techniques in literature, use a cluster head rotation in order to balance the transmission energy cost over the network nodes, because the cluster head role is energy expansive. That permits to grant approximately, the same lifetime until the battery energy depletion. So, in every transmission round, some new nodes play concurrence to be elected as cluster head. Each node selected, has to advertise its status to its neighbor nodes, to know the nodes which will belong to its cluster and to schedule the TDMA intervals [4]. Then, some energy is consumed in this state. This energy for clustering control is considerable, and it is important to reduce this energy to use it to exploit the total network energy to extend the network lifetime.

Table 1. Radio parameter values.

Description	Symbol	Value
Energy consumed by the amplifier to transmit at a shorter distance	ε_{fs}	10pJ/bit/m2
Energy consumed by the amplifier to transmit at a longer distance	ε_{mp}	0.0013pJ/bit/m4
Energy consumed in the electronics circuit to transmit or receive the signal	E_{elec}	50nJ/bit
Energy consumed for beam forming	E_{DA}	5nJ/bit/signal

Our contribution consists in reducing the control energy for cluster formation by keeping each selected cluster head for more than one transmission round. So, each node selected as cluster head, play this role for m consecutive transmission rounds before conceding it for upcoming selection nodes. The proposed algorithm, called Energy Efficient Routing in Wireless Sensor Networks (EERWSN) is a self-organizing, dynamic clustering method that divides dynamically, the network on a number of a priori fixed clusters. Each cluster has one cluster-head. In this work, we use two-level heterogeneous networks, in which there are two types of sensor nodes: the advanced nodes and normal nodes. Let E_0 the initial energy of the normal nodes and, *f* the fraction of the advanced nodes, which own a times more energy than the normal ones. Thus there are *f.N* advanced nodes equipped with initial energy of $(1+a)E_0$ and $(1-f)N$ normal nodes equipped with initial energy of E_0.

We can compute the total initial energy of the networks which is given by:

$$E_{total} = N(1-f)E_0 + Nf(1+a)E_0$$

The node *n* becomes cluster-head for t_n rounds. In homogenous networks, to guarantee that there are average $P_{opt}N$ Cluster heads every round, ERP let each node *n* becomes a cluster-head once every $t_n = 1/P_{opt}$ rounds. The network nodes will have different residual energy when Network evolves. If the rotating epoch t_n is the same for all the nodes as proposed in ERP, the energy will be not well distributed and

the low-energy nodes will die more quickly than the high-energy nodes. Choose different t_n based on the residual energy$E_n(r)$ of node *n* at round *r*.

The probability threshold that each node *n* use to determine whether itself to become a cluster-head in each round, is given as following Equation:

$$T(n) = \begin{cases} \dfrac{p_n}{\left(1 - p_n.\left(r \bmod \left(\frac{1}{p_n}\right)\right)\right)}, if\ n \in G \\ 0 \qquad otherwise \end{cases}$$

Where *G* is the set of nodes that are eligible to be cluster heads at round r. If node *n* has not been a cluster-head during the most recent $\frac{1}{p_n}$ rounds, we have $n \in G$. The p_n parameter is given by Equation:

$$p_n = \begin{cases} \dfrac{p_{opt}E_n(r)}{(1+af)\bar{E}(r)} & if\ n\ is\ a\ normal\ node \\ \dfrac{(1+a)p_{opt}E_n(r)}{(1+af)\bar{E}(r)} & if\ n\ is\ an\ advanced\ node \end{cases}$$

where $E_n(r)$ is the residual energy of the node *n* at the round *r* , $\bar{E}(r)$denotes the average energy of the network at round *r*,which can obtained by

$$\bar{E}(r) = \frac{E_{total}}{N}\left(1 - \frac{r}{R}\right)$$

$$R = \frac{E_{total}}{E_{round}},$$

$$E_{round} = L\left(2NE_{elec} + NE_{DA} + k\varepsilon_{mp}d_{toBS}^4 + N\varepsilon_{mp}d_{toCH}^2\right)$$

k is the number of clusters, E_{DA} is the data aggregation cost which is expended in the cluster-heads, d_{toBS} is the average distance between the cluster head and the base station, and d_{toCH} is the average distance between the cluster members and the cluster-head. If the nodes are uniformly distributed, we can give:

$$d_{toCH} = \frac{M}{\sqrt{2k\pi}}$$

$$d_{toBS} = 0.765\frac{M}{2}$$

From the above Equation, we can find the optimal value *k* of that minimizes E_{round} , which is given by:

$$k_{opt} = \frac{\sqrt{N}}{\sqrt{2\pi}}\frac{\sqrt{\varepsilon_{fs}}}{\sqrt{\varepsilon_{mp}}}\frac{M}{d_{toBS}^2}.$$

This value of *k* is used to determine E_{round} **,** and therefore, by the above equation each node can find the value of the parameter p_n used in T (*n*) calculation. And, for each round *r*, when node *n* finds it is eligible to be a cluster-head, it will choose a random number between 0 and 1. If the number is less than threshold T (*n*), the node *n* becomes a cluster-head during the current round.

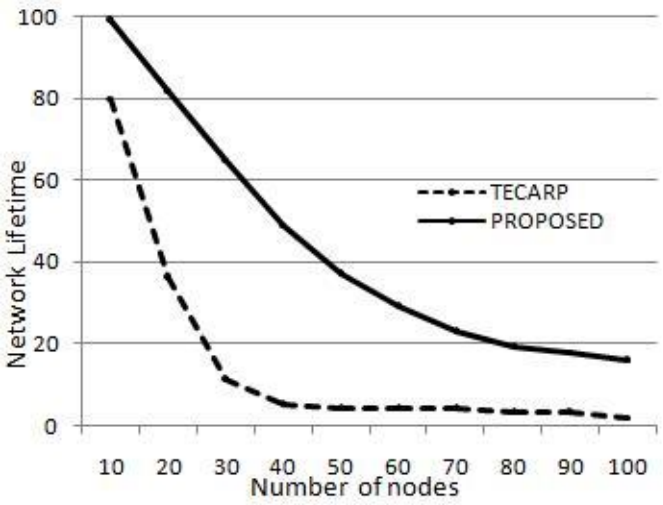
VI. SIMULATION AND RESULTS

The simulation parameters values used in our work are given in the **Table 2**.

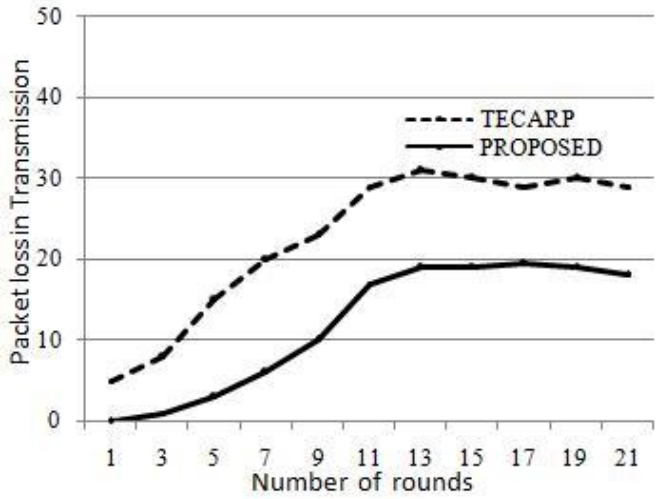
Table 2. Simulation parameter values.

Description	Symbol	Value
Network dimension	M	100m
Number of network nodes	N	100
Data packet length	L	40bits
Control packet length	L_{crt}	20bits
Optimal probability	p_{opt}	0.1
Advanced Nodes percentage	f	Variable
Fraction of advanced nodes energy to normal nodes	a	Variable

In the Enterprise Resource Planning Protocol the network lifetime also be increased, because of defining shortest path in the network using Dijikstra's algorithm, cluster head and routing tree will created by calculating the Residual energy of the node .It will increase the network lifetime of the Networks, it will shown in the figure.1:



When compare to the TECARP, in ERP protocol loss of packets will be reduced in the network due to using best Clustering head Algorithm. And using Electing Energy Efficient nodes in the entire system it will be shown in the figure.2:



VII. CONCLUSION

In this paper, Cluster head creation and Routing tree will be created by using Residual energy of each node, it will helps to increase the Network lifetime. we have proposed Dijikstra's Algorithm helps to identify the shortest path in the network. Through the simulation, we demonstrate that the proposed algorithm allows a large stable network lifetime compared to the most known Bully Algorithm and Dijikstra's Algorithm in this area. Our future work is based on security.

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TRANSLUCENT CONCRETE

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Abstract- The concrete currently used in the construction industry generally consists of at least cement, water and aggregates (fine or coarse). As is well known, traditional concrete has a greyish colour, and its high density prevents the passage of light through it, which means that it is also impossible to distinguish bodies, colours and shapes through it. As can be imagined, concrete with the characteristic of being translucent will permit a better interaction between the construction and its environment, thereby creating ambiences that are better and more naturally lit, at the same time as significantly reducing the expenses of laying and maintenance of the concrete. Along with the translucent characteristics, the paper confines its area towards the reinforcement method of this type of concrete such that they can be practically implemented as a load bearing structure. This new kind of building material can integrate the concept of green energy saving with the usage self-sensing properties of functional materials.

Index Terms- Translucent, Reinforcement, load-bearing

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I. INTRODUCTION

Today we are living in a world where energy expenditure and environmental problems have escalated to global scale. In today's developed world our built environment takes energy; energy to make the materials that go into the buildings, energy to construct them (Embodied energy) and energy to heat, cool & light them (Operating energy). Our project of casting translucent concrete aims at reducing this operating energy by exploiting vast amount of potential energy in the form of sunlight. Another additional feature is its pleasing aesthetics that can change the image of the concrete which is generally perceived as dull, pale, opaque grey material.

II. OBJECTIVE

To cast a special type of concrete with light transmitting properties, to study their characteristics and to develop a functioning material which is not only energy saving but gives out artistic finish.

III. FORMULATION FOR OBTAINING A TRANSLUCENT CONCRETE MIXTURE

The invention relates to a formulation for obtaining a translucent concrete mixture comprising a mixture of polycarbonate and epoxy matrices as well as glass fibers, optical fibers, colloidal silica, silica and diethylentriamine (DETA) and Portland cement. This invention has greater mechanical strength properties than those of a standard concrete, with lower density and mechanical characteristics that enable same to be used in both a structural and architectonic manner. The inventive formulation used to obtain the translucent concrete mixture comprises a type of concrete that is different from those currently available, which combines the advantages of existing concretes with translucency.

IV. DESCRIPTION

The concrete generally used in construction generally consist of at least cement, water and aggregates (fine or coarse). As is known, traditional concrete has a greyish colour, and its high density prevents the passage of light through it, which means that it is also impossible to distinguish bodies, colours and shapes through it. As can be imagined, concrete with the characteristic of being translucent will permit a better interaction between the construction and its environment, thereby creating ambiences that are better and more naturally lit, at the same time as significantly reducing the expenses of laying and maintenance of the concrete.
With the aim of eliminating these and other drawbacks, thought has been given to the development of a translucent concrete, which concerns a formulation of concrete which, as well as permitting the passage of light through it, also works more efficiently in the mechanical sense than traditional concrete.

V. INGREDIENT CHARACTERISTICS

The characteristic details of this novel concrete are studied under the following description and following the same reference signs for indicating it.

A polymeric matrix is expected to be provided to enhance the binding capacity and also the mechanical strength.

Preferable two polymeric mixture as per our studies are required. One, epoxy and the other is polycarbonate matrix. These together with their respective catalyst shall form a good binding strength.

The aggregates used in the manufacture and formulation were fiberglass, silica, colloidal silica sol and optical fibers. Optionally, rocky elements can be used as aggregates, for example, gravels, sands, etc.

The setting agent used is diethylenetriamine (DETA), which has to be dehydrated on molecular sieves prior to use.

The optical fibers used in the formulation of this concrete are basically fine glass or plastic threads that guide the light. The communication system arises from the union between the light sources that is sufficiently pure for not being altered. The types of fibers used are monomode and virgin fibers, in other words, those in the pure state and without any coatings, the aim of which is so that the light can pass through the concrete. Used as additives are: pigments; bridging agents for favouring the attachment to the matrix, giving resistance and protection against aging; lubricant agents for giving surface protection and filmogenic gluing agents for giving integrity, rigidity, protection and impregnation, metal salts, thixotropic agents (flakes of inorganic materials, glass microspheres, calcium carbonates, silicon dioxide, etc.), flame retardant agents (elements containing chlorine, bromine, phosphorus, etc.) and UV protection agents (stabilisers). Silica sol, also known as silica hydrosol, is a colloidal solution with a high molecular hydration of silica particles dispersed in water. It can be used as a binding agent. Silica of between 0.5 and 10% by weight of resin has to be used so that, once set, the silica used provides greater resistance and hardness to the concrete. According to the study the mechanical characteristics such as compressive resistance of a translucent concrete with epoxy matrix is up to 220 Mpa.

The mechanical characteristics such as compressive resistance of a translucent concrete with polycarbonate matrix is up to 202 MPa, as well as allowing light to pass through without any distortion at all. The good dispersion of the aggregates, additives and, above all, of the matrix, can be appreciated. The direction of the layers is parallel to the direction of the moulding. It has a laminar drying in the same direction in which it is cast. It displays good crystallisation in the highest parts, and decreases a little when approaching the lower end.

The manufacturing process of this concrete consists of the mixture of two processes, one where the cement is mixed with water, and the other where the matrices are mixed.

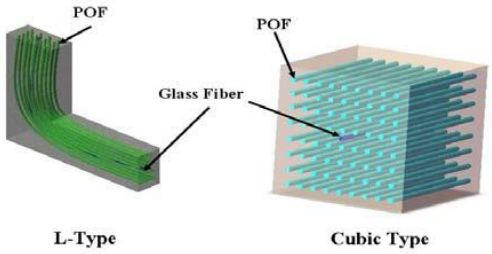

Fig: 01. Integrated model of translucent concrete cube

Fig: 02. Form-work of wood and thermocol

VI. EXPERIMENTS ON TRANSLUCENT CONCRETE

1. *LIGHT GUIDING PROPERTY ON TRANSLUCENT CONCRETE.*

The following are the factors to be considered for the performance of the transparency of the concrete:

a. Transmittance
b. Haze
c. Bi-fringence
d. Refractive index.
e. Dispersion.

The transmittance can be directly calculated by the ratio of the incident energy and transmission energy of light expressed as following equation:

(1) $\rho=\xi\times (J_1/J_0)\times 100\%$

Where ρ, ξ, J_1 and J_2 are transmittance, correction coefficient of measurement equipment, transmission energy and incident energy, respectively. While the translucent concrete studied by us is heterogeneous, its transmittance cannot be obtained by equation (1), because the number of POFs in unit area is different at different area, that is, the transmittance in unit is related to the arrangement of POF in translucent concrete.

Improvement in the calculation method for transmittance are as follows.

a) Incident light energy per unit area (ρ_0):

(2) $\rho_0 = W_0/A_0$

Where W_0 and A_0 are light energy of incident probe and area of incident probe.
b) Incident total energy of concrete section at the side of light (J^s_0):

(3) $J^s_0 = \rho_0 \times A_{1=} (W_0/A_0) \times A_1$

Where A_1 is the cross-section area of translucent concrete.
c) Transmitted light energy of single POF (ρ_1):

(4) $\rho_1 = (W_1/n_1)$

Where W_1 and n_1 are light energy of transmission probe and the number of POFs covered by transmission probe.
d) Transmitted light energy of translucent concrete (J^s_1):

(5) $J^s_1 = \rho_1 \times N = (W_1/ n_1) \times N$

Here N is the total number of POFs in the translucent concrete.
Then based on equation (3) and (5), we can obtain the transmittance (ρ^s) of the translucent concrete.

$$\rho^s = \xi \times (J^s_1/J^s_0) \times 100\ \% = [\ (\xi \times N \times W_1 \times A_0)/(W_0 \times A_1 \times n\ )\ ] \times 100\ \%$$

2. *LIGHT GUIDING EXPERIMENT ON TRANSLUCENT CONCRETE.*

In order to study the light guiding property of translucent concrete, six units of translucent concrete is fabricated with different POF volume ratios of 1%, 2%, 3%, 4%, 5% and 6%, and the diameters of POF is 1mm. The transmittance is measured by the Optical Power Meter and its wavelength range is 400-1100nm. The incandescent lamp with 200W and halogen lamp with 500W are chosen to provide light. To eliminate the measuring dispersion of transmittance caused by the discrepancy of POFs' position and the material, three areas (denoted as 1, 2 and 3) in the middle part of translucent concrete are chosen to test shown as figure below, and the number of POFs in each chosen area shall be equal. The number of the POFs is covered by transmission probe or integral sphere are 2 for 1% POF volume ratio, 4 for 2% POF volume ratio, 5 for 3% POF volume ratio, 7 for 4% POF volume ratio, 3 for 5% POF volume ratio and 9 for 6% POF volume ratio respectively. The incident light energy and transmission light energy are read simultaneously at each step.

Fig: 03. Optical Power Meter

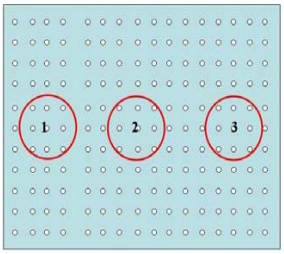

Fig: 04. Measuring area of the optical fibers

3. *SELF-SENSING PROPERTY OF TRANSLUCENT CONCRETE BASED ON STRESS ELASTO-OPTIC EFFECT.*

Glass fiber is a kind of photoelastic material, which is isotropic under normal circumstances. Once be applied load, glass fiber becomes anisotropic, and light birefringence phenomena in it is generated. Commonly, if the optical constants and thickness of glass fiber, the isochromatics and isoclinics are known, the stress state of the glass fiber can be obtained based on the shear difference method. Based on this phenomenon, glass fiber is layout into the cube to monitor the stress state of structures, and the glass fiber can be considered as a sensing element and an optical transmission material. In order to study the self-sensing property of translucent concrete cube, we simultaneously layout a glass fiber with 15mm diameter and numbers of POFs into the concrete with the size of 100mmx100mmx100mm. In the test, the isochromatics and the isoclinics of the samples are gotten by using the plane polarized light and circularly polarized light equipments respectively. Figure below shows the experimental setup including a glass fiber or a translucent concrete, a loading device and a photoelasticity experimental equipment. The circularly polarized optical field is obtained by adding two 1/4λ wave plates in the plane polarized optical field. The strain applied on the samples is recorded by the strain gauge pressure transducer.

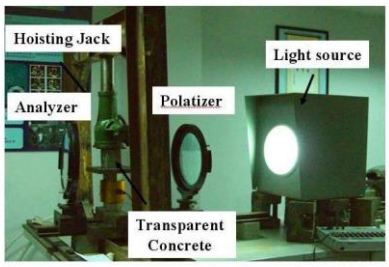

Fig 05: Experimental Setup

4. *TEST OF GLASS FIBER'S STRESS ELASTO-OPTIC EFFECT.*

Glass fiber with 15mm diameter is chosen to test its elasto-optic property under radial stress. Before test, the cross-section of glass fiber is polished to ensure the surface smooth. Under the plane polarized optical field, the glass fiber is applied radial load of 0.4kN and 0.8kN respectively. Keeping the polarizer and the analyser mirror orthogonal, the series of isoclinic of glass fiber at 0-90 degree with the step of 10 degree are obtained by synchronously rotation of the corresponding orthogonal polarization axis. To separate the isochromatic from the colour coupled photo elastic patterns, the series of isochromatic of fiber glass are obtained under the circularly polarized optical field, where the glass fiber is applied 0.2-1.6kN with step of 0.2kN.

5. *TEST OF SELF SENSING PROPERTY OF TRANSLUCENT CONCRETE BASED ON STRESS ELASTO-OPTIC EFFECT.*

Figure below shows the translucent concrete with size of 100mm×100mm×100mm by combining with glass fiber and POFs. The diameters of glass fiber and POF are 15mm and 2mm respectively. The glass fiber is considered as stress-sensing element in the concrete. Like the test described in the 3.2.1, the isochromatic and the isoclinic of the glass fiber are monitored under plane/ circularly polarized optical field, which can reflect the stress state of the concrete. In order to test the self-sensing properties of the translucent concrete, the elasto-optic effect of the translucent concrete under different damage modes are studied. Figure 7b shows the damage modes of concrete, where a crack with size of 0.5mm is produced. Figure 8 gives three loading modes:

- Un-damage mode (I)
- "Longitudinal" damage mode (II)
- "Lateral" damage mode (III).

The "longitudinal" damage mode is that the crack is parallel to the loading direction, and the "lateral" damage mode is that the crack is vertical to the loading direction.

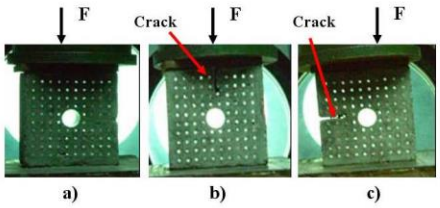

Fig 06: Loading Modes

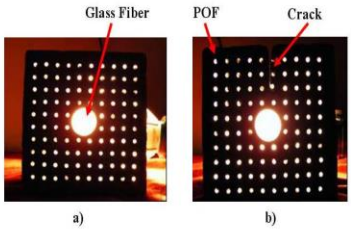

Fig 07: Undamaged and Damaged block

6. *TEST OF MECHANICAL PROPERTY OF TRANSLUCENT CONCRETE BY FREEZING TEST.*

In this paper, the POF volume ratios of translucent concretes chosen for test are 0% (or plain concrete), 1%, 2%, 3%, 4%, 5% and 6%. After 25 freeze-thaw cycle test, the mechanical properties of translucent concrete are evaluated by the compressive strength loss rate (ρ_f), expressed as follow.

(7) $$\rho_f = [(f_{c0}-f_{cn})/f_{c0}]\times 100$$

Where f_{c0} and f_{cn} are compressive strength before and after freeze-thawing test.

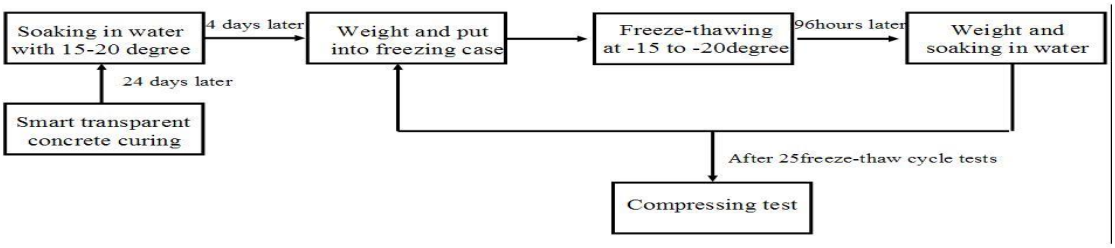

Fig. 08: Methodology for Freezing – Thaw test.

7. PERMEABLITY TEST FOR TRANSLUCENT CONCRETE.

For the concrete cubes, the interfacial bonding of the POFs and concrete is a crucial factor in determining ultimate impermeability properties. The chloride diffusion coefficient method (or electric flux method) is used to test the impermeability property of translucent concrete, which can rapidly evaluate the permeability of concrete by measuring the electric energy through concrete. In this paper, concrete cubes with 0%, 3% and 6% POF volume ratio are chosen for the test. The electric energy is recorded by the electric flux detector and cylindrical concrete specimens with 100mm diameter and 50mm height are fabricated from the prefabricated concretes by core-drilling method, shown as figure below. Moreover, in order to evaluate the effect of interface bonding on the impermeability property, each model of specimen has been divided two types. One is that the border of POF and concrete is covered by epoxy resin, the other one is not covered by epoxy resin, as shown in figure below.

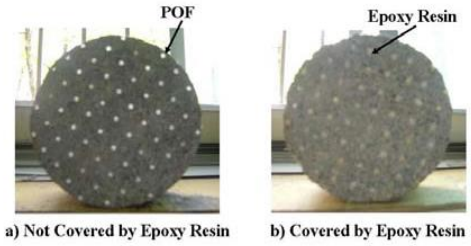

Fig 09: cylindrical concrete setup for Permeability Test

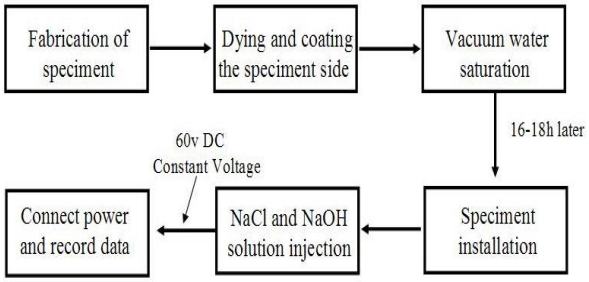

Fig 10: Methodology for Permeability Test.

VII. EXPERIMENTS RESULTS AND ANALYSIS

1. *LIGHT GUIDING PROPERTY:*

Figure 11 and figure 12 show the light guiding property of translucent concrete with the POF volume ratio of 1%, 2%, 3%, 4%, 5% and 6% by using the halogen lamp and incandescent lamp, respectively. It can be seen that the transmittance of each type of translucent concrete almost keeps stable at whole wavelength, and the linear relationship between the POF volume ratio and its transmittance is good.

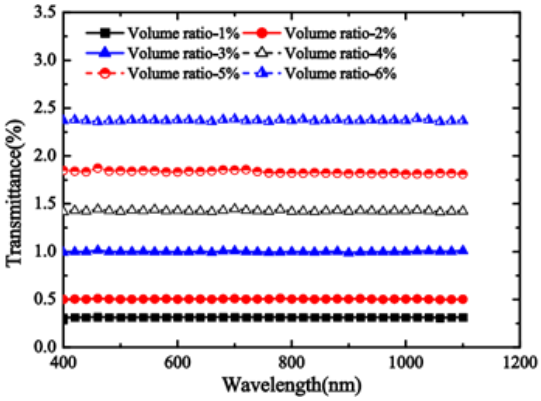

Fig 11(a): Transmittance

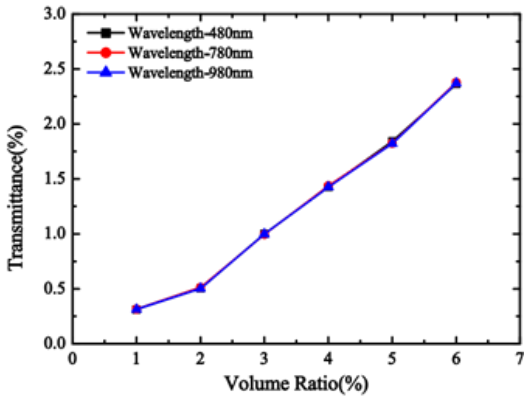

Fig 11(b): Relationship b/w POF volume and Transmittance

Fig 11: Light guiding test by Halogen Lamp

For the halogen lamp, the transmittances of the six ratio translucent concrete are 0.29%、0.59%、0.98%、1.41%、1.83% and 2.36%; for the incandescent lamp, the corresponding transmittances are 0.41%、0.82%、1.22%、1.72%、2.15% and 2.59%, respectively. The discrepancy of transmittance induced by different lamp is that the light scattering's angle of the chosen lamp is different, and the POFs absorb much light scattered by incandescent lamp than that by halogen lamp.

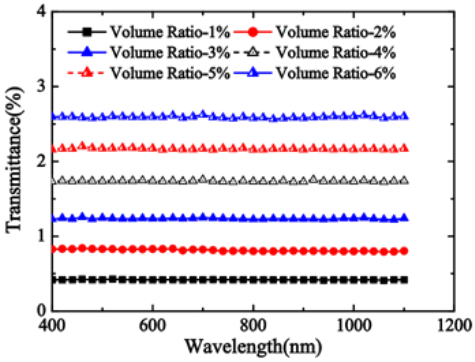

Fig 12(a): Transmittance

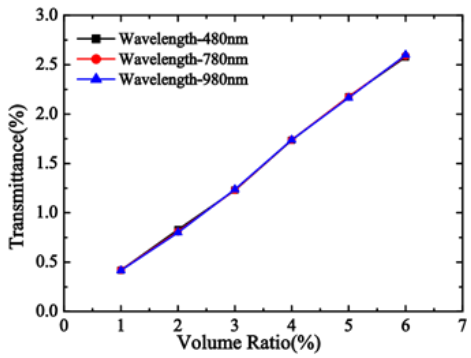

Fig 12(b): Relationship b/w POF volume and Transmittance

Furthermore, it is worthily of note that the large the POF volume ratio is, the large the transmittance is. In fact, the POF volume ratio and the corresponding transmittance are just like a sword with both edges. We cannot only pay attention to the high transmittance, for the POF inevitable affects the concrete strength. In the following experimental results, it can be seen that POF will reduce the concrete strength.

2. PHOTOELASTIC EFFECT OF GLASS FIBER ON GLASS FIBER:

Figure 13 shows the results of photoelastic effect of glass fiber applied radial load of 0.4kN under plane polarized optical field. Both the isochromatics and the isoclinics are figured out in the figure. The isoclinics, described as black lines in the figure, are changed along with the angle of the rotation of the corresponding orthogonal polarization axis, while the isochromatics remain unchanged at the same load. The isoclinics denote the direction of principle stress of the glass fiber, and the isochromatics are the difference.

Figure 14 shows the isochromatics at different load by adding two 1/4λ wave plates in the plane polarized optical field. It can be seen that the isochromatics are changed with loading change, which hints that the isochromatics of glass fiber are sensitive to the external load. In photoelasticity experiment, it is difficult to measure the series of isochromatic precisely due to various factors such as the accuracy or resolution of the measuring equipment. From the test's results, it can be seen that the glass fiber has a good photoelastic effect which is sensitive to the external force applied on it.

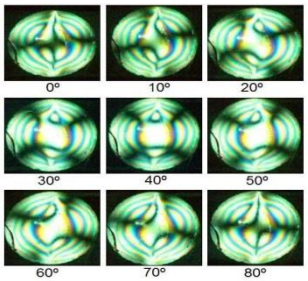

Fig 13: Photo-Elastic effect of glass Fiber

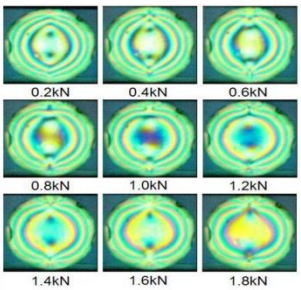

Fig 14: Isochromatic effect on Glass fiber

3. IMPERMEABILITY PROPERTY OF TRANSLUCENT CONCRETE.

Figure 15 show the results of photoelastic effect of translucent concrete at three conditions above mentioned under the plane polarized optical field. It can be seen that the isochromatics of glass fiber at the three conditions are different from each other at the same load due to the damage and different loading conditions. Comparison with that of the undamaged concrete, the isochromatics of glass fiber changes larger at "III" condition than that at "II" condition.

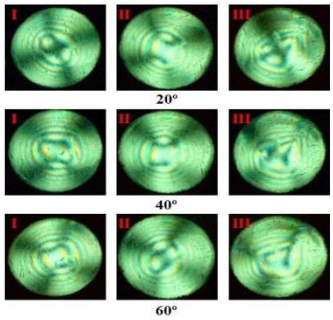

Fig 15(a): Photoelastic fringe at diff angle with 12KN

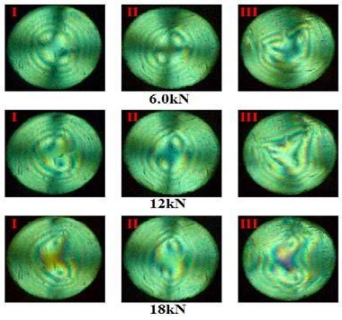

Fig 15(b): Photoelastic Fringe at diff level load

Figure 16 shows Photo elastic fringe of glass fiber at different angle under plane polarized optical field, where the concrete is applied 12kN load which is vertical to the crack. Figure 17 illustrates the series of isochromatics of glass fiber at 2.5-15kN with the step of 2.5kN under the circularly polarized optical field. It is obviously seen that the stress state of concrete with damage is more complicate than that with non-damage from figure 15 and figure 16. Based on the photo elastic fringe or stress state of glass fiber in the concrete, the stress state of corresponding concrete can be figured out.

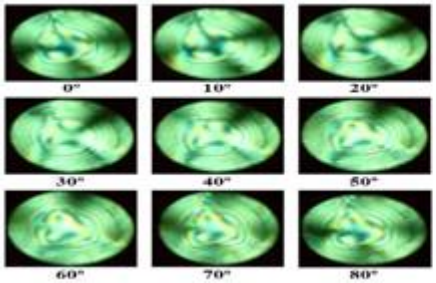

Fig 16: Photo elastic fringe of glass fiber at diff angle

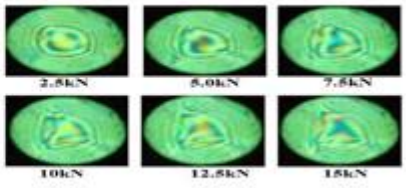

Fig 17: The series of isochromatic of glass fiber at diff loads

4. MECHANICAL PROPERTY OF TRANSLUCENT CONCRETE AT FREEZE-THAW

From figure 18, it can be seen that the mass of translucent concretes almost are unchanged in 25times freezing and thawing cycle and the maximum loss rate of mass is about 0.4%. Figure 19 shows the compressive strengthen of translucent concretes with freeze-thaw or not. It can be seen that the compressive strength of each type of translucent concrete have greatly decreased after 25times freeze-thaw cycle, and the maximum loss rate of compressive strength is about 42% comparison with that without bearing the function of freeze-thaw for the same type of concrete. It can be seen that the larger the POF volume ratio is, the smaller the compressive strengthen of the translucent concrete is. So we cannot endless increase the transmittance by way of increasing the POF volume ratio. One point to be mention, the compressive strengthen of the plain concrete (or the translucent concrete with 0% POF volume ratio) is smaller than that of the accustomed plain concrete. The reason is that we consider the fabrication method of the translucent concrete

and ignore the normal mix proportion of cement mortar at pre-test. To improve the compressive strength of the translucent concrete, one solution is that the translucent concrete can be produced by some special high strength concrete, which can reduce the impact of the POF to the concrete's compressive strength.

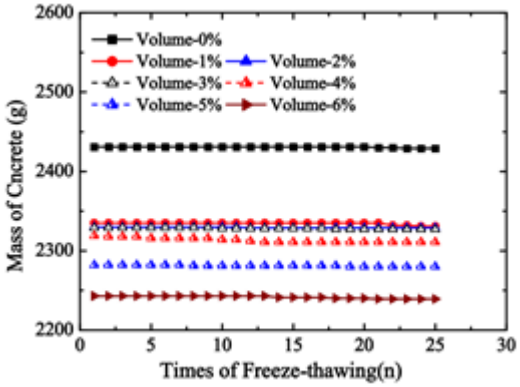

Fig 18: Loss rate of concrete mass at each freeze thawing

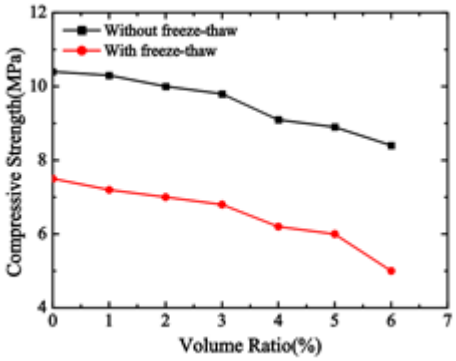

Fig 19: Compressive strength of concrete block with freeze-thaw

5. *IMPERMEABILITY PROPERTY OF TRANSLUCENT CONCRETE.*

Figure 20 shows the relationship of current strength over time. After the vacuum water saturation, the initial current strength of the plain concrete, the translucent concrete with 3% POF volume ratio, the translucent concrete with 3% POF volume ratio and POF covered by epoxy resin, the translucent concrete with 6% POF volume ratio and the translucent concrete with 6% POF volume ratio and POF covered by epoxy resin are 70.4mA, 104.5mA, 79mA, 117mA and 114.9mA, respectively. After six hours conduction time, the corresponding current strengths of the above six concretes increase to 113.6mA, 181.7mA, 126.4mA, 201.6mA and 1944.2mA, respectively.

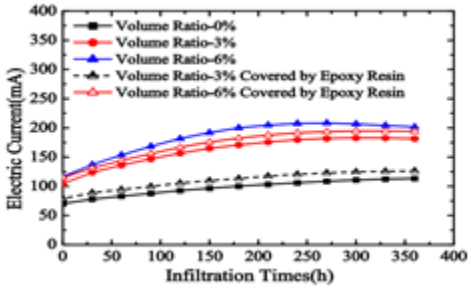

Fig 20: Relationship of strength over time

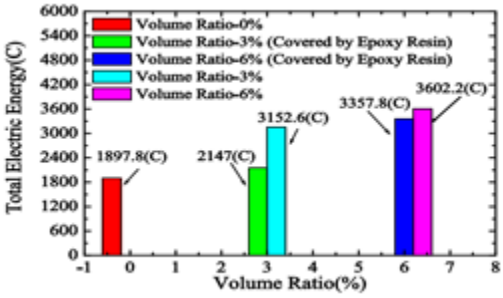

Fig 21: Comparison of total electrical energy traversing the block

The total electric energy of the plain concrete, the translucent concrete with 3% POF volume ratio and that with 6% POF volume ratio are 1897.8C, 3152.6C and 3602.2C, that is, there are some minor gaps between the POFs and concrete which cause the decrease of the anti-permeability shown in figure 24. It also can be seen that the anti-permeability is greatly improved by using the epoxy resin to cover the boundary of the POFs and concrete, and the total electric energy of the translucent concrete with 3% and 6% POF volume ratio covered by epoxy resin are reduced to 2147C and 3357.8C. In field application, the anti-permeability index of translucent concrete is very important for the long-term service. We can improve the anti-permeability by two methods: one is to seal the boundary of POFs and concrete with translucent waterproof material such as epoxy resin; the other one is to make the POF's coating rough to increase the compactness of interface between the POF and concrete.

VIII. CHARACTERESTICAL OVERVIEW OF THE PRODUCT

1. Formulation for obtaining a translucent concrete mixture, comprising a mixture of epoxy and polycarbonate matrices, plus fiberglass, optical fibers, colloidal silica sol, silica and diethylenetriamine (DETA) and Portland cement.
2. Formulation for obtaining a translucent concrete mixture, wherein the content of the components is: epoxy matrix from 0% to 90%, and the polycarbonate matrix from 0% to 60%, fiberglass from 0% to 10%, colloidal silica sol from 0.5% to 5%, silica from 0.5% to 10%, diethylenetriamine (DETA)

3. The ratio of the polymer matrices and the mortar is at least 1.5:1, and the mixing is done manually or mechanically.
4. According to study maximum water absorption range is within 0.35%.
5. s mechanical and optical characteristics, can be used for purposes that are both architectural and aesthetic, and also structural and under conditions of service equal to and even different from those of a traditional concrete.

In accordance with the above description, it is possible to affirm that the light refraction characteristics, or translucidity, as well as the mechanical resistance to compression of the formulation of the concrete of the present invention, have not been achieved by any other concrete, thereby meeting the optical and mechanical characteristics for calling it translucent concrete.

Other unique characteristics of the formulation of the concrete forming the object of this invention are that it can be used for structural purposes at the same time as being translucent; in other words it can be used in any kind of construction permitting colours, shapes and outlines to be seen through it.

IX. APPLICATIONS

Thanks to new features this material presents innovative technical solutions, semi-natural and ecological, for the traditional construction problems allowing a wide area of applications in construction, architecture, decoration and even furniture.

Some of the possible applications for this new material are spread over several areas creating new possibilities to various products such as:

1. Translucent concrete blocks suitable for floors, pavements and load-bearing walls.
2. Facades, interior wall cladding and dividing walls based on thin panels.
3. Partitions wall and it can be used where the sunlight does not reach properly.
4. In furniture for the decorative and aesthetic purpose.
5. Light fixtures.
6. Light sidewalks at night.
7. Increasing visibility in dark subway stations.
8. Lighting indoor fire escapes in the event of a power failure.
9. Illuminating speed bumps on roadways at night.

X. ADVANTAGES AND DISADVANTAGES

The main advantage of these products is that on large scale objects the texture is still visible - while the texture of finer translucent concrete becomes indistinct at distance.

- When a solid wall is imbued with the ability to transmit light, it means that a home can use fewer lights in their house during daylight hours.
- It has very good architectural properties for giving good aesthetical view to the building.
- Where light is not able to come properly at that place translucent concrete can be used.
- Energy saving can be done by utilization of translucent concrete in building.
- Totally environment friendly because of its light transmitting characteristics, so energy consumption can be reduced.
- The main disadvantage is these concrete is very costly because of the optical fibers.
- Casting of translucent concrete block is difficult for the labour so special skilled person is required.

XI. CONCLUSION

A novel architectural material called translucent concrete can be developed by adding optical fiber or large diameter glass fiber in the concrete mixture. The translucent concrete has good light guiding property and the ratio of optical fiber volume to concrete is proportion to transmission. The translucent concrete not loses the strength parameter when compared to regular concrete and also it has very vital property for the aesthetical point of view. It can be used for the best architectural appearance of the building. Also used where the light cannot reach with appropriate intensity. This new kind of building material can integrate the concept of green energy saving with the usage self-sensing properties of functional materials.

XII. ACKNOWLEDGEMENT

The research work would not have been possible without my guide and my soul motivation Mr. A.Vijay. Also the facts and works provided in this paper is dedicated to all the civil engineers to look world in a smart way. And lastly I want to thank my parents for their unconditional support.

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[6] https://www.google.com/patents/EP1947069A1?cl=en&dq=translucent+concrete&hl=en&sa=X&ei=NnsCUo-aNdDyrQfj0oDQBw&sqi=2&pjf=1&ved=0CDQQ6AEwAA

[7] https://www.google.com/patents/EP2410103A2?cl=en&dq=translucent+concrete&hl=en&sa=X&ei=NnsCUo-aNdDyrQfj0oDQBw&sqi=2&pjf=1&ved=0CDsQ6AEwAQ

A QR Code Based Processing for Dynamic and Transparent Seat Allocation

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Abstract- In Indian Railways transport system and in most other public transport system a passenger cannot book for a ticket after the charting of train is done and a seat remains unused if a passenger did not board a train or cancels his ticket after the charting of train is done our approach to overcome it is by a dynamic seat allocation system using QR Code containing the URL to an online website for railway reservation has been developed. In a QR code a passenger specific URL is stored, when Hand held Terminal device running on android OS encodes this URL by the Check-in an passenger which is updated in the central database and any passenger who don't board on the train his QR code check-in procedure is not done and after the specific time interval the ticket for it is automatically made available in the system for booking to other passengers.

Index Terms- QR code, Dynamic Seat Allocation, android, TTE .

I. INTRODUCTION

Indian Railway is largest human transport system in the world. Over 20 million passengers travel daily by train all over India. A dynamic seat allocation system using QR Code containing the URL to an online website for railway reservation has been developed. A passenger can create an account online and check for availability of tickets online and on availability of a seat book a seat for oneself until the train departs.

In the proposed system, in the QR code a passenger specific URL is stored, when Hand held Terminal android device encodes this URL by the Check-in process it redirects to the SQL database server and verifies the data stored of the passenger and updates the information of all passengers boarded the train. DSA server allot the seats of absent passengers to the waitlisted passengers and if still some seats remain vacant then reflect them as available across the railway network from where any passenger willing to board the train can book their ticket.[2]

It also assures transparency in the berth allocation system and also make the ticket checking process fast.

II. EXISTING SYSTEM

The current Indian Railway System being one of the world's largest railway networks has less exposure to the current advanced technology. Lack of optimization in seat allocation and procurement of tickets by touts decreases the revenue of railway being one of its major drawbacks. [1]

The main drawback of the old railway reservation system is the reservation charts which are prepared 4 hours prior to the train departure. Whether a passenger has boarded the train or not his berth still remains reserved till his destination. A seat may also go vacant if a passenger cancels his ticket after the train's charting is done.

Also the transparency in the existing ticketing system is compromised at various levels this results in more space for touts to book tickets illegally and sell them at exaggerated price.
Lack of optimization in seat allocation, for example whether passenger has boarded or not his seat remains reserved till his destination.

III. PROPOSED SYSTEMS

The system proposes evolutionary changes in seat allotment procedures of Indian Railway system, some specifications are as follows: [2]

- Dynamic seat allocation will enhance the chances of fair and efficient seat allocation for passengers in waiting list.
- With the help of CHECK-OUT procedure, a passenger willing to discontinue his journey can inform PRS system and thus a vacant seat available can be allotted to a passenger in waiting list.
- The TTEs will not have to carry the complex reservations charts, also the passengers will be benefited by using the E-Tickets so this reduces a lot of paper work.
- If at any point of time a passenger wants to check the status of reservation, he simply has to log in to the website and key in his PNR number to get all the details.

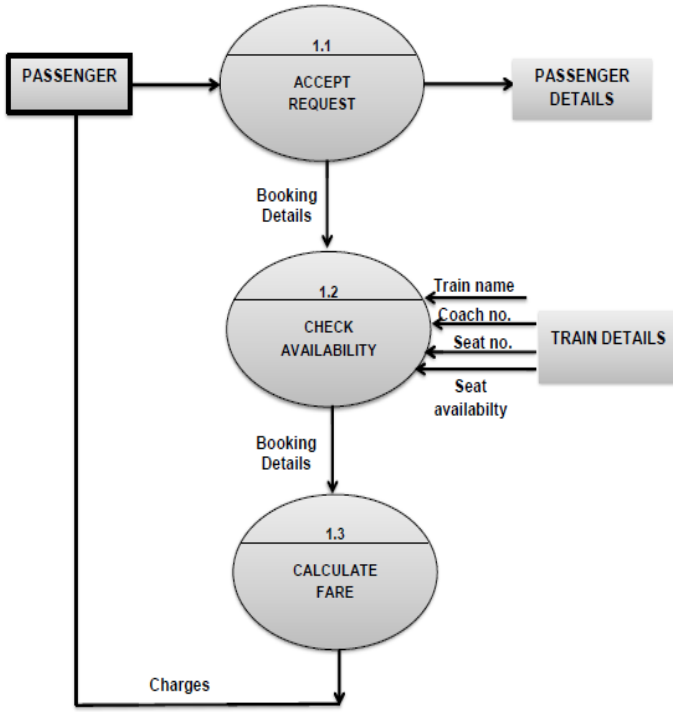

Figure 1: Flow Architecture.

Dynamic Seat Allocation Model

Our proposed DSA model is divided in the following sub-module:

Little Modification in Current Passenger Reservation System

Today PRS is available at 8000 counters more than 2380 locations throughout the countries, including all major stations, and important non-railhead locations such as tourist centres and district headquarters. The PRS services are available to passengers for 23 hours in a day. Passengers can reserve a berth for any train 120 days in advance. In addition to the railway counters, multiple delivery channels have been provided to Rail passengers to access the PRS services. I-Ticketing and E-ticketing and through Internet was launched in year 2002 and 2005 respectively. Booking through Post offices was launched in year 2007.Besides all these facilities provided by Indian Railway one attempt that was tried to make is to reduce the usage of paper as much as possible. Passengers are requested to use their Mobile Phones as journey tickets, because the ticket is stored in Mobile Phone either as an SMS sent by IRCTC or in the PDF format store in memory card in the case of e-ticket. In an attempt with the Indian Railway our proposed Model suggest the use of QR code in the ticket generated from the counter and e-ticket, which contains the URL.[6]

Check-In, Check-Out and Booking Procedure.

In Check-In, a passenger places his Mobile Phone or ticket in his hand near Hand Held Terminal of TTEs to read QR code. A TTEs uses application of his Android HHT to read the QR Code over the ticket or from the screen of passenger's phone and verifies it. In Check-out, the TTE makes an entry that the passenger has disembarked from the train. In booking procedure, the TTE can make a booking while in the train in case any seats are vacant after all passengers have boarded and all the waiting list passengers have been allotted a seat.

Up gradation Policy

Availability of seat on train when it is running is depends upon the following policy:

First the berth is provided to waiting list passengers who are on the train and only those waiting passenger are given first priority whose journey in km is maximum. It means waiting list passengers are arranged in descending order according to their distance to be travel. [2]

Second condition will apply if there will be no waiting list passengers, only then the seat or berth can be booked from counter or through online to the passenger who is willing to start the journey from the next station when the train has to arrive.

Dynamic Seat Allocation Procedure

Once the DSA Server updates its database it will get the current vacant seat information. Next, if the waiting list passengers are on the train and the seat are vacant then DSA SERVER will automatically allocate the seat to waiting list passenger otherwise it will be booked from counter or through online. In this way it is possible to allocate seat dynamically during the journey of waiting list passenger. The above concept can be best understood by the figure2.

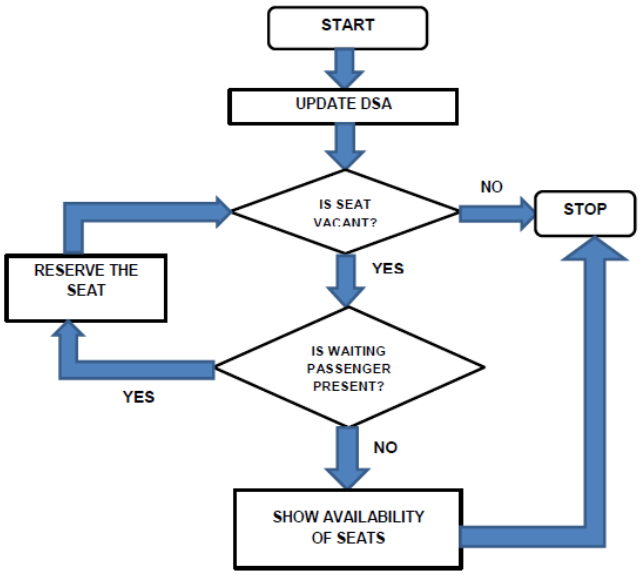

Figure 2: System Working model.

IV. IMPLEMENTATION

Android based HHT device:

Using this authentication of the TTE is done as soon as the app is invoked in the Start Activity. For taking care of the authentication part, we have designed a simple java checking code which authenticates the TTE based on the given input parameters. Once the TTE is authenticated using the concept of "process calling", we invoke the next activity which is the Trains List activity.

Trains List Screen:

After authentication of the TTE is done Trains List activity is invoked. We have used Scroll View and Linear Layout, we have used a Spinner for the button so that a list view can be provided. Once the Next button is clicked TTE will be redirected to the next Activity in sequence called Menu activity.

Menu:

In this activity, there are 4 buttons provided, Check In-Out, Booking, Feedback and View Chart. Depending on which button is clicked the TTE will be redirected to that particular activity

Booking:

In this activity, TTE needs to enter the details of the passenger like Name, Age etc. and also provide the starting station, destination and fare amount. The calculation of fare is done on a basis of formula based on distance between starting station and destination. Once the Submit button is pressed, the QR Code with above information is generated. For generation of QR Code, Zxing library is used. We call the encode Barcode function which takes a String as parameter. TTE can share the generated QR Code image via Bluetooth, email or any other way suitable for the user. There is also provision of booking 5 tickets at the time by entering the right amount of details. All of the information is stored in the SQL database.

Check In-Out:

In this activity, TTE can scan the QR Code image which is the ticket of the passenger. This is done by calling the Scanner application installed on the device. [7]

View Chart:

Here, all the tickets booked can be seen in the form of a chart. This is done by accessing all the data stored in the SQLite database.

Website:

Home page:

On this page, there is an option for the user to login by clicking on the Log In link.

Login:

On this page, a user is required login providing his login details. In case the user does not have an account on the website he can click on the Register link provided which will redirect him to the Registration page where he can create a new account by providing details. All the required validations are done on the page and username and password are case sensitive.

Train Details:

On this page, user needs to provide details of his journey in text boxes. Database is checked for the trains which are available for the given journey details on pressing the search button. This is done by searching every train in database for given details.

Availability:

On this, we can see if the train is available for the provided details. We can also see if the ticket is available for the provided details. On pressing Book button we are redirected to a new page called RESERVATION DETAILS.

On pressing Fare button we can see the fare of the journey. Fare is calculated depending on the distance between the source and destination.

Reservation Details:

User needs to provide his details on this page like, Name, Age, and Gender. All this details are stored in the database and depending on the availability of the berth a seat is assigned to the passenger. On pressing Book button user is redirected to CARD DETAILS page.

Card Details:

User needs to provide details for making the payment of the journey. User will need to provide his Credit Card details for payment. On pressing Book a berth will be reserved for the passenger that is the entry will be made in the database.

Ticket:

Ticket details are displayed on this page along with the QR Code image which can be downloaded. [8]

Figure 3: QR Code Ticket 61

Cancel Ticket:

After the user logs in there are links at every page for cancelling the ticket named Cancel Ticket. On clicking this link, user is directed to cancellation page where we can see table with all the entries made so far. After cancellation, entries are removed from database & seat is allocated to waiting list passenger.

V. GRAPHICAL USER INTERFACE

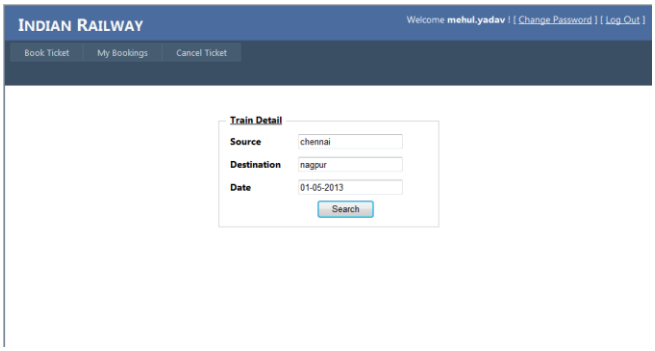

Figure 4: Select the train for Booking

Figure 5: Reservation Window

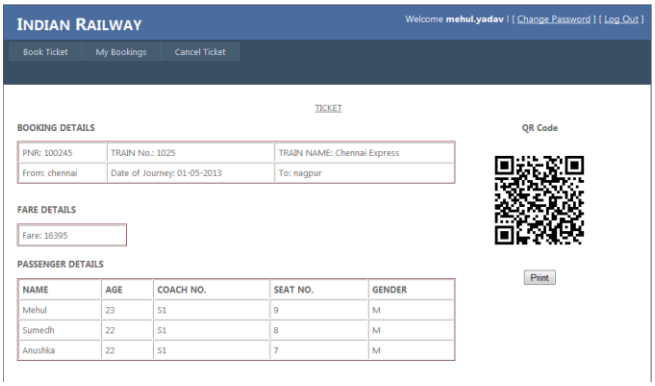

Figure 6. Ticket with the QR Code

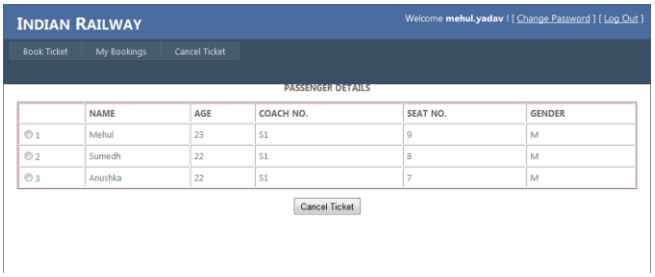

Figure 7: Cancel Ticket Window

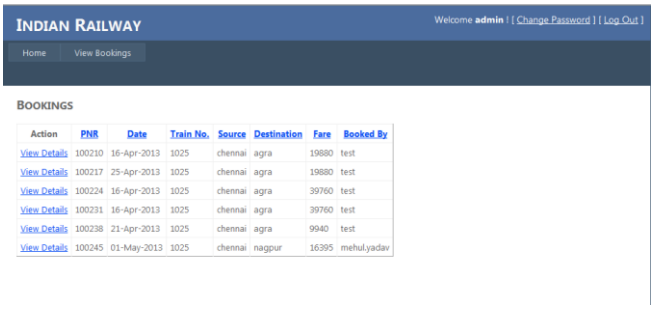

Figure 8: Admin login homepage

Android based HHT device:

In Fig. 1 there are four main options, they are Check in-out, Booking, Feedback, View Chart options. The Check in-out directly opens the QR code Scanner via the camera installed in the device.

In Fig. 2 the TTE will find the booking window where he is required to fill the necessary fields as found in the booking website.

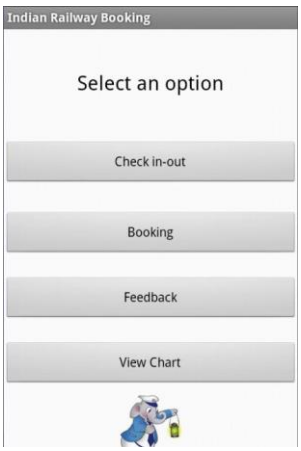

Figure 9: Option Screen Figure 10: Booking Screen

In the view chart option, TTE can view all the passengers who have boarded the train until now.

Figure 11: Passenger Chart status

VI. CONCLUSION

This model proposes High degree of efficiency in the ticket booking system and also maintain high level of transparency in the procedure. In case of any last minute ticket cancelation or non-boarding of a passenger the QR code based check-in using the android based HHT system given to TTE system ensures a dynamic allocation of tickets to waitlisted passengers or makes available for booking by any other passenger. A Check-out and Booking process is also provided to the TTE by this HHT. Check-out process provides the passenger to break his journey at any station by getting his remaining money back and at the same time his vacant seat is provided to a waitlisted passenger. Booking interface provides capability to book the ticket for passengers on board.

VII. FUTURE WORK

In Future the Project can be extended by adding some functional features like a SMS facility where in the server will send a text message to a waiting list passenger incase their ticket

gets confirmed. The project is highly scalable and can be extended for use with other transport systems like Bus, Airline, etc.

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Influence of Time of Sowing on Productivity and Seed Quality in Babchi (*Psoralea corylifolia* L.)

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Abstract- An experiment was conducted to evaluate the effect of different sowing time on seed yield and quality in under used medicinal plant babchi. The study was carried out for 12 months from January to December. Results showed that the seeds sown in November month recorded the maximum seed yield and quality parameters followed by October month than other months. November month recorded the maximum field emergence (92%), number of branches per plant (12), number of racemes per plant (121) at 90 days after sowing, pod yield (2415kgha^{-1}), seed yield (1931kgha^{-1}), 100 seed weight (1.69g), germination (46%), vigour index (901), protein (18.8%), oil content (6.7%) and it was on pared with October month. Lowest seed yield of 825 kgha^{-1} was recorded in February month sown crop, the other biochemical quality parameters like protein (18.0%) and oil (6.2%) content were also low in this month. Finally, it could be concluded that October or November was the suitable time for babchi sowing.

Index Terms- Babchi, medicinal plant, month of sowing, yield and quality parameters.

I. INTRODUCTION

Psoralea corylifolia L. commonly called as babchi or karpokkarasi is an important medicinal plant in the Indian ayurveda, Tamil siddha and Chinese medicine belonging to the family Fabaceae. It is an erect, annual herb. It bears a single seeded pod, which is indehiscent and the pericarp is usually found adhering to the seed. The pericarp is sticky and oily which contains coumarins, of which Psoralen and Isopsoralen are therapeutically important. It has been used in treating leprosy and psoriasis, eczema and hair loss. In addition, *Psoralea* is used to promote bone calcification, healing of wounds and ulcers. Besides treating psoriasis, psoralen is being investigated as a cure for several diseases including AIDS. It is also used in the treatment of intestinal amoebiasis (Farooqi and Sreeramu, 2001).

Medicinal plants are much desired for various purposes of pharmaceutical application and rural health setup due to their very broad ecological adaptations. But no attempt has so far been made for the extensive cultivation of many species except a very few, that are being exported. Psoralea is not cultivated on a commercial scale anywhere but reported to be grown to some extent in Rajasthan and the eastern districts of Punjab adjoining Uttar Pradesh in India for its seeds (Saif *et al*., 2007). Hence, it is warranted to trace crop management techniques for large scale production such as suitable time of sowing so as to get higher yield in an ecofriendly manner. Unlike the commercial crop, the seed crop require special conditions which are under the influence of the environment prevailing during seed formation and maturation phases for realizing good quality seeds. Seed production is very much influenced by the environmental conditions particularly photoperiod and temperature and such information enable the production of good quality seeds (Kalavathi, 1996). As an upshot of the impact of environmental parameters on physiological stages, the optimum sowing time of a crop varies with region and genetic differences of cultivars (Seghat and Mousavi, 2008). As emphasized by Snoek (1981), the total yield of the crop is markedly influenced by different sowing and transplanting times. In seed production, Wood *et al.* (1980) opined that the environmental conditions particularly the light and temperature (Crocker and Barton, 1955) interact with genetic system and elicit developmental changes during ripening, which exert influence on yield and seed quality. Choice of appropriate sowing time is important, because of the necessity of maximal usage of natural resources during growing season. In pumpkin early sown plants were weakly established in spring due to the low soil temperature and the damages of frost. Also, the delay in sowing adversely influences the growth and development of the plants because of shortened growth period and the likelihood of the coincidence of flowering with high temperature (Robert and Korkmaz, 1998). Hence studies were carried out to fix the optimum time of sowing to produce the high quality seeds.

II. MATERIALS AND METHODS

Seed crop of babchi were raised in Department of Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore from January 2009 to December 2009 at monthly interval, on 16th day of every month seeds were sown under irrigated condition. The soil type was clay loam and the experimental plot size was 3x3 m and the spacing adopted was 45x45 cm. The crop was fertilized with the recommended Nitrogen, Phosphorus and Potassium (NPK) schedule of 50:60:50 kgha^{-1} (Farooqi and Sreeramu, 2001) that were applied basally prior to sowing of seeds except 50 kgha^{-1} N which was applied as top dressing on 45th day after sowing. The experiment was laid out in Randomized block design. At each month, the trial was conducted in four replicates of similar plot size. Need based plant protection measures were also taken to control the incidence of pests and diseases during the crop period. The crop was harvested at physiological maturity stage in three different pickings. During the crop period, at each month sowing the

following observations *viz.,* field emergence (%), plant height (cm), number of branches per plant, number of racemes per plant at 60 and 90 days after sowing, days to first flowering, days to 50% flowering, pod yield ($kgha^{-1}$), seed yield ($kgha^{-1}$) and 100 seed weight (g) were recorded. Extracted seeds were dried to 8% moisture content and were evaluated for the seed quality parameters *viz.,* germination (%) as per ISTA (2010), hard seed (%), root length (cm), shoot length (cm), dry matter production 10 $seedlings^{-1}$(mg) and vigour index (Abdulbaki and Anderson, 1973). The seeds were also evaluated for the biochemical parameters *viz.,* Electrical conductivity (dSm^{-1}) (Presley, 1958), Dehydrogenase activity (OD value) (Kittock and Law, 1968), Protein content (%) (Ali-Khan and Youngs, 1973) and Oil content (%) (AOAC, 1960). The data obtained from different observations were analyzed as per methods described by Panse and Sukhatme (1985). Wherever necessary, the % values were transformed to angular (Arc-sine) values before analysis. The critical differences (CD) were calculated at 5% probability level.

III. RESULTS AND DISCUSSION

The effect of time of sowing on seed yield and quality revealed that highly significant variations was observed in all the growth, yield and seed quality parameters except root, shoot length and dehydrogenase activity (Table 1&2). Among the months of sowing, November month recorded highest field emergence of 92%. It is 18% higher compared to February month (74%). Summer months recorded the minimum field emergence it might be due to higher temperature that could have caused the mortality of weaker seedlings due to heat shock. The seeds sown at July month recorded maximum plant height of 29.6, 60.7, 94.7 cm at 30, 60, 90 days after sowing respectively. It is 57% higher than February month at 90 DAS. Sharratt and Gesch (2004) in *Ocimum* also revealed that the higher temperature during vegetative growth period reduced the plant height. In babchi the vegetative growth of February month sown crop coincide with summer months this might be reason for the minimum plant height. The number of branches were also the highest (12) in October and November month sown crop, than February (9) at 90 days after sowing. The critical yield attributing parameters like number of racemes per plant were maximum (121) with November month, which recorded 37% higher number than February month (Figure 1). In all growth and yield parameters the October month observations were on pared with November month, which might be because of favourable weather conditions prevailed during that months allows better utilization of nutrients and other resources resulting in higher numbers of reproductive structures. Rahimi (1993) in cumin also expressed that the yield components are highly sensitive to photoperiod and temperature.

The crop sown in the April month expressed the first flowering, it was 13 days earlier than September (55 days). Days to 50% flowering was also low in April (51 days) and highest in September (66 days), might be due to the preference of long day condition by the crop. This variation was due to requirement of photoperiod for flowering of crops (Damato *et al*., 1994 and Mohan *et al*., 2001). The pod ($2415kgha^{-1}$) and seed yield (1931 $kgha^{-1}$) per hectare were the highest in November month at a rate of 58 and 57% higher than February month, pod and seed respectively. These variations might be due to the environmental factors such as light, temperature and rainfall which play an important role in growth and yield of the crop. As the light and temperature remained favourable for growth ultimately more photosynthetic surface was available for improvement in yield. In addition the February sown crop came to flowering during the month of April and seed development and maturation took place during May month, where high temperature and low relative humidity is the phenomenal prevalence. These extreme conditions of this month affect the development of seeds as evident through the low yield of the present result. This leads to the conditions favourable for early flowering (high temperature and long day) which is not ideal to produce higher yield of good quality seeds. On the other hand, higher pod and seed yield with better quality were obtained from November sowing followed by October, where the crop came to maturity in the months of February, January respectively, when the weather conditions are conducive, devoid of extreme temperature and low humidity, which might have been favourable for higher productivity.

Results also showed that among the months, November recorded the maximum (1.69g) 100 seed weight than February month (1.30g), due to the optimum temperature during seed development enables the accumulation of higher photosynthates as opined by Chaudhari *et al.* (1995) and Reddy and Rolsten (1999) in coriander. The physiological potential of the seed in terms of germinability (46%), dry matter production (100 mg 10$seedlings^{-1}$) and vigour index (901) (Figure 2) were higher with the seeds produced from November sown crop, which recorded the 11% higher germination, dry matter production and 16% higher vigour index than February month. Castillo *et al.* (1994) and Greven *et al.* (1997) stated that the environment during seed development is the major determinant of seed quality, particularly seed vigour. The results of the present study revealed that the maximum average hard seed percentage (61%) was recorded in the seed lots harvested from January to March sown crop than September- November (54%) sown crop, because of high temperature and low relative humidity that coincided with seed development. The development of hard seed in leguminous species is both genetic and environmentally controlled (Baskin and Baskin, 2000) and the months of sowing, exerted influence on this seed quality aspect. The difference in hard seed percentage across the months were highly significant and the seeds sown during February reached seed maturity during April- May coinciding with hot and dry weather resulting in higher desiccation, that associate with higher percentage of hard seeds which was also opined by Justice and Bass (1978). Similar that of growth and yield parameters the biochemical factors like protein (18.8%) and oil content (6.7%) also superior in November month than other months. The February month recorded lower level of protein (18.0%) and oil content (6.2%). The lowest electrical conductivity (0.094 dSm^{-1}) was recorded in November month and highest (0.101 dSm^{-1}) was in April month, due to variations in environmental factors cause the higher level of membrane damage in summer months.

Thus, the study concluded that November month sowing recorded the maximum seed yield and quality characters and it was on pared with October month. The environmental condition prevailed during this month enhanced the growth and yield parameters. Hence for babchi, October or November month are

the suitable months for seed production with maximum seed quality.

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Table 1: Influence of time of sowing on growth and yield attributing characters

Month of sowing	Field emergence (%)	Plant height (cm)			Number of branches per plant	Number of racemes per plant	Days to first flowering	Days to 50 % flowering	Pod yield ($kgha^{-1}$)	Seed yield ($kgha^{-1}$)
		30 DAS	60 DAS	90 DAS	60 DAS	60 DAS				
January	82 (64.90)	10.3	33.0	51.3	7	11	50	55	1486	1190
February	74 (59.34)	7.3	19.4	41.1	5	7	46	52	1027	825
March	78 (62.03)	7.7	20.3	50.6	6	9	45	52	1161	859
April	75 (60.00)	8.1	33.0	53.3	6	9	42	51	1279	1022
May	75 (60.00)	13.6	33.6	63.9	7	8	45	51	1684	1348
June	88 (69.73)	13.7	34.4	78.1	7	10	46	54	1733	1388
July	90 (71.57)	29.6	60.7	94.7	7	11	46	55	1956	1565
August	90 (71.57)	22.7	56.3	90.4	7	17	49	56	1886	1511
September	90 (71.57)	14.3	48.5	74.7	8	19	55	66	1921	1536
October	92 (73.57)	22.4	50.1	81.5	8	20	52	62	2064	1654
November	92 (73.57)	20.7	52.4	89.0	8	21	50	60	2415	1931
December	85 (67.21)	12.2	36.7	65.0	7	15	50	60	1561	1249
SEd	(0.831)	0.236	0.442	0.593	0.031	0.164	0.118	0.158	13.120	10.761
CD (P=0.05)	(1.724)	0.490	0.918	1.229	0.064	0.340	0.244	0.327	27.209	22.317

DAS- Days after Sowing

Table 2. Influence of time of sowing on resultant seed and seedling quality characters

Month of sowing	100 seed weight (g)	Hard seed (%)	Root length (cm)	Shoot length (cm)	Drymatter production 10 $seedlings^{-1}$ (mg)	EC (dSm^{-1})	Dehydrogenase activity (OD value)	Protein content (%)	Oil content (%)
January	1.42	60 (50.77)	10.9	8.4	95	0.095	1.160	18.5	6.6
February	1.30	62 (51.94)	10.7	8.2	93	0.100	1.155	18.0	6.2
March	1.35	62 (51.94)	10.7	8.2	89	0.099	1.157	18.2	6.4
April	1.41	60 (50.77)	11.0	8.4	89	0.101	1.156	18.2	6.3
May	1.44	58 (49.61)	10.9	8.3	92	0.098	1.156	18.5	6.5

June	1.49	58 (49.61)	11.1	8.5	90	0.097	1.159	18.7	6.5
July	1.68	56 (48.45)	11.1	8.4	93	0.096	1.160	18.7	6.5
August	1.63	56 (48.45)	10.8	8.3	98	0.095	1.162	18.6	6.6
September	1.60	54 (47.29)	10.9	8.4	99	0.095	1.161	18.7	6.6
October	1.69	54 (47.29)	11.0	8.4	95	0.095	1.162	18.7	6.6
November	1.69	54 (47.29)	11.2	8.4	100	0.094	1.162	18.8	6.7
December	1.43	56 (48.45)	11.0	8.3	91	0.097	1.160	18.6	6.6
SEd	0.006	(0.949)	0.163	0.163	2.301	0.002	0.019	0.163	0.106
CD (P=0.05)	0.012	(1.958)	NS	NS	4.750	0.003	NS	0.337	0.218

(Figures in parentheses indicate arc sine transformed values)

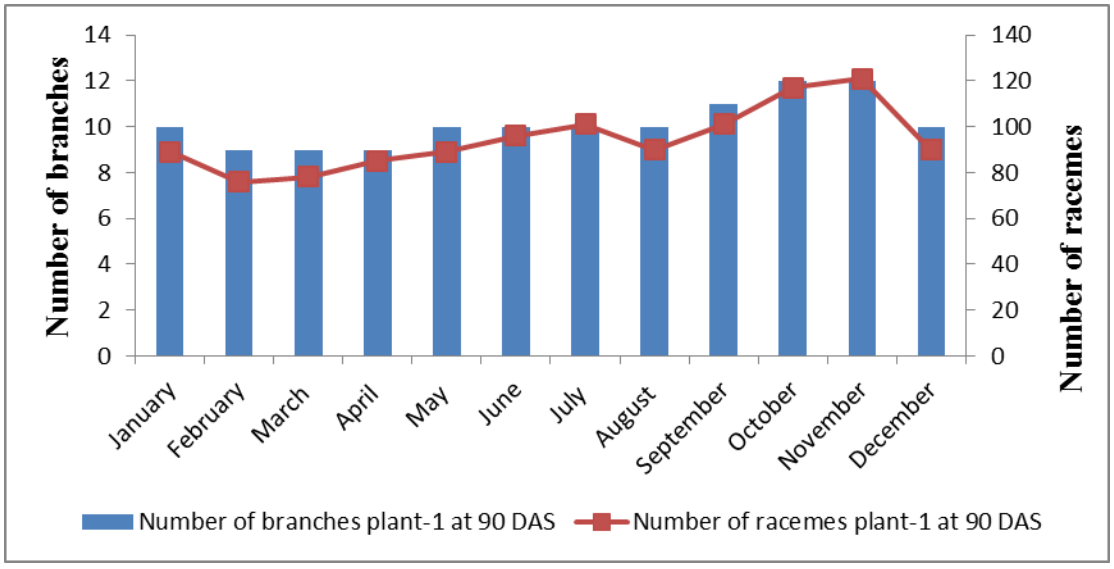

Figure1: Influence of time of sowing on yield attributing characters in babchi

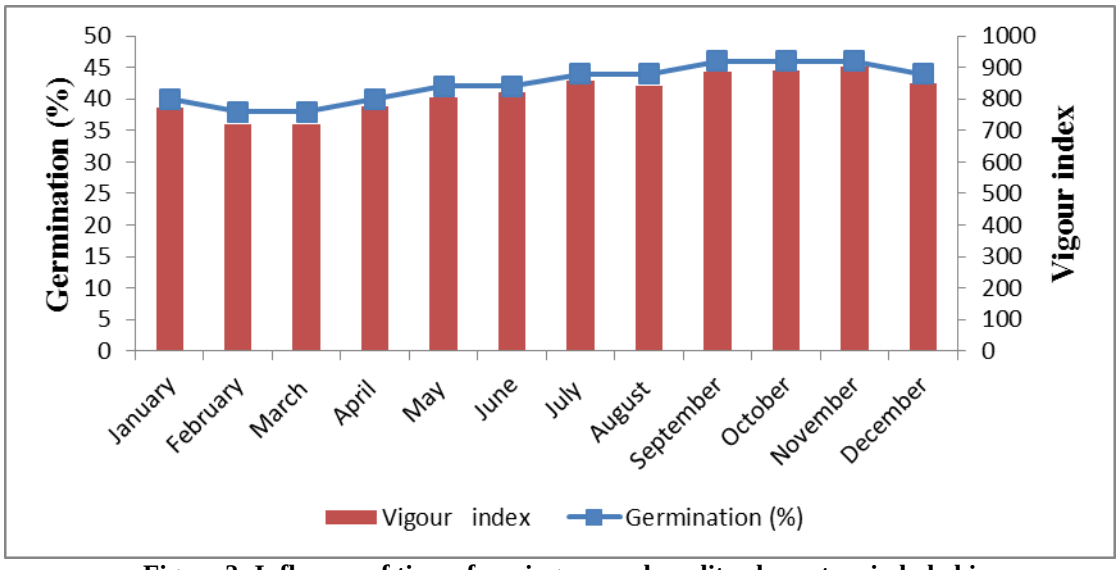

Figure 2: Influence of time of sowing on seed quality characters in babchi

A study of Biofilm formation & Metallo-β-Lactamases in Pseudomonas aeruginosa in a tertiary care rural hospital

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Abstract- Background and Aims: Pseudomonas aeruginosa is an opportunistic pathogen. The appearance of the Metallo-β-Lactamases genes and their spread among bacterial pathogens is a matter of concern with regard to the future of antimicrobial therapy.Antimicrobial resistance is an innate feature of bacterial biofilms. Biofilm formation is higher in MDR strains**.** The present study was undertaken with the aim to find Prevalence of Metallo-β-Lactamases among isolates forming Biofilm, Antibiotic resistance pattern of the isolates and their correlation with biofilm producer. The study was carried out in the Tertiary Care Hospital from the period of February 2013 to August 2013. Total of 60 Multidrug resistant (MDR) Pseudomonas aeruginosa isolated from 638 clinical samples were identified by standard microbiological techniques & the isolates were further tested for Antibiotic susceptibility testing.
Results:Of 60 Multidrug resistant (MDR)Pseudomonas aeruginosa, the Metallo-β-Lactamases was seen in 30%& Meropenem resistance was seen in 16.66 %.Highest prevalence of Metallo-β-Lactamases was seen in Pus 41.66% followed by Urine (33.33%) blood (23.07%), sputum (20%), Miscellaneous (30%). Biofilm formation was seen in in 65%. Higher antibiotic resistance was seen in strong biofilm producers as compared to the negative biofilm producers.In our study P. aeruginosa showed (56.67%) resistance to ceftazidime,Cefoperazone(61.67%), netilin (78.33%), ticarcillin (61.67%). P.aeruginosa showed higher sensitivity to Amikacin (83.33%),Meropenem(81.67%),Cefepime (66.67%),tobramycin(80%).

Conclusion: In our study Amikacin & Meropenem demonstrated maximum sensitivity against pseudomonas species. Therefore, use of these antibiotics should be restricted to severe nosocomial infections, in order to avoid rapid emergence of resistant strains.

Index Terms- Antibiotic resistance, Biofilm formation, MDR, Metallo-β-Lactamases, Pseudomonas aeruginosa
.

I. INTRODUCTION

Pseudomonas aeruginosa is an epitome of opportunistic nosocomial pathogen; it is aerobic Gram-negative bacillus, highly versatile microorganism able to tolerate low oxygen conditions. It can survive with low levels of nutrients and grow in temperatures ranging from 4-42°C. [1] These characteristics allow it to attach itself and survive on medical equipment and on other hospital surfaces, which favors the beginning of infections in immunocompromised patients.[1, 2]

P. aeruginosa can cause pneumonias, urinary tract infections and bacteremia's as well as causing high morbidity and mortality in patients with cystic fibrosis due to chronic infections that eventually cause pulmonary damage and respiratory insufficiency. Infections due to P. aeruginosa are difficult to eradicate because of their elevated intrinsic resistance as well as their capacity to acquire resistance to different antibiotics.[3]

Biofilms have an enormous impact on healthcare, and are estimated to be associated with 65% of nosocomial infections [4]

A biofilm is a structured consortium of bacteria embedded in a self-produced polymer matrix consisting of polysaccharide (EPS), protein and DNA. Bacterial biofilms cause chronic infections because they show increased tolerance to antibiotics and disinfectant chemicals as well as resisting phagocytosis and other components of the body's defense system. Characteristically, gradients of nutrients and oxygen exist from the top to the bottom of biofilms and these gradients are associated with decreased bacterial metabolic activity and increased doubling times of the bacterial cells; it is these more or less dormant cells that are responsible for some of the tolerance to antibiotics. Biofilm growth is associated with an increased level of mutations as well as with quorum-sensing-regulated mechanisms. Conventional resistance mechanisms such as chromosomal lactamase, up regulated efflux pumps and mutations in antibiotic target molecules in bacteria also contribute to the survival of biofilms. Biofilms can be prevented by early aggressive antibiotic prophylaxis or therapy and they can be treated by chronic suppressive therapy**.** [5]

The components of the EPS involved in the formation of P. aeruginosa biofilm are encoded mainly by different genes located in three independent operons: algU, psl, and pel. [6-8].Type IV pili (T4P) produced by P. aeruginosa shows twitching motility. These have been associated with biofilm formation, an essential event in host colonization. [8-10] these filamentous structures located at one pole of the bacteria are involved in various mechanisms such as adherence to human cells, formation of microcolonies, bacterial aggregation, phage receptor, evasion of the immune response and cellular signaling. . [11, 12]

Antimicrobial resistance is an innate feature of bacterial biofilms. [(13)] Many studies have shown that biofilm formation is higher in MDR strains [14]

Resistance to multiple drugs is usually the result of combination of different mechanism in a single isolate. There is variety of mechanisms involved in the resistance of P. aeruginosa, among them over expression of efflux pump, acquisition of Extended-Spectrum β-Lactamases (ESBLs) and Metallo-β-Lactamases (MBLs); target site or outer membrane modification, porin mutations, plasmid enzymatic modification. [15]

Carbapenemics (imipenem and meropenem) are broad-spectrum antibiotics used for the treatment of nosocomial infections caused by P. aeruginosa. Specific resistance to carbapenemics is attributed to the lack of porin permeability (OprD), an increase in the expression of the active expulsion pumps (MexAB-OprD) and to production of metalloenzymes. [15]

It has been demonstrated that MBLs require divalent cations, usually zinc, as metal co-factor for their enzymatic activity and no therapeutic option is known to be available to control MBLs .Three groups of MBL have been identified: class A (serines dependent and partially inhibited by clavulanic acid are inducible and nontransferable), class B (zinc dependent, inhibited by EDTA, inducible or associated with conjugative plasmids) and class C (oxacillinase). [15]

In India, the prevalence of MBLs ranges from 7.5% to 71% [16]

The present study was undertaken with the aim to find

- prevalence of Metallo β lactamases (MBLs)
- No. of isolates forming Biofilm
- Antibiotic resistancepattern of the isolates
- Correlation of biofilm producer & isolates producing Metallo-β-Lactamases (MBLs)
- Correlation of biofilm producer & antibiotic resistant pattern of the isolates.

II. MATERIAL AND METHODS

The study was carried out in the department of Microbiology, tertiary care hospital from the period of February 2013 to August 2013. A total of 60 Multidrug resistant (MDR) Pseudomonas aeruginosa isolated from clinical samples like pus/wound, blood, sputum, catheter tips and urine were identified by standard microbiological techniques. [17]

The Isolates were further tested for Antibiotic susceptibility testing by Kirby-Bauer disc diffusion method on Mueller Hinton agar as per CLSI Approved Standard M100-S17)**.** [18]Antibiotic disc were obtained from Hi-media Laboratories Pvt. Ltd, Mumbai, India. Multi-drug resistance among Pseudomonas aeruginosa is defined as non-susceptible to ≥ 1 agent in ≥ 3 antimicrobial categories**.** Table d [19]

III. PHENOTYPIC DETECTION OF MBL

Phenotypic detection of MBLs among the clinical isolates of P. aeruginosa was carried out using imipenem (10 µg) and imipenem (10 µg) +EDTA (750 µg) discs as described earlier [20.] The MBL producing isolates showed a greater than 7mm variation between the inhibition zone around imipenem discs alone and the inhibition zone around imipenem+ EDTA discs.

IV. THE BIOFILM FORMATION BY TUBE METHOD (TML)

A qualitative assessment of bifilm formation will be determined as described by Christensen et al. [21] TSBglu (10mL) was inoculated with loopful of isolates from overnight culture plates and incubated for 24 hours at 37°C. The tubes were decanted and washed with PBS (pH 7.3) and dried. Dried tubes were stained with crystal violet (0.1%). Excess stain was removed and tubes were washed with deionized water. Tubes were than dried in inverted position and observed for biofilm formation. Assays were performed in triplicate at three different times.

The data obtained was recorded and analysed by using appropriate statistical methods.

V. RESULTS

Of 60 Multidrug resistant (MDR) Pseudomonas aeruginosa isolated from 638 clinical samples, the Metallo-β-Lactamases was seen in 18 (30%) & Biofilm formation in 39(65%).

Table 1: Specimen wise distribution – Metallo β- Lactamases & Biofilm formation

Specimen	No of isolates	Metallo-β-Lactamases positive	Biofilm formation
Urine	15	5 (33.33%)	6S 4W 5N
Blood	13	3 (23.07%)	4S 3W 6N
Pus	12	5(41.66%)	6S 1W 5N
Sputum	10	2(20%)	5S 2W 3N
Miscellaneous	10	3(30%)	6S 2W 2N

TOTAL	60	18(30%)	27S 12W 21N

S: Biofilm production Strong, W: Biofilm production Weak, N: Biofilm production Negative

Table 2: No of isolates forming biofilm & Metallo-β-Lactamases

Biofilm formation	No of isolates	Metallo-β-Lactamases positive isolates
Strong	27	14 (51.85%)
Weak	12	4 (33.33%)
Negative	21	0
Total Isolates	60	18

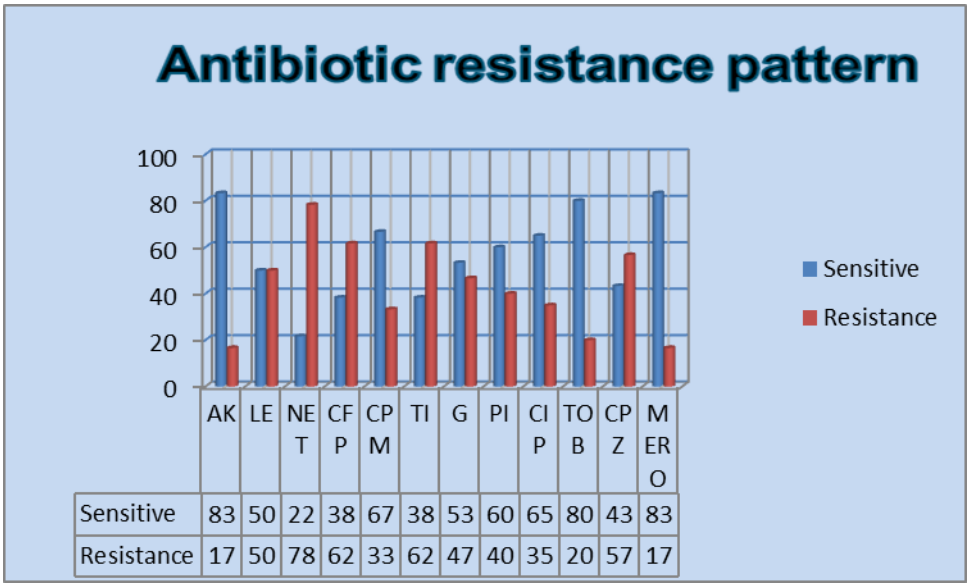
Table showing higher percentage of Metallo-β-Lactamases in strong Biofilm forming isolates

Table 3: Biofilm formation & antibiotic resistant pattern of the isolates

Antibiotic tested	Biofilm formation					
	Strong %		Weak %		Negative %	
	S	R	S	R	S	R
Amikacin	81.48	18.52	75	25	90.47	9.52
Levofloxacin	25.93	74.07	66.66	33.33	71.43	28.51
Netilin	00	100	16.66	83.33	52.38	47.62
Cefoperazone	18.52	81.48	50	50	57.15	42.85
Cefepime	74.07	25.93	75	25	52.38	47.62
Ticarcillin	37.04	62.96	33.33	66.66	42.85	57.15
Gentamycin	51.85	48.15	58.33	41.66	52.38	47.62
Piperacillin	51.85	48.14	75	25	61.90	38.09
Ciprofloxacin	37.04	62.96	83.33	16.66	90.47	9.52
Tobramycin	70.37	33.33	83.33	16.66	90.47	9.52
Ceftazidime	37.04	62.96	41.66	58.33	52.38	47.62
Meropenem	85.18	14.81	83.33	16.66	80.95	19.05

Table showing higher antibiotic resistance in Strong Biofilm producer as compared to the strain not producing biofilm

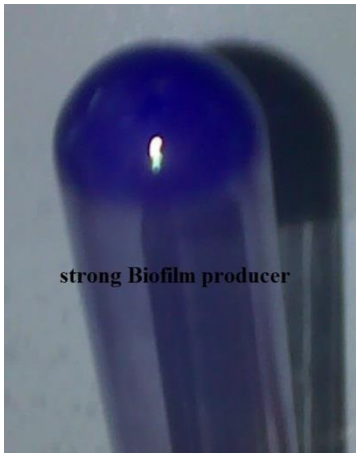
Chart 1: Antibiotic resistance pattern



	AK	LE	NET	CFP	CPM	TI	G	PI	CIP	TOB	CPZ	MERO
Sensitive	83	50	22	38	67	38	53	60	65	80	43	83
Resistance	17	50	78	62	33	62	47	40	35	20	57	17

Figure:

1A: strong Biofilm producer



1B: Weak Biofilm Producer

1C: Non Biofilm Producer

VI. DISCUSSION

Pseudomonas aeruginosa is a common nosocomial pathogen, notorious for its multidrug resistance (MDR) and life threatening infections in critically ill patients.Lately, carbapenems are being used as the last resort antimicrobial to treat serious infections due to MDR P. aeruginosa. [22] In a few Indian studies, the rate of carbapenem resistance in P. aeruginosa has been reported to vary from 12-37 % [23]

In our study, Meropenem resistance was seen in 16.66 %(10/60), Metallo-β-Lactamases was seen in 18 (30%).Highest prevalence of Metallo-β-Lactamases was seen in Pus 41.66%) followed by Urine (33.33%) blood (23.07%), sputum (20%), Miscellaneous (30%).

Shashikala in their study reported a prevalence rate of resistance to imipenem/ meropenem of 10.9% among P. aeruginosa isolates.[24] whereas Sachinkumar in their study reported resistance to Carbapenems in P. aeruginosa of 53.96% [25]

In a study carried out by Varaiya, et al on Incidence of metallo beta lactamase producing Pseudomonas aeruginosa in ICU patients they found 25% of Pseudomonas aeruginosa were found to be carbapenem resistant and 20.8% were found to be MBL producers. Overall 36 % patients responded to gatifloxacin, 42 % responded to piperacillin/tazobactam while 14 % responded to combination of gatifloxacin and piperacillin/tazobactum. [26] Viren A Javiya in their study reported notable resistance of (19.64%) to P. aeruginosa against carbapenems. [27]

In relation to carbapenems, the samples were more resistant to imipenem than to meropenem. Variations in the resistance rates between these antibiotics have been previously describe by Alicia Valéria Zaranza whereas in a study in Brazil, described higher resistance to meropenem. This susceptibility difference among carbapenems is explained by several resistance mechanisms, such as loss of proteins of external membrane OprD, that causes resistance to imipenem and not to meropenem; superexpression of efflux systems; and carbapenemase production. [28]

In our study P. aeruginosa showed (56.67%) resistance to ceftazidime, Cefoperazone (61.67%), netilin (78.33%), ticarcillin (61.67%). Similar is the finding of Bijayini Behera et al who reported 70% resistant to ceftazidime, 75% to piperacillin, 59% to piperacilin/tazobactam, 89% to ticarcillin/clavulinic acid, 82% to cefoperazone, 74% to amikacin, 81% to cefepime, 71% to levofloxacin, 79% to ciprofloxacin and 69% to aztreonam. [22]

Carlos J et al in their study reported P. aeruginosa showed (75%) sensitivity to amikacin; (61%) gentamycin; (77%) tobramycin and (100%) resistance to Ceftriaxone, Cefoxitin, Ampicillin, Cefazolin, Trimeth-Sulfameth. They also reported resistance to Ceftazidime(67%); Ciprofloxacin(75%); Levofloxacin (80%) this is similar to our study. [14]

In our study P. aeruginosa showed higher sensitivity to Amikacin (83.33%), Meropenem(81.67%) , Cefepime (66.67%), tobramycin (80%). similar is the finding of Viren A Javiya et al, Neils et al who demonstrated maximum sensitivity to amikacin against pseudomonas species. [27, 5]

In our study Biofilm formation was found in 39(65%). Strong biofilm producer was shown by 27/60(45%); weak biofilm producer in 12/60(20%). (Fig 1A, 1B) Alicia Valéria Zaranza in their study showed biofilm production by the Congo Red Agar method in 52.0% & biofilm formation on polystyrene microplates, from 86.0% strains. Among them 22.1% were strongly adhered, 47.7% were moderate and 30.2% were weakly adhered. [28] Carlos J et al reported biofilm formation in P. aeruginosa in 83% of clinical strains & that biofilm formation was prevalent among isolates with a MDR phenotype. [14] In our study we found higher antibiotic resistance in strong biofilm producers as compared to the negative biofilm producers.

In our study 50% of the strains from Sputum were strong biofilm producers, 20% weak biofilm producers and among them 20% of the strains were Metallo –β- lactamases positive. Drenkard E, Ausubel FM in their study found that antibiotic-resistant phenotypic variants of P. aeruginosa with enhanced ability to form biofilms arise at high frequency both in vitro and in the lungs of CF patients. They also identified a regulatory protein (PvrR) that controls the conversion between antibiotic-resistant and antibiotic-susceptible forms. [29]

25% of the P. aeruginosa were isolated from urine of inpatients. Study by Lucchetti et al showed that P. aeruginosa was the main isolated agent causing infections in the urinary tract, and according to epidemiologic data, 35.0% to 45.0% of all acquired nosocomial infections are urinary and 80.0% are related to catheter use. [30] In our study P. aeruginosa were isolated from females (53.3%) and males (46.6%) respectively.

The high incidence of this bacterium in the ICU is probably due to the fact that P. aeruginosa is an opportunist pathogen that causes bacteremia in immunocompromised patients, burn victims, patients with urinary infections related to catheters use and nosocomial pneumonia, related to mechanical ventilation, especially in this unit. A remarkable feature in infections by P. aeruginosa acquired in the ICU is multiresistance. [27] In our study (23/60) 38.33% of the isolates were isolated from ICU.

Pseudomonas aeruginosa produces amature in vitro biofilm in 5–7 days. Development of an in vitro biofilm is initiated by planktonic (freely moving) bacteria that reversibly attach to a surface, At this stage, the bacteria are still susceptible to antibiotics The minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) of antibiotics to biofilm-growing bacteria may be up to 100–1000-fold higher compared with planktonic bacteria .Monotherapy with antibiotics such as lactams, which are only active against dividing P. aeruginosa cells, are therefore not very efficient at eradicating biofilm infections There is increased horizontal gene transmission in biofilms .These physiological conditions may explain why biofilm-growing bacteria easily become multidrug resistant by means of traditional resistance mechanisms against lactam antibiotics, aminoglycosides and fluoroquinolones, which are detected by routine susceptibility testing in the clinical microbiology laboratory where planktonic bacterial growth is investigated. [5]

Neil et al in their study reported Colistin is only antimicrobial active against the non-dividing central part of P. aeruginosa biofilms in vitro. Since the metabolically active surface layer of the biofilm is susceptible to ciprofloxacin in contrast to the dormant central part of the biofilm, combination therapy with ciprofloxacin and colistin was able to kill all cells in the biofilm in vitro. [5]

Antibiotic resistance is increasing at an alarming rate, leading to increased morbidity, mortality and treatment costs. A key factor in the development of antibiotic resistance is the inappropriate use of antibiotics. The medical fraternity needs to understand that antibiotics constitute a precious and finite resource. Unless conscious efforts are made to contain the menace of drug resistance, multi-drug resistant organisms, untreatable by every known antibiotic, may emerge, reversing the medical progress made by mankind and throwing us back to the pre-antibiotic era. [24]

VII. CONCLUSION

In our study Amikacin & Meropenem demonstrated maximum sensitivity against pseudomonas species. Therefore, use of these antibiotics should be restricted to severe nosocomial infections, in order to avoid rapid emergence of resistant strains.

Carbapenem resistance not only has enormous therapeutic implications, but is also important from the point of view of infection control. Such stains are known for rapid intra institutional spread and therefore, must be notified to infection control teams.

Higher antibiotic resistances were seen in strong biofilm producers are due so testing for biofilm formation.

Regular antimicrobial susceptibility surveillance is essential. An effective national and state level area-wise monitoring of the resistance patterns antibiotic policy and draft guidelines should be introduced to preserve the effectiveness of antibiotics and for better patient management.

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Use Solar Heat for Prosperity, Healthy and Pollution Free Life

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Abstract- Solar heat is utilized in residential sector for heating water for bathing, cleaning and washing throughout the world. Its utilization is very much less is in commercial, industrial and agricultural sectors. Solar heat is also utilized for cooking food but limited. Solar thermal applications are economical and efficient for our daily life. India has a high solar resource; therefore, need to develop solar thermal applications in residential, commercial, industrial and agricultural sectors. Cooking food by solar cooker is clean and free from smoke, thus it can provide quality way of life to the millions of people using chulhas and kerosene for cooking. Need innovation, technological development, implementation, awareness and encouragement to increase use of solar heat in all walks of life, under the guidelines Jawaharlal Nehru National Solar Mission.

Index Terms- Aware, Cook stove, Encourage, Innovation, Solar resource

Abbreviations- CSPC - Concentrated Paraboloid Solar Cooking, GWth - Gigawatt Thermal, ETC- Evacuated Tube Collector, FED – Full Energy Delivery, FPC – Flat Plate Collector, JNNSM – Jawaharlal Nehru National Solar Mission, MNRE – Ministry of New and Renewable Energy, PED- Partial Energy Delivery, R&D – Research and Development, SWHS-Solar Water Heating System.

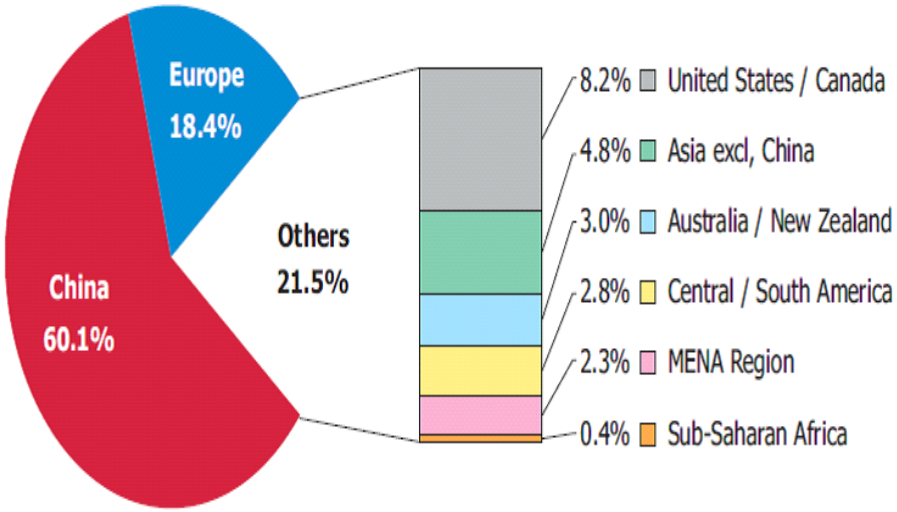
I. Introduction

Solar thermal applications are the efficient means for utilizing solar energy. Sun rays are directly converted into heat; no mechanical or electrical conversion is required. Solar hot water collectors are used by more than 200 million households (over half of them in China), as well as in schools, hospital, hotels and government and commercial buildings, and there is growing trend to use solar resources to generate process heat for industry (1). India is a tropical country, where sunshine is available for longer hours per day and in great intensity. Solar thermal applications are economically viable and can be used for water heating, drying and cooking. Solar thermal applications have a wide range of temperature, below 100^0C and above 400^0C (2). Solar water heating is well established, matured technology; its applications are used in many sectors; residential, hotels, hospitals, industry and other (railway, defence, hostel, religious places). Flat Plate Collectors (FPC) and Evacuated Plate Collectors (EPC), non concentrating solar collectors, are used up to 100^0C for solar water heating and solar drying and industrial heat processing. Concentrated solar technologies (Parabolic Trough) are used for temperature above 100^0 C for cooking and industrial process heat. Solar dryer utilizes FPC based solar air heating system to absorb solar energy. Solar thermal dryer are suitable for drying agricultural produce (cereals and pulses), food processing industry (tomatoes, bananas, mango, peaches, pulp). Solar dryer is also suitable for fish drying, tea, leather, tanneries, spice drying and drying of the painting in paint workshop (automobiles, motor cycle and bicycles). Solar cookers are the best for clean and hygienic cooking of food. Use of solar resource is very much less in India as compared to available solar resource. Special attention is required for development of R&D to meet the requirement of various sectors. MNRE should develop pilot projects in all the sectors and exhibit for technology development and encourage for adoption. State governments have a vital role for development of solar heat applications in all the sectors, protecting loss of agricultural produce, saving of electricity, gas and oil. Presently, India's substantial and sustained economical growth, coupled with rapid industrialization and population growth is placing immense pressure on the country's non renewable natural resources (fossil fuels and nuclear fuels) and increasing India's dependence on imported fuels (3). There is need to curb this increasing import for increasing our competitiveness in international market and raising living standard of peoples. Increased adoption of solar thermal applications would not only reduce import, but emissions also.

II. Status of the World by End of 2010

Total installed capacity in the world by end of 2010 was 195.8GWth, a total of 279.7 million square meters of collector area. China has been leader with the installation capacity of 117.6 GWth and followed by Europe - Albania, EU 27, Macedonia, Norway, Switzerland, Turkey 36.0 GWth, United States and Canada 16.0 GWth, Asia excluding China -India, Japan, Korea South, Taiwan, Thailand 9.4 GWth, Australia and New Zealand 6.0 GWth, Central and South America -Barbados, Brazil, Chile, Mexico, Uruguay 5.5 GWth, the MENA countries- Israel, Jordan, Lebanon, Morocco, Tunisia 4.4 GWth and Sub - Saharan African countries - Namibia, South Africa and Zimbabwe 0.8 GWth (4).

Figure1, Share of Total Installed Capacity in Operation by Economic Regions at the end of 2010.



Source: Solar Heat Worldwide, Market and Contribution to Energy Supply 2010

China has been a leader with an installed capacity 117.6 GWth and majority of solar water heaters are installed in urban residential sectors (both multi-storey as well as independent houses). 10% households are using solar water heaters and have a target of 30% by 2020. In Europe, 90% capacity is in residential sector, predominantly in individual houses.

III. Solar Water Heaters

Status of Solar Water Heater in India

Solar water heater is used in households, hotels, and guest houses, hospitals, for bathing, washing, cleaning and cooking. In industries, solar water heaters are required for process and steam generation. Solar water heaters installed in India by 2009, residential 80%, hotels 6%, hospital 3%, industry 6% and others (railway, defence, hostel, religious places) 5% (5). Karnataka and Maharashtra are leading states in utilizing solar water heater, more than 65% installed capacity of India and total installed capacity in India was 3.5 million m^2 till 2009(6).

Table 1, Estimated Breakup: Functional SWH Installation till 31 December, 2009 -3.1 million m^2, assumes functional are 85% of the installed SWH.

Sector	Million m^2
Residential (80%)	2,108
Hotels (6%)	0.158
Hospital (3%)	0.079
Industry (6%)	0.158
Other (Railway, Defence, Hostel, Religious places, other) (5%)	0.132
Total	2.635

Source: Greentech knowledge Solutions.

IV. Solar Water Heaters Technology for Residential, Hotels, Hostels and Hospitals Sectors

A solar water heater consists of collector to collect solar energy, insulated storage tank and pipelines. The solar energy incident on absorber panel coated with selected coating transfer the heat to riser pipes underneath the absorber panel. The water passing through the risers get heated and delivered to storage tank. The re- circulation of same water through absorber panel in the collector raises the temperature up to 80^0 C. There are two types of water heater, flat plate collectors and evacuated tube collectors. The solar radiation is absorbed in Flat Plate Collectors (FPC). FPC is consisting of an insulated outer metallic box covered on the top with glass sheet. Inside there are blackened metallic absorber (selectively coated) sheets with built in channels or riser tubes to carry out water. The absorber absorbs solar radiation and transfer heat to flowing water. Evacuated tube collector is made of double layer borosilicate glass tubes evacuated for providing insulation. The outer wall of inner tube is coated with selective absorbing material. This helps absorption of solar radiation and transfer heat to the water which flow in inner tube.

Flat Plate collectors are more efficient than ETC during sunshine conditions. The energy output of Flat Plate Collectors is reduced in comparison to ETC in cloudy and extremely cold conditions. Solar Water Heaters for domestic purpose are generally available between 100 to 300 litres. For hotels, hostels and hospitals large size of water heaters are available.

Solar Water Heaters for Residential Sector

Hot water is required in households for bathing, cleaning and washing. In urban households water is heated on LPG stove, electric geyser, and electric immersion rod and LPG/PNG geysers, where as in villages wood and biomass or agricultural waste is utilized for heating of water. Now a day, rates of electricity have been regularly increasing, Government of India has limited the LPG gas cylinders, consequently, heating water

by electric immersion rod, electric geyser and LPG/PNG would be costly. Potential of Solar water heater depends upon three factors, availability of solar resource, period of utilization of hot water and purchasing power of peoples. Throughout India a good solar resource is available. The period of utilization of water is 4to 5 months in north India and 8 to 12 months in south India. Therefore, payback period is less in south India in comparison to north India. North Indian has to pay more for same quantity of water and identical size of solar water heater. Urban population has very much higher purchasing power in comparison to rural population. Considering all above factors, urban areas of five states Karnataka, Maharashtra, Tamil Nadu, Andhra Pradesh and Gujarat and National Capital Regions have the highest potential for solar water heating system. 100 litres SWH at residence can save 1500 units of electricity annually, 1000 SWH of 100 litre capacity saves 1MW peak load (7). Ambitious target of JNNSM for installation of solar collectors is 20 million sq. metres by 2022. Residential sector has a share of 80% of total solar collector area - 16 million sq. meters. 100 litre of solar water heater requires 2 m^2 of solar collector area. 8 million solar water heaters of capacity 100 litre could be installed –saving of 8 GW peak load.

Solar water heaters for Hotels, Hostel and Hospitals

Hot water is required in Hotel, hostel and hospitals for bathing, cleaning and washing. In Hotels, hostel and hospitals gas stove, Electric geysers, immersion rods and LPG geysers are used. Two factors affects for potential of solar water heater, availability of solar resource, period of utilization of hot water. The period of utilization of water is 4to 5 months in north India and 8 to 12 months in south India. Therefore use of solar water heater is economical in south India. Huge requirement of water in early morning before sun shines and limited area / roof available for installation in hotel, hostels and hospital are great barriers in adoption of solar water heaters.

Solar Water Heaters for Industrial Sector

Solar water heaters for industrial use can be classified on the basis of temperature used for the process, Low Temperature - below 100^0C, Medium Temperature - below 400^0C and High Temperature- above 400^0 C. 30% of total industrial heat demand is required at the temperature below 100^0C and 57% below 400^0C (2). Solar heat can be utilized in the sectors like food (including wine and brewages), textile, transport equipment, metal and plastic treatment, and chemical. The application depends of upon temperature level required for the process in industry. Use of solar water heater, vary country by country, firstly - solar resource in the country, secondly- level of temperature required for process for the industry in that country.

Solar Water Heating Technology for Industrial Use

In India, solar water heating technology developed for industrial purpose (Arun 160) is under pilot scale demonstration. It is a Fresnel paraboloid concentrator mounted on flat dish with down ward facing cavity receiver at its focus designed to absorb concentrated solar energy and to transfer it for useful application. The concentrator track the sun on two axes, continuously facing it to capture maximum amount of solar radiation over a day. The dish concentrator along with the receiver is mounted on specially designed tower. Number of concentrators can be installed according to requirement of steam /water. Example of pilot scale demonstration solar water heaters are in operation in industrial sector in India, Mahanand Dairy at Latur - Pressurized hot water for milk pasteurization with storage, Chitale Dairy at Sangli - Steam generation for milk Pasteurization, Mahindra & Mahindra at Pune - Pressurized hot water for degreasing process, Heavy Water Board, Kota - Steam for effluent evaporation.

Applications of Solar Water Heater in Industry

Solar water heating can be utilized in many industries such pulp and paper, textile, dairy, leather, food processing, electroplating, fertilizer, drug and pharmaceuticals. There is high potential of solar water heating in Pulp and paper, dairy and textile in India.

Pulp and Paper

High quantity of hot water and steam is required in pulp and paper for preparation of pulp, cooking, drying and bleaching. Presently, Heavy furnace oil and coal is utilized for generation of steam. Million ton of coal and furnace oil can be saved by use of solar thermal application.

Dairy

India is the largest producer of milk in the world. Milk production in the country was estimated around 94.5 million MT in 2005 (5), the milk production was expected to grow to 120 million MT by 2012.In dairy large quantity of hot water is required for multiple purposes, utensil cleaning, pasteurization process (60 - 85^0C), sterilization process (130-150^0C) . In milk dairies the furnace oil is used as a fuel. Million litres of furnace oil can be saved by solar thermal applications.

Textile

Textile industry is the largest industry in India. The industry is growing 5% annually. In textile industry, major part of steam is required for chemical processing, such as scouring, bleaching, dyeing, mercerizing, printing, curing etc. The steam requirement is 20 Kg/ Kg of cloth. Textile industry utilizes coal and biomass for steam generation. Presently, coal and biomass are cheaper; therefore, adoption of solar water heater would be at slow rate.

Solar Water Heaters for Cooking

Steam is generated by Concentrated Paraboloid Solar Cooking (CSPC), which is utilized for cooking. Cooked food by steam is clean, healthy and hygienic. Solar water heating cooking plants can provide thousand meals per day, and can be installed in hotels, hospitals, schools and religious places. Especially, solar water heater is most suitable for cooking mid day meals in schools. Million tons of gas, oil and coal can be saved.

Solar Water Heating Technology for Cooking

Steam is generated by Concentrated Paraboloid Solar Cooking (CSPC), which is utilized for cooking. CSPC system consist of pairs of sleeping dish and standing dish in parallel, aligned in east -west direction. Receiver is placed at the focus point of each pair of dish, water flows through the receivers and converts into the steam which is utilized for cooking. A number

of parabolic solar concentrators are employed to heat the water and form steam, which can be effectively used for large - scale cooking in community cooking. CSPC system is provided with diesel/ LPG back up to enable to cook in cloudy days, night hours, monsoon periods, and no separate system is required. A pilot scale demonstration solar water heating cooking plant is installed at Bramhakumaris Ashram at Mount Abu, can provide 600 meals in a day i.e. 300 meals twice a day (requires 300 Kg of steam per day). It saves 9,600 litre diesel and 25,728 Kg CO_2 emission per annum (8).

Solar Drying

Drying process is carried out in agricultural, food processing industry and other industries. Main function of drying is to remove the moisture from the substance for preserving for a longer period. In India, agricultural produce are produced in bulk quantities in seasons, it becomes difficult to utilize them, and wasted due non- availably of preservation. By use of solar drying techniques vegetables, fruits and cereals wastage can be minimized and consumption of coal and firewood can be substantially reduced.

Solar Drying Technology

For agricultural products average temperature required for drying ranges between 50^0C to 80^0C. For drying, most commonly used dryers are FPC -based solar air heating system to absorb solar energy. There are two systems, Full Energy Delivery (FED) and Partial Energy Delivery (PED). Full Energy Delivery (FED) system is used when the temperature requirement are lower. Partial energy delivery system are associated with back up and can be used when temperature requirement are higher. Generally higher temperature 140^0C to 220^0C are required in Industries and provided with back of fossil fuels or biomass.

Solar Drying of Fruits, Vegetables and Cereals

35% of agricultural produce roughly amounting to Rs. 500,000 million goes to waste annually after harvesting (9). 10% of cereals and pulses, 40% of fruits and vegetables are wasted annually (10). Farmers sell their produce at a cheaper rate in the top season and do not get full value of their produce. Fruits and vegetables are very cheap in the season and very costly in off-season, therefore, there is wide gap between seasonal rates and off-seasonal rates. Farmers are not getting full amount of their produce and purchaser paying more due to wastage. By using proper solar drying techniques wastage can be minimized. Farmers dry grains in open air by direct sun rays for preserving. This method has several disadvantages such as uncontrolled and slow rate of operation, dependent on environment and weather conditions, contamination, dusting, fermentation, attacks by birds and insects and other unfavourable conditions. Waste of agricultural produce and other produce can be eliminated by using proper solar drying applications. Solar drying applications are economical, energy saving and environment friendly. Solar drying can effectively used in food processing industries, for meeting the demand of solar dried tomatoes, bananas, peaches and mango pulp in international market.

Solar Drying in Industries

Utilization of solar drying is limited in industries. Very few installations of solar drying applications are available in India. Solar drying applications can be utilized for drying spice, leather, fish, tanneries, food pulp, painting (all type of automobiles including motor cycles and bicycles). Presently, solar drying systems are installed at Sakthi Masala, Erode and leather dryer with hot air ducts at M.A. Khizar Hussain & Sons, Chennai. In India, the high potential is expected in fish and tea industry. India has large coastline and island water ways which contributes million tons of fish and millions of peoples are involved in fish industry. Fish spoils quickly, it cannot sustain for long period without freezing or drying. Fishing is carried out almost in the year except one or two months. Ample Solar resource is available in coastal areas. Million tons of firewood can be saved by adoption of solar drying techniques. India is among the largest tea producing country of the world. Several million tons of coal is used for drying of tea. By adoption of solar drying techniques million tons of coal can be saved.

Solar Cooking

2.7 billion Peoples relied on traditional use of biomass for cooking, around 40% of global population, out of which 836 millions in India (around 72% share of population of India) (11). Chulha (cook stove) is used for cooking, traditional fuels are burnt in chulha, emits hazardous smoke. Chulha emits smoke in open atmosphere; pollutants are 5 to 15 times higher than industrial combustion of coal. Use of culha deteriorates air quality, create chronic health problems, and damage to forest, eco system and global climate. World health organization claimed approximately 1.5 million people per annum in the world die of indoor pollution and carbon monoxide poisoning every year because of burning of biomass in chulha, out which 300,000 to 500,000 die in India. These chulhas are required to be replaced by solar cookers. Generally, three types of solar cookers are available in the market - box cooker, dish cooker, community solar cooker.

Box Cooker

Solar box cookers are useful for small family consist of three to four members in the family. The moderate and high temperatures can be obtained with box cookers. Cost of box type solar cooker is less, but could not replace chulha due lack of important features such as boiling of water, roasting of chapatti, frying/ tadka/ vagar. It cannot replace chulha due lack of facilities required in Indian foods.

Dish Cookers

It is concentrating type parabolic dish solar cooker. Temperature can be achieved 350 to 400^0C; therefore, can be used for boiling, roasting and frying. It can be used in households in rural and urban areas, dhabas, tea shops, etc.

Community Solar Cookers

Food can be cooked in kitchen by community solar cookers. It consist of large reflector, which reflects the light in kitchen through in its north wall while a secondary reflector further concentrate rays at the bottom of the pot/ fry pan painted with black. High temperatures are achieved in order of 400^0C, therefore, enables to cook food in shorter period. It acts like gas,

electric or fire wood system. 7 sq. meter sized reflector solar cooker can cook the food of 50 people; bigger size reflector can be used for more than 50 people but limited 100 peoples. Traditional food cooking is possible - making chapatis, purees, dosa etc. including vaghar/tadka in dal and vegetable

Jawaharlal Nehru National Solar Mission

Jawaharlal Nehru National Solar mission emphasized the need to encourage solar heating system below 80^0C - solar collectors, which are already using proven technology and are commercially viable. Mission has set the ambitious target for temperature below 80^0C for domestic and industrial applications. The mission targets are 7 million sq meters -phase 1 (2010-13), 15 million sq meters - phase2 (2013-17), 20 million sq meters-phase 3 (2017-22)

Role of Government

Using of solar heat is at infancy stage in India. Technology is to be developed in Industrial and agricultural sectors. There is need to develop pilot demonstration projects in India in industrial and agricultural sectors for technological development and awareness. Initial cost of solar equipment are very higher, needs Government support. Solar thermal applications vary region to region and, therefore, state government can effectively encourage for adoption.

MNRE

MNRE is working for development of R&D, setting up pilot demonstration projects, providing subsidies. Under the guidelines of MNRE Fresnel paraboloid reflecting concentrator (named Arun 160) was developed by M/s Clique Development Pvt. Ltd., Mumbai. Arun-160 has been installed as pilot demonstration projects at milk dairies and hotels. There is need to develop pilot demonstration projects in other industries also.

State Governments

Solar thermal applications differ from state to state. State governments form the policy and regulation according to their requirement. State Governments can provide additional subsidy or incentive in addition to the MNRE for progress of solar thermal applications. State Governments may issue mandatory regulations for incorporating solar water heating system in new or renovated buildings with financial incentives such as discount on monthly electricity bills. State governments need to take step to reduce wastage of fruits, vegetables, fish and cereals in their state by development of solar drying centres in the state. Similar steps are required by the state governments in industries and commercial sectors.

Research and Development

Solar thermal applications in commercial, industrial and agricultural sectors are limited worldwide. Solar resource countries have an opportunity for development of solar thermal applications. Our country has high solar resource; therefore, solar thermal applications can be implemented in domestic, commercial, industrial and agricultural sectors. Solar water heater, for the domestic purposes have matured technology. Solar water heaters for industrial purpose are to be developed according to the requirement of industry (temperature and pressure of water and steam is different for different industries). Similarly, solar drying system is to be developed for agricultural and industries as per requirement of temperature and ways of drying (drying temperature and drying ways are different for different articles). India is losing Rs. 500,000 million per annum on account wastage of cereals, fruits and vegetables due to lack of drying and preservation. Solar drying techniques are required to be developed to avoid huge loss to the country every year. Million ton of fish is wasted every year; this wastage is to be reduced. Solar cookers available in market for domestic purposes do not fulfil the requirement of cooking of Indian traditional food. There is need to develop solar cookers according to the requirement of cooking Indian traditional food at reasonable and affordable cost.

Impact of Import

Presently, India is importing coal, gas, oil and uranium to meet the energy needs. Energy needs would further increase with population, economic and industrial growth of country. Thus the import of coal, gas, oil and uranium would substantially increase. The import of such things is very much costlier in comparison to our own resources. More import means, the cost of energy produced would be high, our product and services would become costly, our competitiveness would be reduced in the international market. Costly product and services would make our life costlier and lower standard of living. It has become imperative to use solar resource in our day to day life for leading economical and pollution free life.

V. Discussions and Conclusions

Use of solar heat is increasing worldwide, since economical and energy efficient. Our country has been importing coal, natural gas, oil and uranium for requirement of energy needs. Solar heat, which is abundantly available, can be used in residential, commercial and industrial and agricultural sectors. Utilization of solar heat can substantially reduce the import of coal, gas, oil and uranium.

Presently, gas geysers/ electric geyser, gas stoves and kerosene are utilized at residence in urban areas for requirement of hot water in our country. At this stage, we need to follow China, 10% households use solar water heaters and targeting for 30% by 2020. Solar water heating is a matured technology. Increase in installation of solar water heaters would save peak load in Gigawatts and million ton of gas and huge quantity of kerosene. Need to aware and encourage for fast growth of adoption of solar water heater at households.

Presently, solar water heaters are used at Mahanand Dairy at Latur and Chitale Dairy at Sangli, need to encourage in other milk dairies to adopt solar water heating system. Detailed study may be conducted for developing and implementing for solar heating system in industries like food (including wine and brewages), textile, transport equipment, pulp & paper metal and plastic treatment, and chemical.

Solar water heaters for cooking food are installed at Brahmakumaries Ashram at Mount Abu, there is need to design and develop water heater on similar pattern for cooking food in hotels, hostels, hospitals, mid day meals in schools and big mess. Millions of gas cylinders and furnace oil can be saved.

40% of fruits and vegetables are going waste every year due to lack of preservation. Farmers are not getting full cost of their produce, they sale their produce in cheaper rates in seasons. Fruit and vegetables become very costly except top season period. Purchaser pay high cost if purchases in off season. In similar way grains are also going waste due lack of preservation. Solar drying technique may be developed for preservation of fruits vegetables and grains. Solar drying has not been put in use in industrial sectors except one or two industry. Solar drying applications, needs to be encouraged for fish drying, tea drying, drying of spices, leather, foods pulp and painting.

In India, 836 million people are without access to clean cooking facilities, use traditional fuels - fire wood, agricultural waste and biomass cakes. Solar cooker manufactured do not meet the requirement of Indian cooking. Another drawback of solar cooker, the food cannot be cooked in kitchen; one has to remain in the scorching heat of sun. Solar cookers need to be redesign as per requirement of Indian cooking to enable to adopt solar cookers.

Use solar heat, save coal, oil, gas, electricity to make country competitive and prosperous. There is need to aware about the impact of using solar heat to the masses and involve them for adoption. Government of India and State Government need to work together for development of solar thermal application in residential, commercial, industrial and agricultural sectors. NGO should come forward for increasing adoption of solar thermal applications.

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Annotated Image search: Annotated Image Search using Text and Image Features

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Abstract- As the diversity and size of digital image collections grow exponentially, efficient image retrieval is becoming increasingly important. In general, current automatic image retrieval systems can be characterized into two categories: text-based and image content-based. For text-based image retrieval, the images are searched using the annotated text. In this framework, manual image annotation is extremely laborious and the visual content of images are difficult to be described precisely by a limited set of text terms. To overcome these difficulties, content-based image retrieval systems index images by their visual content, such as color, shape, texture, etc.

It is a remarkable fact that, neither searching the images based on the content of the image nor searching the images using the annotated text may lead to an accurate result but jointly they tend to produce a perfect result; this is probably because the writers of text descriptions of images tend to leave out what is visually obvious (the color of flowers, etc.) and to mention properties that are very difficult to infer using vision (the species of the flower, say) and the content of the image depicts the description that may be left out by the writer.

An efficient image retrieval system is highly desired. An algorithm which can combine both the retrieval systems i.e. Text Based and Content Based search and then filter out the common images can provide the exact solution for the underlying problem of the retrieval system. Our approach strives to implement the content based search by color and texture features of the objects present in the image using DWT, RGB color filter and color moments and text based search using the simple string match algorithm, and later using both results a similarity comparison is carried out to come up with a final result of the retrieval system. Our image extraction algorithm is based on both the content and the text based retrieval system with high recall rate. The results show that we can improve search accuracy by combining text based search with content based search.

Index Terms- Color Moments; Content Based Image Retrieval (CBIR); Feature extraction; RGB Color Filter; Similarity Comparison; Text Based Image Retrieval (TBIR)

I. INTRODUCTION

The Annotated Image search system present a scalable image retrieval system based jointly on text based and visual content based. The solution that we propose is a solution for retrieving images using both their text descriptions and visual content, such as features in color and texture. A query in this system consists of keywords, a sample image and relevant parameters. The retrieving algorithm first selects a subset of images from the whole collection according to a comparison between the keywords and the text descriptions. Visual features extracted from the sample image are then compared with the extracted features of the images in the subset to select the closest.

"Text-based" means the images are searched comparing the annotated text of the image in the database with the user input text using a simple sub-string matching algorithm.

"Content-based" means that the search analyzes the contents of the image rather than the annotated text http://en.wikipedia.org/wiki/Metadata_(computing) such as keywords, tags, 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.

Using both text and image content features, a hybrid image retrieval system is developed in this paper. We first use a text-based image to retrieve images based on the text information on the annotated image to provide an initial image set. An image content based ordering is then performed on the initial image set. Such a design makes it truly practical to use both text and image content for image retrieval. Experimental results confirm the efficiency of the system.

II. LITERATURE SURVEY

Over the past few years, various techniques have been integrated into CBIR systems to improve the rate of relevant images in the result set. Such techniques include unifying keywords and visual features for indexing and retrieving, using mechanisms of relevance feedback, applying ontology based structures, querying by concept, etc. In the system developed by Zhou and Huang [1], each image was represented by vectors of visual features and text annotations. Keywords were semantically grouped based on user's feedback

made during the retrieval process. The system supported joint queries of keywords and example images. Through relevance feedback, retrieving results were further refined.

Zhang and Song [2] implemented a hybrid image retrieval system that was based on keywords and visual contents. Text descriptions of images were stored in a database, on which full-text index catalogues were created. Vectors of visual contents were extracted and saved into a Lucene index. The system was queried jointly by keywords and an example image.

An image retrieval methodology was proposed in [3], where images were divided into regions by a fully unsupervised segmentation algorithm. These regions were indexed by low-level descriptors of colour, position, size and shape, which were associated with appropriate qualitative intermediate-level descriptors that carried high-level concepts. A user could query the system by keywords which carried the high-level concepts. Comparisons were then made with the intermediate-level descriptors and the associated image regions. A relevance feedback mechanism based on support vector machines was employed to rank the obtained image regions that were potentially relevant to produce the results.

A hybrid model of image retrieval was proposed and implemented in [4], where ontology and probabilistic ranking were applied. When the system was queried by a keyword, images annotated by the keyword were selected together with those annotated by keywords conceptually related. The degree of relevance was evaluated by an ontology reasoned whose output were passed to a Bayesian Network to get the rankings.

For large-scale applications of CBIR, linear search over high-dimensional feature vectors must be avoided. Cortina [5], a large-scale image retrieval system for the World Wide Web, was reported to be able to handle over 3 million images. The system had a crawler which collected images and their text descriptions. The text descriptions were stored in a database, where inverted index over the keywords were created. Four MPEG-7 visual features were extracted from the images and stored in another database. To reduce the searching time, the whole dataset was organised in clusters by each descriptor type. When querying the system, a user had to submit a keyword to search through the inverted index to get a set of matching images. The user then had to select one or several images that were visually close to what he/she was looking for. Query vectors from these chosen images were constructed to perform a nearest neighbour search in the spaces of feature descriptors. To avoid a linear search, the visual feature vectors were clustered by the k-means algorithm [6].

The text-based CBIR approaches proposed in [7] were meant to provide quality results within searching times that are acceptable to users who are used to the performance of text search engines. Like Cortina, several MPEG-7 visual descriptors were extracted from the images crawled from the SPIRIT collection [8]. The descriptors were saved as XML documents. An inverted index was created over the terms of the feature vectors. Queries were in the form of example images.

A system architecture for large-scale medical image understanding and retrieval was described in [9], where a hierarchical framework of ontologies was used to form a fusion of low-level visual features and high-level domain knowledge. The implementation was based on the Lucene Image Retrieval Engine (LIRE) and the system supported query by text, by concept and by sample image.

A system for near-duplicate detection and sub-image retrieval was described in [10]. Instead of using global visual features such as colour histograms, the system used a local descriptor, PCA-SIFT [11], to represent distinctive interest points in images. To index the extracted local descriptors they employed locality sensitive hashing [12]. With further optimisation on layout and access to the index data on disk, they could efficiently query indexes containing millions of interest points.

From the above literature survey we come to the conclusion that most of the researches have worked on either on text based or content based retrieval systems. But very few of the researches have addressed the combined model consisting of both the retrieval system. In our work we will address the combined hybrid model which tries to produce highest accuracy result of any retrieval system.

III. THE ANNO- SEARCH SYSTEM

With the rapid growth of the numbers of digital images, the need for effectively and efficiently retrieving the images has become demanding. Text based retrieval has been widely used where images are indexed by text terms and retrieved by matching terms in a query with those index. However, text annotations often carry little information about image's visual features. When users wish to retrieve images of similar visual content, a pure text based approach becomes inadequate. Content based image retrieval (CBIR), instead of using text annotations as the basis for indexing and searching, uses visual features extracted from images, such as color, texture, shape and spatial relations of pixels. Unlike text annotations which are subject to human perception, these features make objective representations of images.

The Annotated Image search Systems strives to combine both the searches i.e. text based and content based search to match the result accuracy.

In this paper, we propose a scalable image retrieval system based jointly on text annotations and visual content. Let us discuss the system shown in fig.1 one by one.

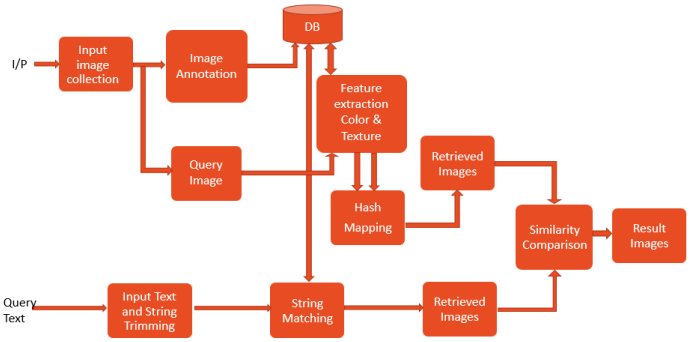

Fig.1 Block Diagram of Annotated Image search System

3.1 Image Collection

Image collection is a process which requires a large collection of images pertaining to different classes. We have collected images that lie in 8 different classes namely Plant, Idol, Lake, Duck, and white flower, Yellow Hibiscus, Pink Hibiscus and Rabbit. Each class has minimum of 10 images with each having different tags. Sample images of each class is as shown in the table below.

Sl.No	Image	Image Class	Description
1		Plant	Flower Plant in the Garden
2		Idol	Idols with flowers in Front
3		Lake	Building behind the Bush of the Lake
4		Duck	Beautiful White color Duck
5		White Flower	Plant with White Flower and long Green Leaves

6		Yellow Hibiscus	Beautiful Yellow Hibiscus Plant with a Flower
7		Pink Hibiscus	Pink Hibiscus Flower with Green Leaves
8		Rabbit	Rabbit eating Green Leaves

Fig.2 Image Collection

3.2 Image Annotation

Image annotation is a process where each image subjected to the annotation algorithm to extract the image content and form a relevant annotated text for the image. In our work the database is limited to 100 images, so we use manual annotation method to tag the relevant images. Once the database size increases, auto annotation algorithm can be implemented.

3.3 Search by Content

Search by content is a process where the input image is searched against the database images for similar features. The algorithms used in these systems are commonly divided into three tasks:

- Feature Extraction (DWT, Image Segmentation, RGB Color Filter and Color Moments)
- Hash Map Indexing
- Similarity Measures

3.3.1 Feature Extraction

The important task in Feature Extraction is to extract texture features which are most completely describing the information of texture in the image.

Various kinds of texture analysis methods are used to examine textures from different perspectives. Individual method can't be used for all textures multidimensionality of perceived texture. In our approach, a set of parameters which are driven from the variation of pixel elements of texture are used to define an image model. The method used in this work is discrete wavelet transform.

3.3.2 Discrete Wavelet Transform

DWT can be performed by iteratively filtering a signal or image through the low-pass and high-pass filters, and subsequently down sampling the filtered data by two. This process will decompose the input image into a series of sub band images.

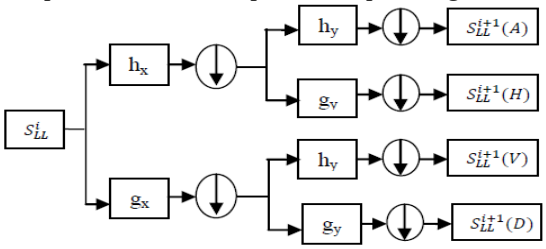

Fig 3. Discrete Wavelet Transform

Figure 3 illustrates an example of DWT, where h and g represent the low-pass and high-pass filter respectively, while the symbol with a down arrow inside a circle represents the down sampling operation. From figure 4, an image S at resolution level i was decomposed into four sub band images after going through one stage of decomposition process. The four sub band images consist of one approximation image and three detail images. The approximation image is actually the low-frequency.

A	H
V	D

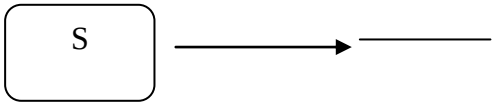

Fig 4. Sub band images for one level of image decomposition using DWT

Detail image contains the information of specific scale and orientation. This means that the spatial information is also retained within the sub band images. Therefore, the detail images are suitable to be used for deriving a set of texture features in the input image. On the other hand, the approximation image can be used for higher levels of decomposition for the input image. Down sampling operation has helps to reduce the useless and redundant samples in the decomposition process. The fig.5 show the DWT of an actual image of an Plant.

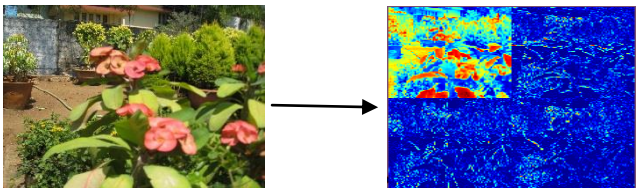

Fig 5. Sub band images for one level of image decomposition using DWT (Actual "Plant" Image as Example)

3.3.3 RGB Color Filter

One of the important features that make possible the recognition of images by humans is color. Color is a property that depends on the reflection of light to the eye and the processing of that information by the brain. We use color to tell the difference between objects, places, and the time of day. Usually colors are defined in three dimensional color spaces. These could either be RGB (Red, Green, and Blue), HSV (Hue, Saturation, and Value) or HSB (Hue, Saturation, and Brightness).

Most image formats such as JPEG, BMP, GIF, use the RGB color space to store information. The RGB color space is defined as a unit cube with red, green, and blue axes. Thus, a vector with three co-ordinates represents the color in this space. When all three coordinates are set to zero the color perceived is black. When all three coordinates are set to 1 the color perceived is white. The other color spaces operate in a similar fashion but with a different perception. In MatLab for example one can get a color histogram of an image in the RGB or HSV color space. Bars in a color histogram are referred to as bins and they represent the x-axis. The number of bins depends on the number of colors there are in an image. Y-axis denotes the number of pixels in each bin. In other words it gives the count of pixels in an image representing a particular color.

Fig 7. RGB Color Filter application on an Image containing "Plant"

Color Feature Extraction

Color image segmentation is a process of extracting from the image domain one or more connected regions satisfying uniformity (homogeneity) criterion which is based on feature(s) derived from spectral components. These components are defined in a chosen color space model. The segmentation process could be augmented by some additional knowledge about the objects in the scene such as geometric and optical properties.

In our work, the input color image will be coarsely represented using 25 bins. Coarse representation uses the spatial information from a Histogram based windowing process. K-Means is used to cluster the coarse image data. In fig.6 the actual Image of a "Plant" is segmented into 25 color bins.

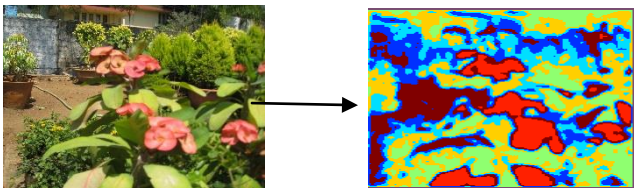

Fig 6. Color Feature Extraction

3.3.4 Color Moments

Color moments are measures that can be used to differentiate images based on their features of color. These moments provide a measurement for color similarity between images. These values of similarity can then be compared to the values of images indexed in a database for tasks like image retrieval.

The basis of color moments lays in the assumption that the distribution of color in an image can be interpreted as a probability distribution. Probability distributions are characterized by a number of unique moments (e.g. Normal distributions are differentiated by their mean and variance). It therefore follows that if the color in an image follows a certain probability distribution, the moments of that distribution can then be used as features to identify that image based on color.

There are three central moments of a image's color distribution. They are Mean, Standard deviation and Skewness. A color can be defined by 3 or more values. Moments are calculated for each of these channels in an image. An image therefore is characterized by 9 moments 3 moments for each 3 color channels.

MOMENT 1 – Mean: Mean can be understood as the average color value in the image.

$$E_i = \sum_{N}^{j=1} \frac{1}{N} P_{ij}$$

MOMENT 2 Standard Deviation: The standard deviation is the square root of the variance of the distribution.

$$\sigma_i = \sqrt{(\frac{1}{N} \sum_{N}^{j=1} (P_{ij} - E_i)^3)}$$

MOMENT 3 – Skewness: Skewness can be understood as a measure of the degree of asymmetry in the distribution.

$$S_i = \sqrt[3]{(\frac{1}{N} \sum_{N}^{j=1} (P_{ij} - E_i)^3)}$$

A function of the similarity between two image distributions is defined as the sum of the weighted differences between the moments of the two distributions. Formally this is:

$$d_{mom}(H, I) = \sum_{i=1}^{r} W_{i1} \left|E_i^1 - E_i^2\right| + W_{i2} \left|\sigma_i^1 - \sigma_i^2\right| + W_{i3} \left|S_i^1 - S_i^2\right|$$

3.4 Hash Map Indexing

Because visual features are generally of high dimensional, similarity-oriented search based on visual features is always a bottleneck for large-scale image database retrieval on search efficiency. To overcome this problem, we adopt a hash encoding algorithm to speed up this procedure.

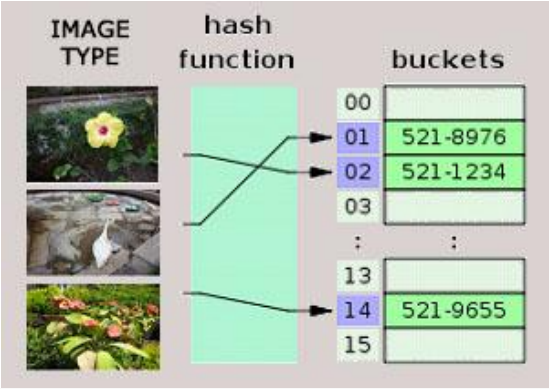

Fig 8. An image feature repository as a hash table

This idea is proposed to encode image visual features to so-call hash codes. Images are divided into even blocks and average luminance of each block is extracted as visual features. These features are transformed by a PCA mapping matrix learned beforehand, and then quantized into hash codes.

3.5 Search By Text

Search by text is a process where the images are searched using the text provided by the user. This is a simple process of comparing the text provided by the user with the annotated/tagged text of the database images. Once the input text matches with the annotated/tagged text of the image, the image will be retrieved, irrespective of the image feature.

3.6 Similarity Comparison

It is difficult to find a unique representation to compare images accurately. In our work we adopt a unique way of comparing the sub-set images of both the searches. In this process the images retrieved by "Image Search" and "Text Search" using similar keyword/image are compared one by one and zeroed upon final result. Similarity comparison involves a simple text based search of the tag of the image retrieved from Image based search. The following flow chart defines the method of comparison:

Step 1: Get the count of number of images from both the searches.
Step 2: Select the images from the search which is having more count (Say Content Based Search)
Step 3: Retrieve the Annotated Text from the Image from Content Based Search.
Step 4: Compare if the same annotated text image is present in Text Based Search.
Step 5: If Present, select for final result else reject the Image.
Step 6: Select the Next Image and go to Step 2.

After completing the similarity comparison the set the images which are retrieved are the final images of this approach.

IV. Result and Discussion

A series of experiments were conducted to evaluate the effectiveness and efficiency of the Anno-Annotation Search system. We created a database of 100 images. They are of high quality and have rich descriptions, such as title, category and comments. Though these descriptions are noisy, they cover to a certain degree the concepts of the corresponding images. These images make-up of the database, from which the relevant images are retrieved to annotate the query image. Two query datasets are used to evaluate the system performance. The first one is 10 images of 5 categories randomly selected. To evaluate the effectiveness of our approach, we deliberately used a few vague query keywords, e.g. we use "Plant" as the query keyword to annotate an image of "Rabbit". We manually assessed the retrieval results on this dataset.
The second dataset is a content-based image retrieval database. Images in this dataset have about 5 on average manually labeled ground truth annotations. And for many images, not all objects are annotated.

4.1. Experiments on System

It is a remarkable fact that, while text and images are separately ambiguous, jointly they tend not to be; this is probably because the writers of text descriptions of images tend to leave out what is visually obvious (the color of flowers, etc.) and to mention properties that are very difficult to infer using vision (the species of the flower, say). And the content based features like color and the texture of the objects present in the image illustrate the characteristic property like base object classes: plant, flower, duck, rabbit, etc. However, certain characteristics of the image are hard to capture using strictly the visual properties, such as events, people, location etc.
It can be inferred that by combining both Text and Content Based Search the irrelevant images can be pruned out from the search result.
The prefect search result of Annotated Image search System is combination of text based search and content based search by selecting the common images from both searches.

Evaluation Result:

Content Based Search
When a query image (say Flower) is given, we retrieved 7 images that are shown in the fig.9 below. Similarly, when then search is conducted for Plant, Duck, Lake and Idol, we retrieved 7, 7, 7 and 7 images respectively. The histogram graph (Fig.10) is derived based on the search result

Fig 9 .Search result for Flower

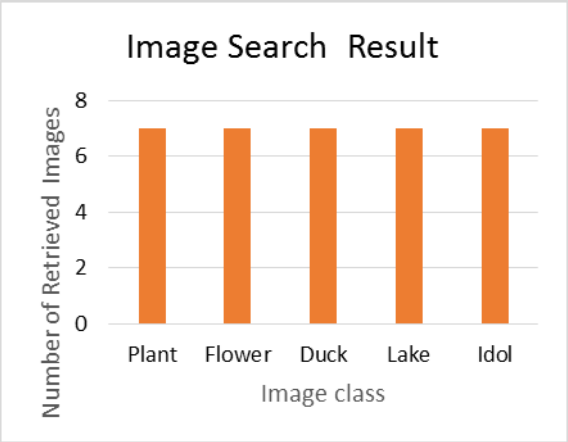

Fig 10. Search Result Graph for Various Image Input

Text Based Search

When a query text (say Flower) is given, we retrieved 9 images that are shown in the fig.11 below. Similarly, when then search is conducted for Plant, Duck, Lake and Idol, we retrieved 9, 9, 6 and 8 images respectively. The histogram graph (Fig.12) is derived based on the search result.

Fig.11 Search result for Flower

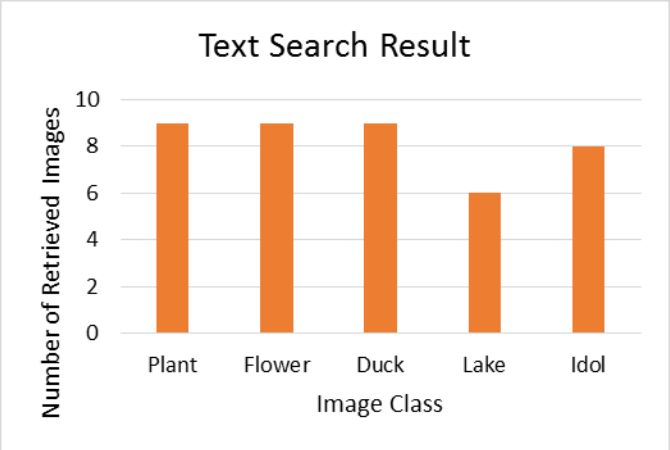

Fig 12. Search Result Graph for Various search keywords

Annotated Image search System Result

By defusing both the system results the final result is inferred that is shown in Fig.13, this result comprise of result for text and content search for similar keywords or images i.e. Plant, Flower, Duck, lake and Idol. The histogram graph (Fig.14) is derived based on the final search result comprising of "Text Search", "Image Content Search" and combination of both.

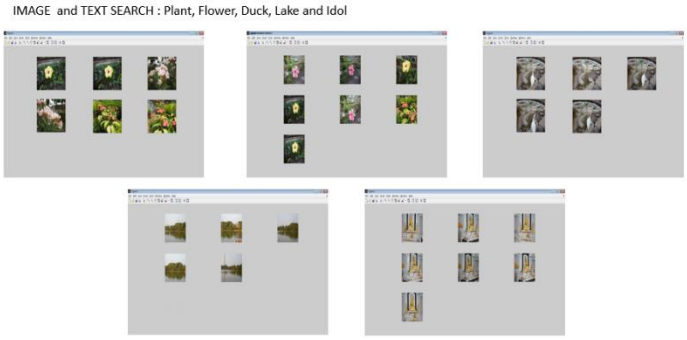

Fig 13. Search result for Annotated Image search System

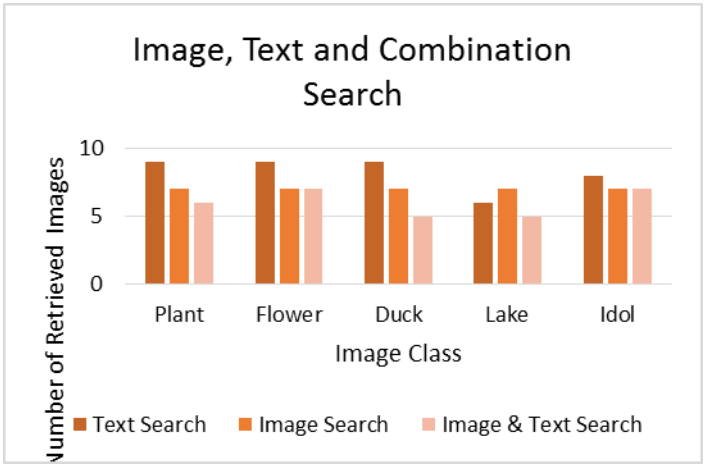

Fig 14. Search Result Graph for Various Searches

The proposed combination model will always result into the best result of any retrieval system

V. CONCLUSION

We have presented a best image retrieval system. The solution unifies well-established text and content based techniques with the aim of overcoming the semantic gap in image retrieval systems that are solely content based. Content based approaches evaluate similarities in visual domain, which provides more objective representations for images than text annotations. The image selection by

the semantic comparison also helps to reduce the size of the data set for the hashing, which further shortens the time spent on the visual comparison. By such a two-staged retrieving strategy, time spent on the content based comparison can be confined within a user-tolerant range. So we believe that the solution has the potential to be scaled up to suit large image collections.

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Urban Development and Deforestation: Evidences from El-Obeid Town (1970-2010), Western Sudan

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Abstract- The study area is located between 30º – 12' East, and 13º -10' North. The Urban Development of the town consists of the residence areas from the first, second, and third classes, in addition to the squatter settlement extensions that planned later and became officially new urban extension. The third class housing represents 70% from the total residential area of the town that expanded at expense of the Urban forests.

The main objective of this study is to show and assess the town's urban development since 1970s, and its impact upon the forests. The study used RS and GIS as integrated tools for application in urban growth effects on El-Obeid Forests. The 1972, 1987, 2000, 2005 and 2010 Land sat TM satellite RS were used to assess El-Obeid town's urban deforestation. The results showed that there was 100% urban deforestation in the study area caused by urban new extensions and development.

Index Terms- Urban Development, Urban Extensions, Urban forests, Urban Deforestation

المستخلص

شمالاً وخطي 13º تقع مدينة الابيض وسط إقليم كردفان بين خطي عرض '10 - شرقاً. يتمثل التخطيط العمراني للمدينة في المناطق السكنية من 30ºطول '12 - الدرجة الاولى والثانية والثالثة بجانب الإمتدادات العشوائية. تمثل مناطق الدرجة الثالثة 70% من مساحات المربعات السكنية والتي توسعت على حساب الغابات.

تهدف الدراسة الحالية إلى عرض وتقييم التطور العمراني للمدينة منذ السبعينات، وتأثير ذلك على الغابات التي كانت تحيط بالمدينة. أستخدم الباحث تقنية الاستشعار عن بعد ممثلة في صور الاقمار الأصطناعية وتمت معالجة الخرائط بواسطة برمجيات نظم المعلومات الجغرافية (Arc Map). أظهرت النتائج أن التوسع العمراني تسبب في إزالة الغابات بنسبة 100% في كل الاتجاهات حول المدينة.

I. INTRODUCTION

Land use and land cover change (LULCC), is a general term for the human modification of earth's terrestrial surface. As humans have been modifying land for different purposes; current rate of modifications is for greater than ever in history. Forest damage caused by urban extensions is currently one of the most serious problems in arid and semi-arid ecosystems, both in Africa and Sudan. FAO's Forest Resources Assessment 2005 gives a global deforestation estimate of 13 million ha per year on average for 2000-2005.

As with so many other environmental problems, there are a lot of things causing the tree trouble. Environmental change as a case of human interference has been continuous phenomenon in the ecosystem balance in the 20th. As the concerns over the society implications of forests conservation and urban extensions goes back to the Mid of the 1970s. In Sudan statistics showed change in forest cover, as about (69.949.000 ha) of Sudan 29.4%, is forested and about 20.0% (13.990.000 ha) is classified as primary forest. During 1990-2010 Sudan lost about 8.4% of its forest cover (6.432.000 ha) (Mongabay.com, 2012).Such loss caused by deforestation of habitat has resulted in widespread impacts and consequences of many environmental problems.

Settlement is the most land use parameter in need through out the history of human beings. New housing in new residences can be needed in urban areas continuously as the population increases. On the other hand, to plan and execute new settlement areas, we need to use a land that may be a forest, an agricultural land or others, which are the approximate cause lead to urban deforestation.

Urbanization is the driving force for modernization, including economic and social development and there is increasing concern about the effects of expanding towns and cities. One strike effect is on the natural resources such as forest lands. The fact is that: high urban populations place increases stress on natural resources (Rees, 1992). The United Nations Population Fund estimated that in 2008, more than half of the World's human population is living in urban areas. Cities are spreading out despite the availability of land for developments within the existing urban envelop (Cegn, 2005).

Generally urban growth becomes the main category that causes strike land use change in recent eras. Transformation, which is a natural phenomenon, is occurred under certain causes related to the human activities such as cutting trees and eradicating forests for urban growth. In many developing countries, urban development often occurs as the result of rural-urban migration. Among developing countries, estimated that 60% of urban growth in 1960-1990 was from natural increase, while 40% from in-migration from rural areas.

Deforestation is categorized as one of the most challenges the world face today, and as stated by Manjula *et al* (2011), it has a crucial geographical dimension and component. Deforestation is a continuous process. Therefore efforts have to be geared towards proper inventory and changes monitoring. United Nations Conference on Environment and Development held in 1992 identified deforestation as a policy issue of global importance (Ayoola, 2012).

There is no clear definition of "deforestation", neither there are reliable estimates of its extent nor its primary causes, and – partly – as reflection of these – there is no consensus on the underlying causes (Angelsen, 1995). Deforestation results from complex socio-economic processes (Walker, 1987). Deforestation is the conversion of forested areas to non-forested land use, which can result from deliberate removal of forest cover for urban development or for agriculture (Giri, 2007). The

narrow definition of deforestation that is used by FAO is "the removal of forest cover to an extent that allows for alternative land use".

Western Sudan has witnessed a rapid shrinkage in its forest resources in recent decades. The scale and impact of declining forest resources vary greatly by provinces depend on population density as well as natural resource utilization patterns. Between 1980s and 2000s, complete forests clearance in the study area has been occurred, all forests surrounding the town had been converted into urban residential lands.

In writing this research the main objective was to map the different periods of forest degradation in last 40 years (1970-2010). In the study area, effective factors mainly of human origin are leading to land resource degradation, which is a process of forest conversion into urban land. So, in the study area single factor causation of deforestation is considered. Urban deforestation is taken to mean in this research complete eradication of forest vegetation to provide land for new urban residential extensions.

II. Material and Methods

The study area: The study area is located between 30º 12' East, and 13º 10' North Fig (1). This area has summer rainfall with an average of 250 mms and temperature of 35º C during summer season. El-Obeid town is the capital of North Kordofan State, characterized by rapid urban development mainly residential areas, since 1970s.The town urban population is developing with the value of economic assets; it has a population close to 301.400 persons in 2002.

III. Urban Extension and Deforestation

Urban areas are the most dynamics, their size has been increased during the past and this process will go on in the future. In less developed countries there is a strong trend towards concentration of people in urban areas that can be observed (Moeller, N.D). Urban deforestation has recently received considerable attention. Over the state, there are many other potential causes of deforestation, land degradation and land use change, including shifting cultivation, firewood, and climate change. This research focuses on the urban new extensions as a main cause of forest change in the area.

IV. Forest lands Quantification View

North Kordofan is an area where forest resources are characterized by over utilization. Sheikan province where El-Obeid town is located has 1900000 fedans of forests, about 2.03% of the greater Kordofan region forest land (92820000) fedaans. Table (1) shows reserved forests in greater Kordofan, their coverage and changes assessment.

Fig (1): Location of the Study area

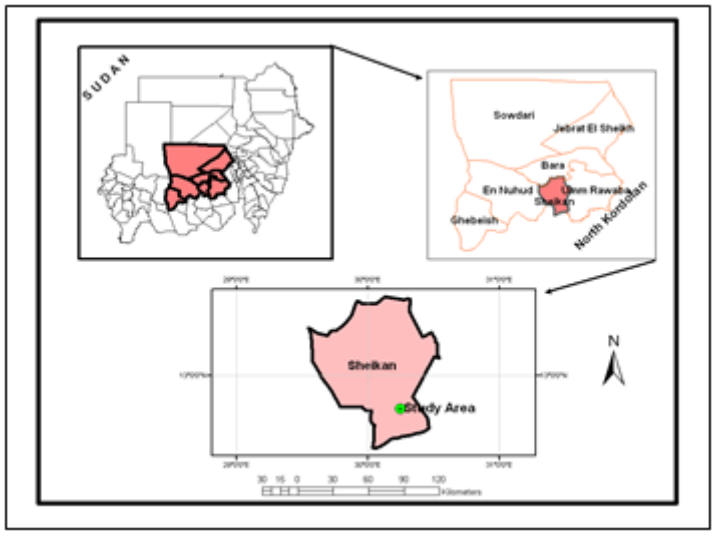


Table (1): Reserved Forests in Greater Kordofan Provinces

Provinces	Forest area (fed)	Coverage %	Exist Status Assessment
Sheikan	**1.900.000**	**9.5**	**Severe to moderate change**
Um Ruwaba	**4.600.000**	**13.4**	**Severe to moderate change**
Bara	**4.600.00**	**2.7**	**Severe to moderate change**
Al Nuhud	**13.000.000**	**0.8**	**Severe to moderate change**
Sodari	**32.800.000**	**0.6**	**Severe to moderate change**
Al Salam	**14.700.000**	**0.9**	**Severe to moderate change**
El Dilling	**4.600.000**	**3.8**	**Less change observed**
Kadogli	**2.800.000**	**1.6**	**Less change observed**
Rashad	**1.200.000**	**15.8**	**Less change observed**
total	**92.000.000**		

The table shows that severe to moderate change over forest areas occurred in six provinces attributed to different deforestation drivers. Sheikan province where the study area is located witnessed severe deforestation mainly occurred at zones surrounding towns and villages. On the other hand, El-Obeid town forest status is presented in table (2). Historically there are eleven big forests in the study area. These were subjected to severe degradation and complete eradication attributed to the urbanization development.

From the table we can obviously quantify the area of forests converted into new urban extensions. About seven forests closely surrounded the town were completely eradicated. On the other hand, Bara road forest and El Dilling road forest were affected only partially as the nearest part to the town converted into urban extensions. From all tables we can conclude that no forest land remain of no change, either completely as that in towns' forests, or at varies rate of deforestation depends on causes and rate of forests utilization.

Table (2): The Study Area Forest Status Assessment

Forest name	Locality	Area (fed)	Dominant Species	Date	Status 2011
Water resource	S/ ElObeid	2080	Mohogni	15/5/1952	Complete eradication
N/reserved forest	N/ ElObeid	2285	Kiter+hashab	15/5/1952	Complete eradication
El Dilling road	s-w/ ElObeid	2110	Kiter+hashab	15/5/1952	45% change
Bara road	N/ ElObeid	850	Hashab	15/5/1952	40% change
Ganzara	n-w/ ElObeid	960	Kiter+haraz	15/5/1952	Complete eradication
Qoz Ashgar	E/ ElObeid	1165	hashab	15/5/1952	65% change
El Ain forest	S/ ElObeid	24809	Kiter	15/4/1954	35% change
Al Ain extension	S/ ElObeid	18800	Varies	15/4/1962	30 % change
Qoz Ashgar extension	E/ ElObeid	220	hashab	15/4/1975	30% change
Megigh	W/ ElObeid	-	Subag+Arad	-	Complete eradication
Sheikan forest	N-E/ ElObeid	198905	Kiter+hashab	15/5/1952	75% change
Fellata Forest	N-w/ ElObeid	5580	Hashab+Kiter	-	Complete eradication
ElPetrol Forest	E/ElObeid	605	Hashab+heglig	15/5/1952	Complete eradication
Abu Safia forest	W/ElObeid	504	Kiter	15/5/1952	Complete eradication

Source: Compiled from Forest Office – ElObeid and Field Survey (2011)

V. METHODS

Views of deforestation have changed, we can now see the clearing of forests taking place in satellite images, accessible worldwide to anyone with a computer through Google Earth (Doug Boucher, et al 2011). A number of change detection techniques has been developed over the last 20 years. Remote sensing is a uniquely versatile tool, since the same data can be analyzed in different way for different applications (Reene, 2001). With the combination of the Geographical Information System and Remote Sensing can render reliable information on land use dynamics (Ayoola, 2012). Since 1970s remotely sensed data as a reliable source were used in conjunction with geographic information system analysis to develop a model of land use change as an effective, accurate and potential tool for monitoring forest degradation as well as deforestation.

A satellite images within 38 years (1972-2010) was generated and analyzed with aid of GIS analytical functions. An integrated quantitative and qualitative investigation of the changes and signs of changes in the urban forests of the study area have been used in this study. The evidence and documents for assessing this study were obtained from a variety of sources. The data used in analysis and interpretation were field data,

Remote Sensing (satellite images), and from other related records, such as maps and other relevant written materials.

VI. Data Collection

Proper forest monitoring and management can be achieved by using remote sensing techniques that are extensively and increasingly used for monitoring and assessing of urban deforestation. To accomplish this study, the researchers used: time series of Landsat images; MSS image land sat2 (14 Jan.), spectral 4bands for the year 1972; TM image landsat4 (20 Jan.), spectral 7bands for the year 1987 and ETM+ image landsat7 (14Jan.), spectral 9bands for the years 2000, 2005, and 2010. The ground resolution of these instrument are 79 m*79 m, 30 m*30 m and 30 m*30 m for MSS, TM and ETM+ respectively.

VII. Results and Discussion

Results are presented in a three folds manner. First, a clear image of maps detected urban deforestation is provided as main source; second in showing different periods scales of changing in forests, the researchers applied the overlap technique to show comparison between periods and estimate the real conversions of forest lands in the area; third buffering system using ERDAS imagine also used to recognized the area deforested.

VIII. Urban Extension and Overlapping Maps Results

Fig (2-a) shows that the area of the town in 1972 was 6.181 Km^2, with an increase urban area of 10.543 Km^2 up to the year 1987, while Fig (3-a) shows the two maps of 1972 and 1987 overlap that reflects the initial history of El-Obeid town urban development at expense of the forest land with strike expansion. The total urban area of the town continuously increased to reach 16.724 Km^2 in 1987 with an increasing urban area of 7.062 Km^2 up to the year 2000. The overlap had been done for the years 1972 and 2000 maps, shows that new urban extensions were increasing eastward as well as southward, and this indicated the pattern of El-Obeid town's urbanization, which attributed to social service accessibility eastwards than the westwards. This also recognized as the value of the land increasingly rose eastwards than westwards. During 2000s, the urban new extensions continued and the town's area expanded to be 23.786 km^2 in 2000 fig (2-c). Fig (3-b) presents the overlap for the years 1987 and 2000 that showed the east and westward expansions, while fig (2-d) shows the urban total expansion in 2005 with an increasing urban area of 3.197 up to the year 2010. Overlap also had been done for the years 1972 and 2010, during these 38 years the total urban converted into urban new extensions was 22.871 Km^2. The town reached its climax of expansion in all directions during 2010. The area between Khor Tagat (8 Km) east and ElObeid had been converted completely into residential land use, and to the west the town expanded far than 15 km. Also southward of the town (9 km) witnessed severe change in its forest lands that converted into new urban extensions. Historically, the northward area was much stocked hashab forest converted to industrial as well as residence extends. Fig (2-e) shows the present image of the town 2010 with a total urban area 29.052 Km^2.

Fig (3-c) shows the spatial growth of El-Obeid Town from 1972 -2010. Several factors are responsible for such growth; the town is headquarters of greater Kordofan region, junction of transport routes, and the main trade center in the western Sudan. These have caused a tremendous increase in its population that required increase demand in land, which led to forest degradation surrounding the town.

IX. Buffering System Showing Urban Deforestation

Four maps had been produced to show the real status of urban forest degradation surrounding ElObeid town. Buffering system as a method of the remote sensing techniques had been used. Fig (4-a) shows the buffering around town's area in 1972 that detected about 10.543 km^2 was area deforested between 1972 and 1987. The area converted to urban new extensions occurred in semi equal distances 2228 meters (2.228 Km) length. The image showed deforestation between 1987-2000 seems to be very clear and obvious and the distance increased to 2309 meters (2.309 km), while the image illustrated deforestation between 2000-2010 extended about 1951 meters (1.951 km), and being less than (1987-2000) because the urban plan for more housing had been stopped and the town took it's present shape of urbanization fig (2-e).

Fig (4-d) gives the longevity and history of the town's real image of urban development. From the figure, the distance of buffering extended about 3888 meters (3.888 km), and all forests surrounding the town had been gone and completely converted into urban land use patterns (residence, industrial, government institutions).

Table (3) gives brief calculations about annual change rate (km^2). From the table negative number represents deforestation. The change rate was more obviously during 1970s, 1980s and 1990s attributed to the urban planning strategy as more housing had been established, while during 2000s less negative change was observed as the urban planning strategy stopped.

Table (2): Annual Change Rate (Km^2)

	periods	Change / area
1	1972 – 1987	- 10.543
2	1987 – 2000	- 07.062
3	2000 – 2005	- 03.197
4	2005 - 2010	- 02.099

Fig (2-a b c d e): Urban Extensions in ElObeid Town – North Kordofan State

(1972-2010)

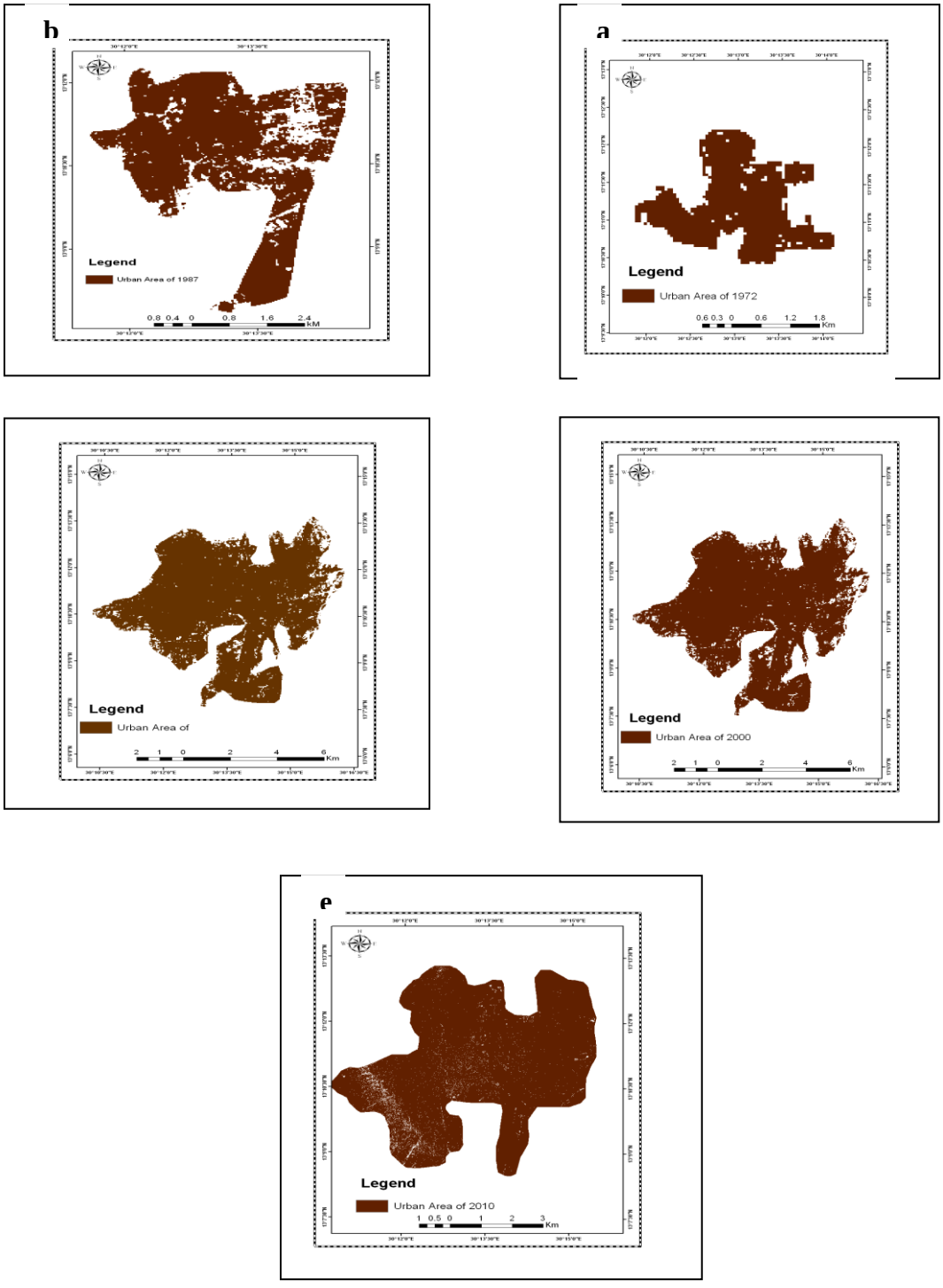

b
Legend
Urban Area of 1987
0.8 0.4 0 0.8 1.6 2.4 KM
a
Legend
Urban Area of 1972
0.6 0.3 0 0.6 1.2 1.8 Km
Legend
Urban Area of
2 1 0 2 4 6 Km
Legend
Urban Area of 2000
2 1 0 2 4 6 Km
e
Legend
Urban Area of 2010
1 0.5 0 1 2 3 Km

Fig (3-a b c d e f): Overlap maps for Different Urban Extensions Periods

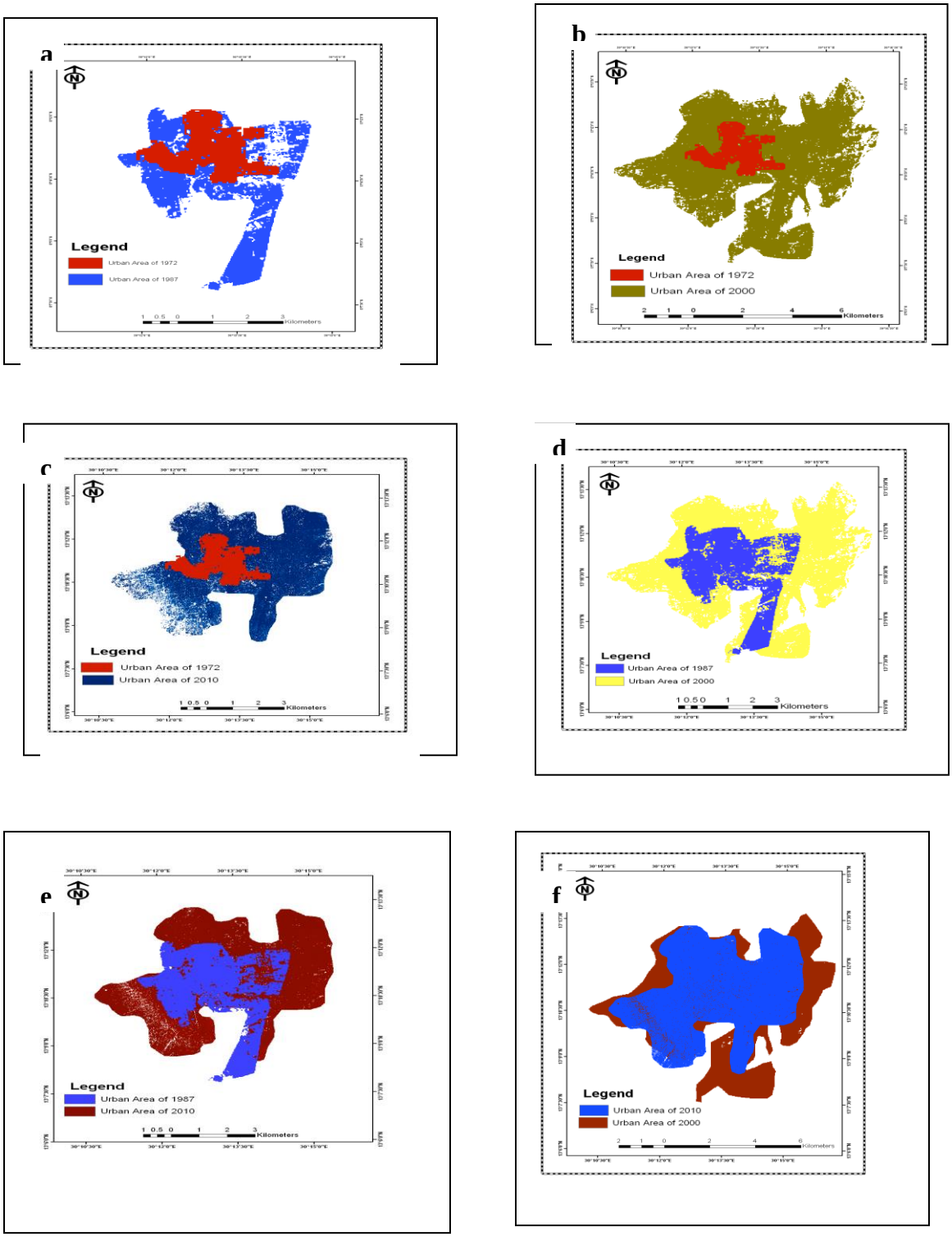
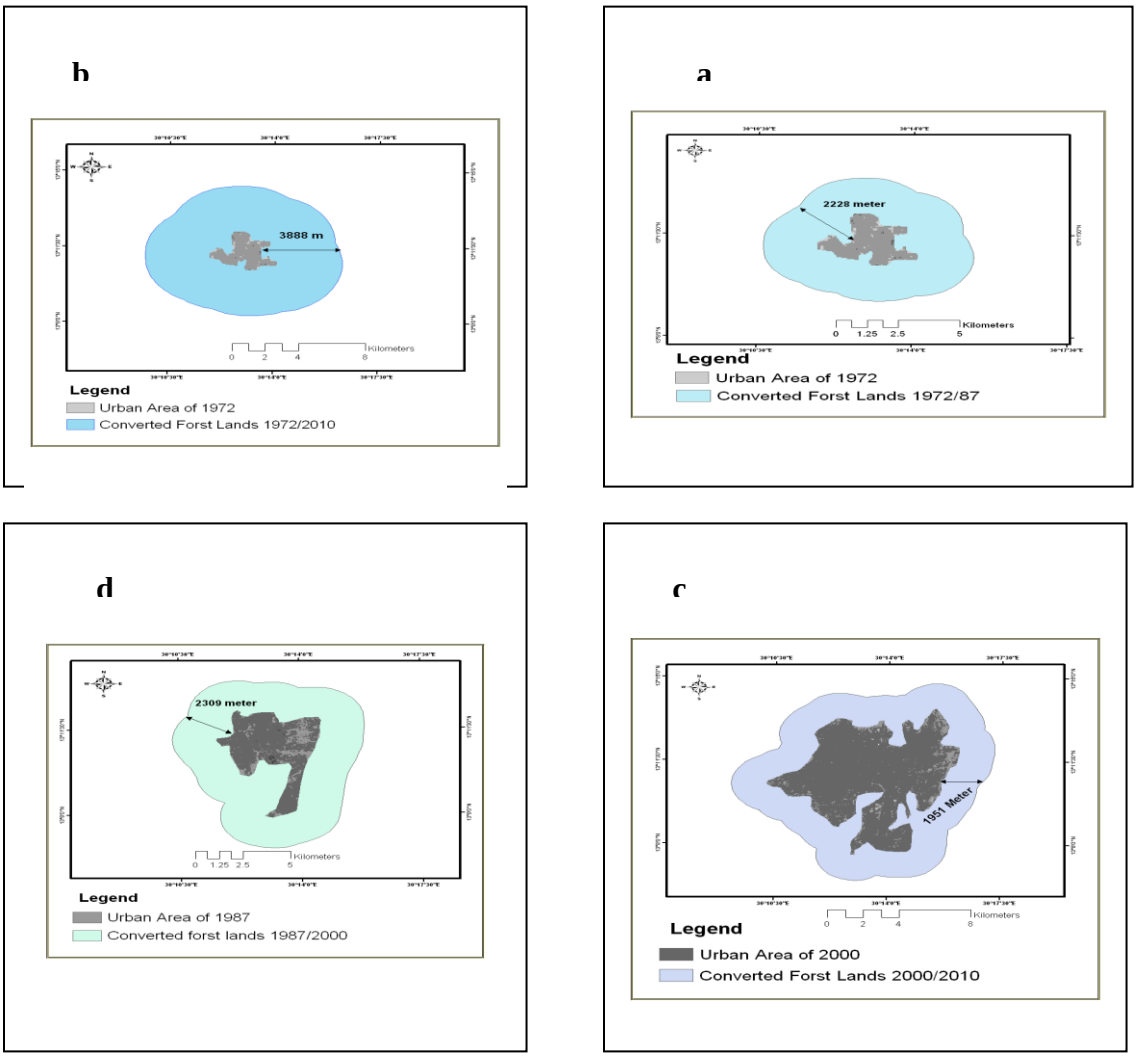


Fig (4- a b c d): Buffering Zones Show Urban Deforestation



X. Discussion

Many authors conceptualized the link between proximate causes of deforestation; social underlying driving forces, land use and land cover change (Meyer and Turner 1992, Turner et al 1993, Ojima et al 1994, and Lambin et al 1999). The approximate causes are human activities (Land uses) that directly affect the environment and this contribute proximate source of change (Helmut, 2001). So, the direct causes of urban forests change in western Sudan are population growth in towns and industrial area development. On the other hand, inspection of the remote satellite based dataset indicates that significant increase in deforested areas in the west Sudan began in 1980s.

From all findings which have been calculated and observed, it can be clearly seen that a drastic decrease in forest cover as a result of urban expansion was occurred.

The processes of transformation of land use from forest land to urban can be clearly passed through the fallowing periods:

1- During 1970s (no problem of urban deforestation noticed).
2- During 1980s (Start period towards ElObeid forest change).
3- During 1990s (urban extensions more intensified eastwards)

XI. Conclusion

To conclude this research, final remarks must be made with regard to deforestation impacts, with the fact that forests are still undergoing significant change, as the urban new extensions plan to be continued. The loss of forests was detected to result in widespread change in land use. In some towns of the North Kordofan, including ElObeid, Bara and Um Rwaba, the new urban extensions are still regularly pointed to as a primary cause of deforestation, and forest land declining is predicted for the immediate future.

In view of increasing forest, and future demand of housing, the loss of forest will be stretched further beyond the exist limit

of the town and will become even more critical in larger areas. Like other important environmental studies, urban deforestation should be evaluated periodically to determine if it still causing impacts upon forest resources, and whether there are plans to stop it.

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Management of Turcicum Leaf Blight of Maize Caused by Exserohilum Turcicum in Maize

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Abstract- Seven fungicides were evaluated in vitro against *Exserohilum turcicum* causing leaf blight of maize The treatment mancozeb 0.25% and combination treatments of carbendazim and mancozeb i.e. saff 0.25% recorded the lowest percent disease index (PDI) reducing the disease by 73.0% and 72.1% respectively. The treatment which had a combination metriram + pyraclostrobin i.e. cabriotop 0.3% was found to be the next best treatment in reducing the disease by 61.5% with PDI of 14.6 following propiconazole with PDI of 18.6.

Index Terms- Maize**,** turcicum leaf blight, *Exserohilum turcicum,* Mancozeb, Management

I. INTRODUCTION

Maize is one of the important cereal crops and it is 3rd major crop in India after rice and wheat. The crop is affected by number of fungal diseases of which leaf blight or northern corn leaf blight or turcicum leaf blight is one of the important diseases affecting photosynthesis with severe reduction in grain yield to an extent of 28 to 91%. Disease symptoms first appear on the leaves at any stage of plant growth, but usually at or after anthesis. The maneb formulations were most effective in minimising the *E. turcicum* severity under field conditions followed by ziram, vacide and Z-65. These fungicides increased the grain yield and seed quality (Cox, 1956). Sohi *et al*. (1965) tested six fungicides for the control of leaf blight on maize hybrid Ganga-5 and found that zineb was found more effective fungicide in controlling the disease with an increase in grain yield of 15.18 per cent followed by captan (10.19 %) over check plots.

Foliar application of fungicides like mancozeb, propiconazole and zineb have been found to be effective against southern leaf blight of maize caused by *Helminthosporium maydis*. Seed dressing with maneb, captan, carboxin + thiram and benomyl + thiram improved seed germination (Miller, 1970).

Kumar *et al*. (1977) evaluated eight fungicides and found that mancozeb, unizeb and dithane-Z-78 significantly reduced the maize leaf blight severity by 55, 47.4 and 44.43 per cent, respectively, and increased grain yield by 8.54, 10.12 and 9.90 per cent.

Field trials conducted by Issa (1983) in Brazil revealed that mancozeb @ 2 kg ha^{-1} as foliar spray was found to be effective in reducing turcicum leaf blight severity in maize. This treatment gave the maximum number of healthy leaves and improved yield over untreated plots. Patil *et al*. (1984) reported that vitavax was found to be the best seed dresser against Drechsler spp. of barley. Three sprays of propiconazole at weekly interval was effective in reducing the rate of turcicum leaf blight development in maize (Bowen and Pederson, 1988).

Kachapur and Hegde (1988) tested seven fungicides and observed that mancozeb and captafol were the most effective fungicides for controlling turcicum leaf blight of maize. Sharma and Mishra (1988) found that *E. turcicum* infection of maize was effectively controlled by six sprays of mancozeb (0.2 %) at 10 days interval starting from three days after inoculation at 30 days after sowing. The infection rate and severity rating were reduced and the grain yield was increased with this treatment.

Begum *et al*. (1993) evaluated five fungicides for control of artificial infections of *E. turcicum* on susceptible maize cultivars. All the chemicals reduced disease intensity and increased the grain yield with mancozeb being distinctly the most effective, followed by carbendazim, zineb, thiophanate methyl and lastly copper oxychloride. Pandurangegowda *et al*. (1993) tested the field efficacy of eight fungicides and found that foliar spray of mancozeb (0.25 %) and maneb (0.25 %) thrice at an interval of 10 days were significantly effective in minimising the disease intensity of turcicum leaf blight. Praveen Kumar *et al*. (2010) reported that the combinations of the mancozeb (0.25 %) + T. viride (0.4 %) + mono potassium phosphate (1 %) + potassium silicate (1 %) were found effective in reducing turcicum leaf blight. In this paper studies were conducted on management of turcicum leaf blight of maize caused by *Exserohilum turcicum* using seven fungicides.

II. MATERIALS AND METHOD

In order to identify a suitable fungicide for the control of tucicum leaf blight a field experiment was carried out at Agriculture Reaserch Institute, Rajendranagar, Hyderabad during *Rabi* season 2011-12. The maize cultivar pioneer 30V 92 was sown in a randomized block design with a spacing of 70 × 25 cm

with three replications. The details of the treatments are given in Table 1.

III. Preparation of Inoculum

Conidia of the fungus was collected from actively growing 12 days old culture. The spores were harvested by adding sterilized distilled water into petriplates and scraped gently with camel hair brush. The spore suspension was transferred in to a beaker and the concentration of spore suspension was adjusted to 4×10^5 spores ml^{-1}.

IV. Pathogen Inoculation

Artificial inoculation of the pathogen *E. turcicum* was done on 30 days old maize plants and further field was inoculated thrice at 2 day interval. To create high disease pressure the spore suspension was sprayed with an automizer in the late evening. To maintain high relative humidity the plots were irrigated frequently.

V. Imposition of Treatments

All the treatments were imposed with the appearance of initial symptoms on the 40 day old plants. The second spray of treatment was done 10 days later *i.e.,* at 50 days stage of the crop. The data on per cent disease index was calculated 10 days after the second spray using the diseases scale given by Payak and Sharma (1983).

VI. Results and discussion

Foliar diseases which rapidly spread and cause epidemics can be managed effectively by developing suitable disease management stratagies. In order to develop a suitable disease management protocol an attempt was made to evaluate different fungicides for the control of turcicum leaf blight. The treatment details, disease severity data are presented in the Table 2.

A perusal of the results indicates that all the treatments are superior in reducing the PDI of turcicum leaf blight of maize over control. The treatment mancozeb 0.25% and combination treatments of carbendazim and mancozeb i.e. saff 0.25% recorded the lowest percent disease index reducing the disease by 73.0% and 72.1% respectively. The treatment which had a combination metriram + pyraclostrobin i.e. cabriotop 0.3% was found to be the next best treatment in reducing the disease by 61.5% with PDI of 14.6 following propiconazole with PDI of 18.6.

The lowest reduction in disease was found by carbendazim 0.1% which could reduce the disease by 28.9% only with PDI of 27.3 over control followed by tebuconazole 0.1% alone with PDI of 21.0.

The results showed that (mancozeb 0.25%) and (carbendazim + mancozeb) was significantly superior over other treatments and can be recommended for the control of disease under field conditions.

From similar studies Harlapur (2005) observed carboxin powder seed treatment (2 g kg^{-1}) followed by two sprays of mancozeb (0.25 %) resulting in significantly minimum PDI and maximum grain yield. The effectiveness of fungicides mancozeb, propiconazole and carboxin against *Exserohilum turcicum* has been reported by earlier workers Singh and Gupta (2000) and Patil *et al.,* (2000) in maize. Pandurangegowda *et al.,* (1993) reported that the foliar spray with mancozeb 0.25% three times at 10 day interval was found to be more effective and significantly reduced TLB severity and increased grain yield. Kumar *et al*., (1977) and Kachapur (1988) have reported that maneb followed by mancozeb effective in controlling TLB of maize.

VII. Conclusion

The management studies showed that (mancozeb 0.25%) and (carbendazim + mancozeb 0.25%) was significantly superior over other treatments and can be recommended for the control of disease under field conditions.

Acknowledgment

The authors gratefully acknowledge the department of plant pathology, Department of Biotechnology and Acharya N.G. Ranga Agriculture University for the kind support for undertaking this study.

Table 1 : List of fungicides used in the present investigation

Treatments	Fungicides	Active ingredients	Concentrations (%)
T_1	Propiconazole	25% EC	0.1
T_2	Hexaconazole	5% EC	0.2
T_3	Tebuconazole	25% EC	0.1
T_4	Mancozeb	75% WP	0.25
T_5	Metiram(55%)+ Pyraclostrobin (5%)	60% WG	0.3

T_6	Carbendazim	50% WP	0.1
T_7	Carbendazim (12%) + Mancozeb (63%)	75% WP	0.25
T_8	Control	-	-

Table 2. Management of Turcicum leaf blight under field condition during *Rabi*, 2011-12

Treatments	**Per cent Disease index (PDI)***	**Per cent disease reduction over control**
Propiconazole (T_1)	18.6 (25.5)	51.0
Hexaconazole (T_2)	20.0 (26.5)	47.3
Tebuconazole (T_3)	21.0 (27.2)	44.7
Mancozeb (T_4)	10.0 (18.3)	73.0
Metiram+ Pyraclostrobin (T_5)	14.6 (22.4)	61.5
Carbendazim (T_6)	27.3 (31.5)	28.9
Carbendazim+ Mancozeb (T_7)	10.6 (19.0)	72.1
Control (T_8)	38.0(38.0)	0
CD	2.50	
SE(d)	1.15	
SE(m)	0.81	

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Effect of Plasma Treatment on the Moisture Management Properties of Regenerated Bamboo Fabric

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Abstract- Moisture management is the ability of a fabric to transport moisture away from the skin to the garment's outer surface in multi-dimensions and it is one of key performance criteria in today's textiles for garments for various end uses. This property has a significant effect on the human perception of moisture sensations as well as the growth of microorganisms. Plasma treatment on textiles is a novel dry processing technique used to enhance comfort, functional and aesthetic properties of regenerated cellulosic fabrics and at the same time reduce the pollution load on the environment. In this study air, argon and oxygen gas plasma treated pure regenerated bamboo fabric in single jersey construction were tested for their moisture management capacity using "SDL-ATLAS moisture management tester". Dynamic liquid transport properties of textiles such as wetting time, maximum absorption rate, maximum wetted radius and spreading speed were measured. The result revealed that the type of plasma treatment and the duration of air, argon and oxygen gas plasma treatment have significant effect on all the parameters of the moisture management capacity. In case of all the plasma treated samples the wetting time and the absorption rate (%/sec) increased, both for the top and bottom surface with the highest duration of 8.2 seconds and highest absorption rate of 64.99 (%/sec) respectively, in case of 10 minutes argon plasma treated sample. The spreading speed (mm/sec) decreased in case of all the plasma treated samples. Slow spreading of 2.1(mm/sec) was recorded in case of 5 minutes air plasma treated sample as compared to 3.21 (mm/sec) in case of the untreated sample. In case of argon and oxygen gas plasma the value of accumulative one way transport index and overall moisture management capacity increased, with the highest value of 265 and 2.04 recorded in case of 10 minutes oxygen gas plasma treated sample. The relationship between the duration of treatment and the absorption rate of the bottom surface in the case of bamboo fabrics was linearly related. The results revealed that the effect of air, argon and oxygen gas plasma treatment on the bamboo knitted sample are significant in altering the parameters of the moisture management properties. Ten minutes oxygen gas plasma has led to significant improvement in the overall moisture management. Special needs for a health care and hygiene products, sportswear and infant garments can be met by plasma treated moisture management fabrics.

Index Terms- Knitted structure; Low pressure glow discharge plasma treatment; Moisture Management Property.

I. INTRODUCTION

Moisture management property is a buzz word today as it refers to transportation of moisture to the fabric through the skin. In some of the sportswear and uniforms, moisture management plays an important role as the moisture is moved away from the skin. In view of its usefulness, many have published papers in particular by Hu et al (1), Wardiningsih and Mazloumpour (2, 3). The effect of cover factor on moisture management was examined by the latter, while the former dealt with the development of a tester. In addition Olga Troynikov and Wiah Wardiningsih have looked into the moisture management property of wool/polyester and wool/bamboo blends suitable as the base layer for sportswear (4). In none of the above studies the effect of plasma treatment on the moisture management of bamboo knitted fabrics has been studied and this paper reports the findings.

Moisture transmission through textiles has a great influence on the thermo-physiological comfort of the human body which is maintained by perspiring both in vapour and liquid form. Most recently, major upsurge on research related to absorption properties of fabrics used for apparel, health care, hygiene products and sportswear has taken place, since this plays an important role in moisture management and its performance.

The base layer of garments is commonly made from knitted fabric due to their high stretch and recovery, ability to provide greater freedom of movement, drapability and tailored fit. Knitted fabrics also have relatively uneven surfaces; this makes them feel more comfortable as compared to the smooth surface of the woven fabrics with similar fibre compositions. This effect results from the fact that fabric that has uneven surfaces has less direct contact with the skin (4, 5). Plasma treatment is a dry textile processing technique and is a surface-sensitive method that allows selective modification for imparting product specific functionality in textiles and apparel. The plasma reaction involves the interaction of atoms, free radicals and metastable particles, electrons and ions. The effect and efficiency of the plasma treatment depends on the pressure, power, duration of treatment and the choice of working gas. Plasma

treatment improves wettability, hydrophobic finishing, adhesion functionality and product quality in cellulosic fabric. The use of oxygen plasma can modify the wettability of cotton and other cellulosic materials. Argon gas is used to increase surface roughness and modify the texture. It also alters the tensile properties and functional behavior of the fabric. It improves air permeability and drape properties (6, 7). Optimization of surface properties of textile materials without altering the inherent properties of the textile materials can be achieved by air, argon and oxygen gas plasma treatments. Plasma treatment can be a viable substitute to conventional processes and very often it can provide the advantageous effect that cannot be obtained by wet processing of textile material. Considering these facts, this research addresses the moisture management properties of pure bamboo knitted fabrics.

In the present study, the simultaneous liquid moisture transport performances on the top and bottom surfaces of knitted fabrics made from pure bamboo were tested using "SDL-ATLAS Moisture Management Tester" (8). The effect of 5, 10 and 20 minutes duration of air, argon and oxygen gas plasma treatments was assessed on the pure bamboo knitted fabrics.

II. MATERIALS AND METHODS

a. Materials

In the present study, hundred percent bleached Bamboo knitted fabric was produced using a yarn of linear density of 19.68 tex and having 8.89 twists per cm. The single knitted fabric was produced on a circular knitting machine. The number of courses and wales per cm was 21 and 16 respectively. The mass per unit area (g/ m^2) was 160 with a loop length of 2.5mm.The thickness of fabric was 0.56 mm. The other dimensional properties of the sample used for this research are given in TABLE I.

Table 1: Properties of Bamboo Knitted fabric

Stitch Density (Stitches/ cm^2)	336.00
Loop length (mm)	2.50
Mass per unit area (g/ $m^{2)}$	160.00
Tightness factor(tex $^{0.5}$ cm^{-1})	17.89
Loop shape factor	1.37
Thickness(mm)	0.56
Bulk Density (g/ m^3)	3.14

b. Method

(i) Plasma treatment

The regenerated cellulosic pure bamboo knitted fabric was treated using low pressure glow discharge plasma. The glow discharge was generated using an apparatus made by Bangalore Plasmatek, Bangalore, India. The DC glow discharge was operated at 0.5 mbar. Different gases like air, argon and oxygen were admitted into the plasma chamber using needle valve to control the pressure. Cathode was located in the centre of the chamber and the chamber walls acted as anode. Samples were placed hanging at a distance of about 18 cm from the cathode. It was operated at radio frequency of 150 to 192 MHz. The process parameters that were varied during the air, argon and oxygen gas plasma was the duration of treatment. The fabrics were treated for 5, 10 and 20 minutes duration.

(ii) Testing of liquid moisture management properties.

The AATCC 195-2009 standard test method was used for the measurement, evaluation and classification of liquid moisture management properties of the untreated and air, argon and oxygen gas plasma treated pure bamboo samples using "SDL-ATLAS Moisture Management Tester" .Before testing the untreated and all the plasma treated samples were conditioned at 25 ± 2^{0}C and 65± 2% RH according to ASTM D1776 standard practice for conditioning and testing textiles. The test solution was prepared by dissolving 9 g sodium chloride (USP Grade) in 1 litre of distilled water and the electrical conductivity was adjusted to 16+0.2 milli Siemens(ms) at 25 ^{o}C by adding sodium chloride or distilled water as necessary. The" Pump- on Time was set at 20 s to assure the predetermined amount of 0.22 cc of test solution is dispensed. The "Measuring time" for each of the untreated and all the air, argon and oxygen gas plasma treated samples was set for 120 s. The objective measurement of liquid moisture management properties was evaluated by placing the 8x8 cm cut fabric specimen between the two horizontal (upper and lower) electrical sensors of the "SDL-ATLAS Moisture Management Tester". The sample was placed on the lower sensor with the specimen's top surface up. The upper sensor was released until it freely rested on the test specimen. The test solution moved freely in three directions: radial spreading on the top surface, movement through the specimen from top surface to bottom surface, and radial spreading on the bottom surface of the specimen. The SDL-ATLAS Moisture Management Tester recorded the following parameters of the liquid moisture management properties .The wetting time (WT_T) (top surface) and (WT_B) (bottom surface) in seconds when the top and bottom surfaces of the specimen started to wet. The absorption rate (AR_T) (top surface) and (AR_B) (bottom surface) was recorded to measure the average speed of liquid moisture absorption for the top and bottom surfaces of the specimen during the initial change of water content during testing. The maximum wetted radius (MWR_T) and (MWR_B) was recorded to measure the greatest ring radius of the solution on the top

and bottom surfaces. The accumulated rate of surface wetting from the center of the specimen where the test solution was dropped to the maximum wetted radius was measured both for top and bottom surface as spreading speed (mm/sec) (SS_T and SS_B).The accumulative one way transport capability (R) was recorded to establish the difference between the area of the liquid moisture content curves of the top and bottom surfaces. An index of the overall capability of the untreated and plasma treated fabrics to transport liquid moisture was calculated by the inbuilt software by combining the three measured attributes of performance i.e. the liquid moisture absorption rate on the bottom surface (AR_B), the one way liquid transport capability (R), and the maximum liquid moisture spreading speed of the bottom surface (SS_B). For each sample five trials were recorded and the average values plotted in form of histograms.

III. RESULTS AND DISCUSSION

The results obtained from this test method are based on the water resistance, water repellency and water absorption characteristics of the fabric structure, including the fabrics geometric and internal structure and the wicking characteristics of its fibres and yarns. The moisture management properties of the untreated and the plasma treated samples are depicted by graphical representations. The top surface parameter means, the side of the fabric that would come in contact with the skin when the garment is worn or when a product has been used. The bottom surface is the side of the fabric that would be the outer exposed surface of a garment when worn or product when it is used.

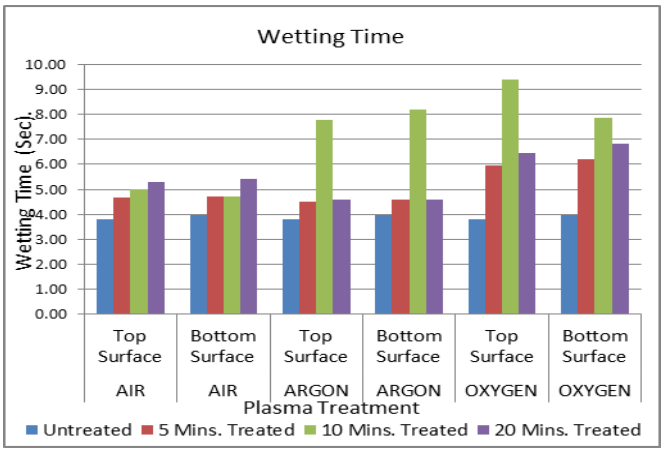

Figure 1: Wetting time (sec) values for the Bamboo fabrics-Top and Bottom Surface

Figure 1 reveals the wetting time per second of pure bamboo fabric on the top surface and bottom surfaces. The samples treated with air plasma treatment showed a slower wetting as compared to the untreated sample. In case of the untreated Bamboo sample the wetting time recorded was 3.79 seconds whereas the maximum wetting time was 5.31 seconds in case of Bamboo sample treated for 20 minutes duration. There is gradual increase in wetting time as the duration increases from 5 to 20 minutes in case of air plasma treated samples. Slower wetting was evident as compared to untreated Bamboo sample, in samples treated for 10 minutes duration both in case of argon and oxygen gas plasma treated samples. The longest time of 9.41 seconds was recorded in case of 10 minutes oxygen gas plasma treated sample. In case of argon gas plasma treatment the samples treated for both 5 and 20 minutes duration was 4.5 seconds. The longest wetting time (8.2 seconds) was recorded in case of 10 minutes argon gas treatment.

The wetting time of the untreated bamboo sample both on the top and bottom surface was 3.9 seconds A higher wetting time of 5.8 seconds in case of the bottom surface was recorded in case of air plasma treated sample treated for 20 minutes. The impact of duration of treatment i.e. 5 and 10 minutes on the samples in case of air plasma and argon gas plasma was not significant, while, the 10 minutes treatment time both in the case of argon and oxygen gas plasma showed a significant delay in the wetting time. The faster wetting is due to the high attraction between the liquid and the fabric surface, known as the fibre surface energy. Untreated Bamboo can be classified as cellulose with high surface energy. The plasma treatment must be lowering the fibre surface energy.

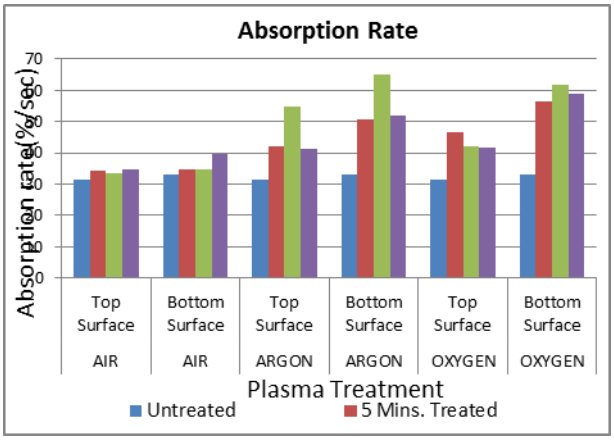

Figure 2: Absorption rate (sec) of Bamboo Fabric-Top and Bottom Surface

Figure 2 indicates the absorption rate of bamboo fabric on the top and bottom surface. The absorption rate is the average moisture ability (%/sec) of the top and bottom surfaces of the fabrics. The results indicate that although there is an increase in the rate of absorption as the duration of treatment increases from 5, 10, 20 minutes, the difference is not very significant. There is a significant change in the absorption rate in case of argon and oxygen gas plasma treated samples. Highest absorption rate of 54.65 (%/ sec) was recorded in case of 10 minutes argon gas plasma treated sample, while the sample treated for 5 minutes using oxygen gas plasma recorded 46.73 (%/ sec) .This is in agreement with the finding of Wong et al (9) who have studied the effect of oxygen plasma treatment on cotton .Formation of voids and cracks on fibre surface are the reasons for this phenomenon. Comparing the absorption rate of top and bottom surfaces of the plasma treated knitted fabric, there is higher absorption by bottom surface as compared to the top surface in all the treatments and time variations. The highest of 64.99 (% sec) was in case of 10 minutes argon plasma treated sample as compared to 33.20 (% sec) in case of the untreated sample. Similarly the highest value of 61.62(%/sec) is recorded in case of 10 minutes oxygen plasma treated sample and 59.09 in case of 20 minutes plasma treatment. The absorption rate of bottom surface indicates that the argon and oxygen plasma treatment and the duration of treatment have had significant effect. Maximum absorption rate values generally decrease due to more compact structure of yarns. The argon and oxygen plasma treatments may be altering the cover factor and making the fabric more open there by indicating an increase in absorption rate. These plasma treatments are altering only the surfaces and the impact is evident both on the top and bottom surfaces.

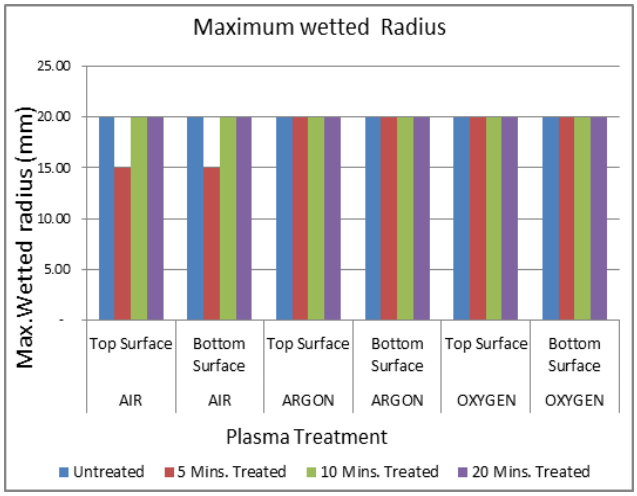

Figure 3: Maximum wetted radius (mm) values of the fabric-Top and bottom surface.

Figure 3 indicates that the maximum wetted radius did not reach the limit of 20 mm even after 120 seconds, possibly the water flow was restricted because possibly the water flow was restricted because of the atmospheric plasma treatment. This was observed both in case of the top and bottom surfaces of the 5 minutes plasma treated samples. This may be due to the surface distortion that could be hindering the spreading. Nevertheless, the spreading symmetry in form of a well-defined circle indicates that the knitted structure and the Plasma treatments is supporting uniform spreading of liquid. The main contributing factors to fabric being slow drying or quick drying are their water spreading area and the spreading speed on the outer surface. A slow drying fabric has a small spreading area and fast spreading speed on the outer fabric surface. It is clear that with the same amount of liquid being dropped onto the fabric's inner

surface during testing time, if the liquid is spreading in a large area on the inner fabric surface with high spreading speed and then quickly transported to the outer surface, the liquid content on the inner fabric surface will be small and the liquid moisture will move more easily from the outer fabric surface into the environment thus, the fabric will dry faster.

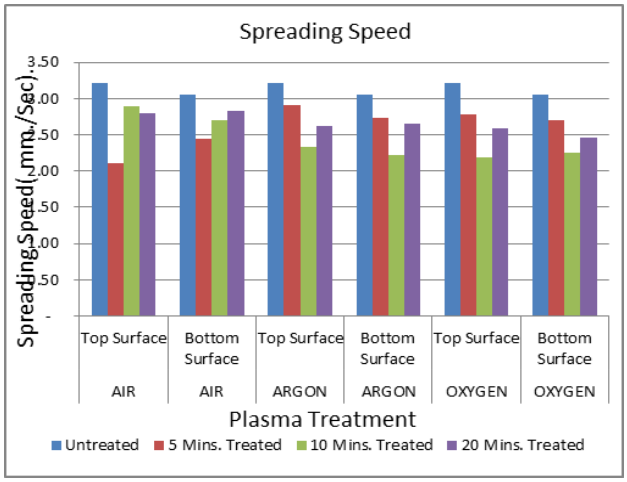

Figure 4**:** Spreading speed (mm/min) values of fabrics-Top and Bottom surface.

Spreading speed (mm/sec.) test results are given in figure 4. It is associated with the moisture transport, which occurs parallel to the fabric surface. As the spreading speed values are compared it can be seen that, all the three types of plasma treatment have reduced the spreading speed. The values of the spreading speed (mm/sec.) for the top and bottom surface for argon gas plasma treated sample were 2.91(mm/sec.) and 2.72 (mm/sec.) respectively. In case of oxygen gas plasma treated sample the spreading speed (mm/sec.) for the top and bottom surface was 2.78 (mm/sec.) and 2.69 (mm/sec.) respectively. These spreading speed values were recorded for 5 minutes duration in case of both argon and oxygen gas plasma treated samples.

Figures 1 and 4 show the wetting time and spreading speed of the untreated and plasma treated samples. Analyzing the combined effect of wetting time and spreading speed it can be stated that in the case of all the plasma treated samples the wetting time has increased and consequently spreading speed for the wetting of the fabric extended in case of the both the top and bottom surfaces . The advantage of this occurrence for the inner surface will be that the fabric will not feel clammy during excessive sweating as in case of athletic wear and that for the outer layer, it will act like a quick drying fabric since the perspiration would not have penetrated into the interstices of the fabric structure.

Figure 3 and 4 indicate the spreading area and the spreading speed. The main contributing factors to fabric being slow drying or quick drying are their water spreading area and the spreading speed on the outer surface. A slow drying fabric has a small spreading area and slow spreading speed on the outer fabric surface as in case of the 5 minutes air plasma treated samples. The spreading area in case of untreated and 5 minutes air plasma treated sample were 20 mm and 15 mm, while the spreading speed was 3.04 mm/sec and 2.44 mm/sec for the top and bottom surface respectively.

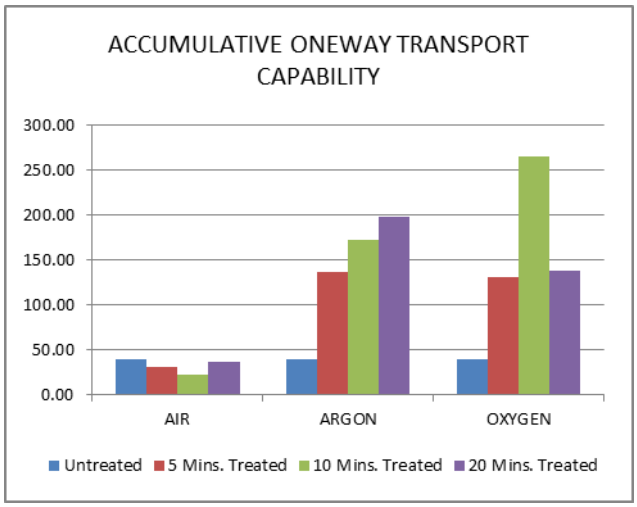

Figure 5: Accumulative one way transport capability

The accumulative one way transport capability index (AOWTI) that represents the difference between the area of the liquid moisture content curves of the top and bottom surfaces of the sample with respect to time is represented in figure 5. The results in case of all the argon and oxygen plasma treated samples indicate an improvement, while in case of the 5,10 and the 20 minutes air plasma treated sample recorded a decline in the accumulative one away transport capability index, as compared to the untreated pure bamboo sample(38.7). Within the 5, 10 and 20 minutes argon plasma treated sample the highest accumulative one way transport capability index (199) was in case of sample treated for 20 minutes duration, while the highest accumulative one way transport capability index (265), among all the plasma treated samples was recorded in case of 10 minutes oxygen gas plasma treated sample.

This is probably due to the difference in accumulative moisture content between the two surfaces of the fabric during the 120 second of testing time. This indicated that before the completion of the 120 second, at certain interval the moisture content of the top fabric surface is more that of the bottom surface and at other time interval the opposite is true. The significant difference AOWTI of the untreated and 5, 10 and minutes argon and oxygen gas plasma treated samples indicated that the top and the bottom surfaces in these cases have undergone uneven pattern of physical modification.

The AOWTI of the untreated pure bamboo was recorded as 38.7 while the 5, 10 and 20 minutes argon and oxygen gas plasma treated samples indicate significantly higher values (>120).The heterogeneity in the fabric surface characteristics due to the argon gas plasma treatments has facilitated the penetration of liquid intermittently. In case of argon gas plasma treated sample the duration of treatment has influenced the AOWTI value since the Pearson correlation of AOWTI and duration of treatment are linearly related (0.90). This indicates that the AOWTI is not influenced by the duration of treatment in case of the air and oxygen gas plasma treated samples.

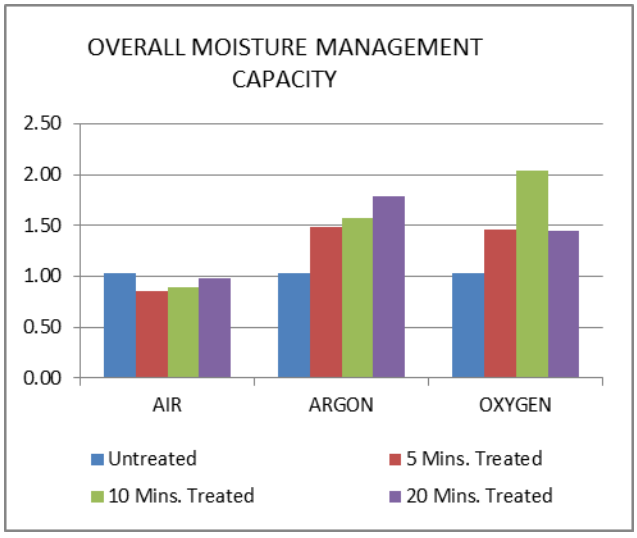

Figure 6: Overall moisture management capacity

The overall moisture management capacity (OMMC) of untreated and plasma treated samples is given in figure 6. The OMMC of the air plasma treated samples decreased in case of air plasma treated samples, while there was a remarkable difference between the untreated pure bamboo sample (1.03) and in case of argon as well as oxygen gas plasma treated samples. In case of argon gas plasma treated samples the OMMC increased as the duration increased. Among the argon gas plasma treated samples the highest OMMC (1.78) was in the case of 20 minutes duration. The highest OMMC (2.04) among all the plasma treated samples was recorded in the case of 10 minutes oxygen gas plasma treated sample. The higher OMMC indicated that when liquid sweat increases and accumulates in the fabric the OMMC value becomes more important and plays a very important role in making the wearer feel dry. This feature is essential in case of athletic wear since the sweat generation is gradual but excessive due to physical movement and exertion.

Pearson correlation between the duration of treatment and the moisture management properties are given in TABLE II. It can be seen that the duration of treatment and the absorption rate of the bottom surface are linearly related since the Pearson correlation are close to +1.The statistical analysis result revealed that the parameters of moisture management properties are significantly affected by the plasma generated by the feeder gas namely air, argon and oxygen gas plasma treatments and the duration of the treatments i.e. 5, 10 and 20 minutes. As the duration of treatment increases in case of air, argon and oxygen gas plasma the wetting time of the top surface and bottom surface increased. The maximum wetted radius of the top and bottom surface of 5 minutes atmospheric plasma decreased as compared to the untreated sample. The accumulative one way transport index and overall moisture management capacity decreased in case of air plasma treated samples as compared to the untreated pure bamboo sample. In case of argon and

oxygen gas plasma the value of one way transport index and overall moisture management capacity increased , with the highest value recorded in case of 10 minutes oxygen gas plasma treated sample.

The type of plasma used and the duration of each of the treatments have played a vital role in the transmission of water through the knitted fabric. The characteristics that define the properties that have a bearing on surface characteristics viz. wetting time spreading speed etc. has altered by the various plasma treatments whereas the bulk properties involving both the top and bottom surfaces of the fabric namely accumulative one way transport index and overall moisture management capacity have improved by the argon and oxygen gas plasma treatments. The statistical analysis results indicate that there is a good correlation between the duration of treatment and the moisture management parameters such as wetting time of bottom surface of air plasma and oxygen gas plasma treated sample, absorption rate of bottom surface of oxygen gas plasma treated sample plasma treated sample. A very good correlation exists in the case of wetting time of top surface and absorption rate of bottom surface of air plasma treated bamboo fabric.

Based on the results obtained, it was found that 10 minutes oxygen gas plasma treatment is enough for the effective modification of pure bamboo fabric for improving the moisture management properties. The changes in morphology and formation of polar groups on the substrates surface, caused by plasma treatment are responsible for the improved property. The changes and improvement differs based on the type of plasma treatment given and the duration of treatment given to the hundred percent pure bamboo knitted fabric. Of all the types of plasma treatment applied to bamboo fabric, oxygen plasma treatment offered the best result, due to the formation of void and reduction in fibre diameter as compared with other types of plasma treatments.

Table 2: Cumulative coefficient of the time of treatment

TEST PARAMETERS:	AIR		ARGON		OXYGEN	
Dependent-independent variable	Pearson correlation coefficient (r)	p-value	Pearson correlation coefficient (r)	p-value	Pearson correlation coefficient (r)	p-value
Duration of Treatment-wetting time_ top surface	0.843	0.009	0.243	0.562	0.48	0.228
Duration of Treatment- wetting time_ Bottom Surface	0.805	0.016	0.205	0.626	0.678	0.065
Duration of Treatment- Absorption rate_ top Surface	0.726	0.042	0.411	0.312	0.43	0.288
Duration of Treatment-Absorption rate_ Bottom Surface	0.950	0.000	0.565	0.144	0.713	0.047
Duration of Treatment- Spreading speed_ top Surface	0.131	0.758	0.581	0.131	0.522	0.185
Duration of Treatment-Spreading speed_ Bottom Surface	0.069	0.871	0.082	0.847	0.678	0.065
Duration of Treatment-Accumulative one way transport capability	0.129	0.760	0.891	0.003	0.439	0.277
Duration of Treatment-Overall moisture management capacity	0.031	0.942	0.911	0.002	0.403	0.322

IV. CONCLUSION

The moisture management tester has provided a comprehensive summary of all the water absorption and spreading ability simultaneously for the surface towards the skin and the outer surface of the garment. In case of the argon gas plasma treated fabrics the AOWTI increases linearly as the duration of treatment increases from five to twenty minutes. The plasma treated bamboo fabrics can be effectively used for sport wear and infant layettes to prevent these garments getting clammy and exhibit quick drying properties. Oxygen plasma treatment offered the best result, due to the formation of void and reduction in fibre diameter as compared with other types of plasma treatments. It is found that the argon and oxygen gas plasma modification alters the surface morphology, give rise to moisture management fabrics. Air, argon and oxygen gas plasma treatment on pure regenerated bamboo knitted fabrics can provide a solution to producing product specific fabrics. Further, the plasma process can be easily amalgamated with the present day industrial set up.

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An evaluative Study of ICDS in Kashmir

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The scheme of Integrated Child Development Service is the foremost symbol of India's commitment to her children. India's response to the challenge of providing pre – school education on one hand and breaking the vicious cycle of malnutrition, morbidity, reduced learning capacity and morbidity, on the other. Despite of the fact that huge allocations have been made by the Central Government for ICDS in Jammu and Kashmir, the development in basic infrastructure and improvements in amenities/facilities has been inadequate, especially in rural areas of the state. Hence, it becomes imperative at this stage to know as to what extent these schemes have been in a position to achieve the stated objectives and what are the challenges for efficient implementation of the programme? This study is a modest attempt in this direction to undertake a firsthand study of efficacy of the programme in rural areas of Kashmir valley. 100 ICDS centers in remote rural settings from four districts of the valley viz. Budgam, Anantnag, Ganderbal and Baramulla have been studied on case to case basis to draw the relevant inferences. These remote rural settings were chosen purposively to gain an understanding of the problems faced by the children who live on margins.

Need and Relevance of the study: Government of India is implementing a number of Centrally Sponsored Schemes (CSS) in the areas of rural development, urban development, health and family welfare, education, agriculture, women and child development, sanitation, housing, safe drinking water, irrigation, transport, border area development, social welfare throughout the Country, including Jammu and Kashmir. The main objectives of all these schemes are to generate employment, reduce poverty & economic inequality and improve the quality of life. Besides, some of these schemes aim at creation of basic infrastructure and assets essential for economic development in rural areas. Despite of the fact that huge allocations have been made by the Central Government through Centrally Sponsored Programme of ICDS in Jammu and Kashmir, the development in basic infrastructure and improvements in amenities/facilities has been inadequate, especially in rural areas of the state. Hence, it becomes imperative at this stage to know as to what extent this scheme is in position to achieve the stated objectives. Such an exercise will help to identify the problems/short comings in implementation of this service. It will also help the policy makers and implementing agencies to introduce the necessary interventions to enhance the efficiency of the programme and to ensure better utilization of the resources.

Methodology and objectives: The present study has been carried out in line with the qualitative research strategy. *100 ICDS centers in remote rural settings from four districts of the valley viz. Budgam, Anantnag, Ganderbal and Baramulla have been studied on case to case basis during the time period of January 2012 to January 2013 to draw the relevant inferences. These centers were selected by simple random sampling and the samples were equally drawn from all the districts i.e. 25 centers from each district. These remote rural settings were chosen purposively for the study so as to gain an understanding of the problems faced by the children who live on margins.* Interview schedule based on various qualitative questions and also including few questions related to quantitative information was used as the main research tool for the data collection. Besides, some inferences were also supplemented by informal interviews and non participant observation. *An objective analysis has been generated from the study which provided the basis for arriving at firm conclusions based on the following objectives detailed hereunder:*

- To analyse the availability of infrastructure related to various services of the ICDS scheme in the Anganwadi centers.
- To identity the issues, problems in terms of infrastructure, functioning, and community response regarding these Anganwadi centers.
- To evaluate the functioning of Anganwadi centers and also the challenges of community response towards these centers.
- To recommend suggestions for the proper functioning of these centers.

Introduction: For a child, family is the primary social institution where one seeks love and affection; care and protection; and the fulfilment of his basic physical, emotional and psychological needs. The transition from joint family system to nuclear family, the rising cost of daily necessities and various other economic and social compulsions are compelling reasons to take gainful employment, (part-time or full-time), to supplement the family income. A large number of families, both in rural and urban areas of the country, live below the poverty line. Some sections of the society, viz. i) urban slum dwellers, ii) marginal farmers and agricultural landless labourers, iii) tribal's and iv) scheduled caste people are distinctly underprivileged. In spite of significant progress in the economic sphere, these sections of society are not in a position to provide due care and security needed for normal growth of their children even today. Therefore, they require additional support through outside interventions to enable the family to fulfil its obligations towards proper health care, nutrition, education and social well-being of their children. Governmental concern for the promotion of services for the growth and development of pre-school children is evident from the constitution of National Children's Board and also from the Resolution of National Policy for Children, 1974. In pursuance of the National Policy for Children, which laid emphasis on the integrated delivery of early childhood services and services for expectant and nursing women, the scheme of *Integrated Child Development Services (ICDS)* was evolved to make a coordinated effort for an integrated programme to deliver a package of such

services. The blueprint for the scheme was drawn by the Ministry of Social Welfare, Government of India, in 1975. The Scheme was launched throughout the country in the same year on experimental basis in almost all states including Jammu and Kashmir in 1975 with the establishment of a project at Kangan in Srinagar district (Now Ganderbal). The scheme called for coordinated and collective effort by different Ministries, Departments and Voluntary Organizations.

The programme approaches a holistic child health comprising health, nutrition, and education components for pregnant women, lactating mothers, and children less than six years of age. The programme is implemented through a network of community-level "A*nganwadi Centers"*. The range of services targeted at young children and their mothers are growth monitoring, immunization, health check-ups and supplementary feeding, as well as nutrition and health education to improve the childcare and feeding practices that mothers adopt. Pre-school education is provided to children between three and six years of age.

Despite of the fact that huge allocations have been made by the Central Government through Centrally Sponsored Programme of ICDS in Jammu and Kashmir, the development in basic infrastructure and improvements in amenities/facilities has been inadequate, especially in rural areas of the state. Same is the case with community response to the programme, these integrated service centers have been just reduced to supplementary nutrition "*Daal centers*". Hence, it becomes imperative at this stage to know as to what extent these schemes have been in a position to achieve the stated objectives. 100 ICDS centers were visited by the researchers and following field observations were made:

Housing and space of the Anganwadi centers: According to ICDS guidelines, the space for the AWCs is to be donated by the community at a central location, preferably near a primary school. The AWCs should provide sufficient space for indoor and outdoor activities and also separate space for kitchen, dining and storage. However, in all the AWCs studied, it was noted that the space is provided by the Anganwadi helpers. It was rather one of the criteria that whosoever provides space would be considered for the work of Anganwadi helper. Consequently, both the quality of space and the locational aspects of the AWCs were compromised. Usually, it was seen that AWHs devote those room to the AWCs which were in poor condition. Regarding the status of the building for running of AWC, it was observed that in the sample surveyed of 100 centers 46 AWC (46 percent) of the AWCs were housed in *pucca* buildings while 39 AWC (39 percent) of the AWCs were housed in semi-pucca houses and another 15 AWC (15 percent) were in *katcha* houses which constitute a perpetual apprehension of danger to the life of the children. As observed most of the AWCs (77 per cent) are housed in the AWHs house while only 16 per-cent AWCs have their own government building and 07 per cent are rented. Majority of the AWWs complained that they do not have sufficient space for conducting different activities, storage of ration etc. It is worth mentioning that all those centers which are located in government buildings are having all the necessary provisions of tape water, solid latrine and adequate space.

Kitchen is an integral part of the AWCs. However, 84 percent AWCs covered under the study had no separate space for cooking purpose as cooking for AWCs was done in the AWHs personal kitchen. Other issues such as separate storage space, dinning and sufficient space for indoor and outdoor activities were also compromised. This was established by the fact that only 29 percent of the AWCs had separate space for storage, 55 per-cents had separate outdoor space for recreation and 53 percent had some sort of space for indoor activity.

Due to lack of separate storage facilities in about 29 percent of the AWCs covered under the study reveals that many a times storage of various items such as utensils and records, in addition to the personal belongings of the AWH occupies the main room pushing beneficiaries to a corner. Most areas in the study witness low temperature during the winter. Delivery of services requires the beneficiaries to sit in the Centre for up-to 4 hours a day. It was found that 88 percent of the AWCs had no arrangement for heating. Consequently, the children got exposed to sever cold and viral infections like fever, cold etc.

Supervision: Growth monitoring and promotion largely remains a neglected area. Regular weighing and keeping records, focus on malnourished children, improving the skills of mothers on child care and any concept of community based nutritional surveillance are areas of serious concern as only 51 percent of the AWWs have prepared community growth chart at the time of survey and those who have not prepared it reported that either they do not know how to prepare it or do not have relevant material for the same.

Enrolment of the beneficiaries: Most of the beneficiaries enrolled in these centers are from the locality. However, there is a gap between the actual enrolled and the nutrition provided to the persons of the community. As informed by Anganwadi workers during the course of study: that the beneficiaries include children of age 0 -6 years, adolescent girls, pregnant and nursing mothers. On an average, the number of beneficiaries enrolled in these centers range from 35 to 45. This is good as per the norms of the scheme. But, the nutrition in many of these centers is not distributed to those actually enrolled. Besides, other persons of the community are also given the supplementary nutrition. This unauthorized practice is observed in almost all the places. Both the Anganwadi worker (AWW) and community are responsible for this practice. The deserving people do not get benefited as they are not given the Supplementary nutrition properly and on times. This is especially case with the children of age group of 3-6 years. They are required to be provided food in two servings after some interval within the centers. But most of the beneficiaries come around 12 pm to 1 pm and carry Supplementary Nutrition to their homes. This practice has become common pattern in all these centers, Due to this pattern; other services of the ICDS scheme get severely affected. It has also been observed that Anganwadi workers have squeezed the scope of the scheme just to the "*Daal Center*" and thus the people are not able to get benefitted from the other services.

So far as the quality or the type of food being provided to the children is concerned, the centers are having a Menu, depicting the schedule for preparing a particular food item on a particular day. But no such practice is found anywhere. While asking Anganwadi workers about the caloric value of the food items and quantity of calories to be given to the beneficiaries of different age group, they are not well versed about it. This indicates their lack of knowledge about the service of the scheme. The most valid reason

behind this is the lack of orientation of the Anganwadi workers about the scheme. Which itself is the outcome of the poor training mechanism on the behalf of concerned department. It has been observed in some (urban) areas of Anantnag, Ganderbal and Baramulla that no children are available to be admitted to the centre as there are many other Institutions like crèches, preparatory schools etc, catering to the purpose. Also for many there is social stigma in sending their kids to the Anganwadi centers as for them it amounts to feeding on charity. Hence in many Anganwadi centers they have prepared fake list of beneficiary kids (possibly those kids may be admitted in some private or govt. Institution). Even though many of the sincere Anganwadi workers deliver the meals to the homes of these kids, but that is not consumed by the actual beneficiary and does not serve the ultimate objective of the scheme.

Immunization: Immunization of pregnant women and infants protects children from various diseases. And is an important service, in which the Anganwadi worker has to play its role. As, this service is mainly to be provided by the ASHA/ANM/MO. But, mobilizing the community and preparing them for immunization is the role of Anganwadi worker, as she is having detailed information about the community and she has to act as a change agent in the community. While analyzing this service delivering in these centers it was found that there is lack of coordination between the Anganwadi worker and the ASHA/ANM/MO. The mal-delivering of this service from these centers is evident from the community's response about their awareness about the need of immunization. It was also found by checking the immunization cards of the infants; that these cards depicted the irregularities, negligence from the mothers in terms of immunization of themselves and also of their children, especially in the areas of Budgam, Anantnag and Baramulla. As immunization prevents from the diseases that are major causes of child mortality, disability, morbidity and related malnutrition. Immunization of pregnant women against tetanus also reduces maternal and neonatal mortality. Mobilizing the community for the same is the vital responsibility of Anganwadi workers and without this the success of the scheme is unattainable. However, it has been found that overall the position was satisfactory. This may be due to the fact that overall utilization of immunization services in the State are better compared to some other states in the country. Though 97 percent of the beneficiary children were immunized but full immunization rate is far from satisfactory. Only 88 percent of the children had received all the doses of immunization. Measles coverage was particularly found to be low than other vaccines and this could be because of the fact that many of the children have not attained the age of 9+ months.

Supply of medicine supplementary nutrition etc.: Supplementary Nutrition includes supplementary feeding, growth monitoring and promotion, nutrition and health education, and prophylaxis against vitamin A deficiency and control of nutritional anaemia. The observations on these services are given below:

The primary objective of the ICDS is to provide supplementary nutrition to the beneficiary children. Supplementary nutrition means identifying and fulfilling the deficiencies of calories, proteins, minerals and vitamins in the existing diets, avoiding cut-backs in the family diet, and taking other measures for nutritional rehabilitation. As per the guidelines, the state government is supposed to provide funds for supplementary nutrition. However, it was observed that there was a single ration for different target groups such as children, pregnant women and nursing mothers, which was not in accordance with the ICDS guidelines. Similarly, there should ideally be provisions of double ration for malnourished children, but it was observed that there was no such practice as no child received double diet, despite of the fact that few AWWs mentioned that certain children were suffering from malnutrition. The AWWs mentioned that they get supplies, which last for 3-4 months only. Once the supplies exhaust, the children stop coming to the AWCs and AWCs get virtually closed.

During the survey most of the mothers mentioned that supplementary nutrition was not provided to their children regularly. They however, mentioned that whenever supply of nutrition items were available at the AWCs, their children get supplementary nutrition. But the problem was that AWCs did not get enough nutrition to last for about 300 days as per norms. Many of the Mothers mentioned that on average AWCs provided supplementary nutrition for only 100 days a year. The AWWs also mentioned that due to inadequate supplies they were not in a position to provide supplementary nutrition for recommended 210 days. All the AWCs had a uniform weekly schedule for providing supplementary nutrition to the beneficiaries. The AWWs mentioned that they followed this schedule strictly when nutritional items were available.

All the AWWs also mentioned that it is not only the inadequate nutrition that affects the provision of nutrition but inadequacy of other material resource such as utensils, functional stoves and cooking fuel also contribute to it. The AWWs mentioned that sometimes they were unable to prepare supplementary nutrition, either because the stove was not in working order or the fuel was not available. The supplementary nutrition was not distributed in the utensils of the AWCs, as in most of the centers we observed the meals being served in private utensils of the beneficiaries. Supplementary nutrition was not generally consumed at the AWCs. As according to norms only, the physically challenged and sick children are allowed to take home supplementary nutrition but in actual practice 91% of the beneficiaries take meals to home. Mothers were also asked to mention whether they were satisfied with the various nutritional items provided at the AWCs. It was a general perception among mothers that children did not like Nutri Pulao. Further, Halwa was not appreciated during winters for reason of potential throat infection. Therefore, it was required that the supplementary nutrition provided should have sensitivity to local taste and seasons

Quality of nutritional items: There is a State Level Committee which is responsible for the procurement of the supplies. Quality of supplies is also monitored by this committee. Mothers of the children were asked to mention whether they were satisfied with the quality of food supplements received by their children. Almost all the respondents (96 percent) were satisfied with the quality of supplementary nutrition received by their children from the AWCs.

AWWs mentioned that the supplies of different items were irregular and it is generally supplied in bulk for which there was an insufficient storage facility both at project and AWC level especially in tribal areas of Ringzabal, Kharian, and chill in district Budgam. Since most of the AWCs were not having adequate storage facility, it affected the quality of the items when these were used after a certain period. For example *Suji* and rice used to get infested with insects in the absence of proper and adequate storage facility. It was also found that Fifty-eight percent AWCs receive the supply of supplementary nutrition yearly while 37 percent receive it half-yearly. Seven percent AWWs reported that they receive the supply when they need it. Two percent AWCs have ready to eat food available at the AWC while all others give cooked food to the beneficiaries. Most of the AWCs provide different varieties of Supplementary Nutrition (Khichadi, Channa, Halwa, Nuetriplawa,dalia, etc.) to the beneficiaries on different days as per their own schedule.

Health Education: Nutrition and Health Education (NHED) is a key element of the work of the Anganwadi worker. This forms part of BCC (Behaviour Change Communication) strategy. This has the long term goal of capacity-building of women – especially in the age group of 15-45 years – so that they can look after their own health, nutrition and development needs as well as that of their children and families. This education is to be provided to the Adolescent girls also. But, in actual practice health education is not provided in any of the centers studied. ICDS workers held the inadequate community response responsible for the same, whereas community held ICDS workers', lack of attitude and interest responsible for it. As a result the masses remain unaware of the health needs and facilities available from the government Institutions.

Health checkups: This includes health care of children less than six years of age, antenatal care of the expectant mothers and postnatal care of nursing mothers. The various health services provided for children by Anganwadi workers and Primary health Centre staff includes regular health check-ups, recording of weight, immunization, management of malnutrition, treatment of diarrhoea, distribution of free medicine etc. While analyzing this service delivering by these centers, it was found that in most of the centers, no health check up has been conducted for a year or so. ASHA has now been given some responsibilities to share. In spite of this, community is not fully benefited by these schemes and it becomes quite clear when conditions of health and hygiene of mothers and their children, in remote rural areas or in poverty stricken family is seen. Even the weight of the new born children is not measured properly and regularly and not to talk of keeping records. There is also the provision for first aid at respective ICDS centers in the scheme. But during the study no ICDS centre reported about the availability of first aid box, and when ICDS workers were asked about it, they didn't know about the provision of the same.

Referral Services: During health check-ups and growth monitoring sick or malnourished children, in need of prompt medical attention, are to be referred to the Primary Health Centre or its sub-centre. The Anganwadi worker is also obliged to detect disabilities in young children. She has to enlist all such cases in a special register and refer them to the medical officer of the Primary Health Centre/ Sub-centre. But during the interview Anganwadi workers reported that now it is certainly responsibility of the ASHA/ANM concerned. They are not sure whether they have a dominant role about counselling for Antenatal and Post natal care to pregnant woman or not. ASHA report that a lady has to visit ICDS centre during the entire period of pre and post delivery. So, in case of any emergency it is primarily the responsibility of ICDS worker to call for referral transport and claim the amount of same from untied fund of NRHM. It was also observed during the study that in remote areas in district Budgam like; villages of Ringzabal, Konzabal, Kharian, Brass, Sutharan etc. which are without any road connectivity wherein there should be necessarily the provision of immunization and first aid at respective centers there was unavailability of the same.

The Non-formal Pre-school Education (PSE): this component of the ICDS may well be considered the backbone of the ICDS programme, since all its services essentially converge at the Anganwadi – a village courtyard. The village courtyard is the main platform for delivering of most of the services of the programme. This is primarily used for the most joyful play-way daily activity, visibly to be sustained for three hours a day according to norms. It brings and keeps young children active at the Anganwadi centre – and consequently this activity motivates parents and communities for availing the scheme.

The AWWs are supposed to provide pre schooling to the children preferably in the courtyard. Every studied centre is provided pre-school teaching learning material for educating the children of age group 3-6 years. Teaching learning material includes books, slates, abscissa slates, pictorial charts, and alphabetic building blocks and also different kinds of toys etc. This service is meant to introduce the kids to formal education system in later stage of life. In most of the centers studied, this service is totally defunct ,and even if in some rare cases pre-school education is provided but there is irregularity in the delivery of same. None of these centers were having a time table for performing different activities within these centers. According to Anganwadi workers, the non- delivering of this service in the Anganwadi centers is due to poor attendance of beneficiaries and also poor response of the community. According to them, community people just send their children for taking the supplementary nutrition from the centers. While analyzing the miss management in delivering of the said service, the community blamed the Anganwadi worker, for their irregular attendance and their lack of commitment for the same. Community also claims that ICDS workers are not providing the masses information about the actual role, which the ICDS scheme is supposed to perform. Most of the community people treat these centers as just "Daal Centers", as mentioned above, which are supposed to serve nutritious food to kids.

It has been observed that wherever this practice is commenced, it is undertaken only for the period when the nutrition is available in the Centre. AWW mentioned that no sooner the supplementary nutrition gets exhausted in the AWC, parents stop sending their children to AWCs. Surprisingly when mothers of the beneficiary children were asked about the range of services available at the AWCs, supplementary nutrition and pre schooling were reported by the respondents to be the two main services available at the AWCs. Majority of the parents mentioned that the main reason for sending their children to AWCs is supplementary nutrition and

preschool education. Parents however are willing to send their children to AWCs for pre schooling even if the nutrition is not available in the Centre, but the problem is that AWWs prefer to close the Centre in case the nutrition is not available in the Centre.

Conclusion: The above discussion leads us to conclude, that ICDS scheme is not being implemented in letter and spirit as mentioned in the guidelines of the scheme. This is quite evident by the fact, that the scheme, which has an integrated approach in its implementation for the proper mental, physical and psychological development of the children, has been reduced just to Daal Center. While analyzing this particular service of the scheme, the situation there too is not satisfactory. Various factors are responsible for the mal functioning of these centers and few have been mentioned above. In fact, the present study cannot be called macro study, as it has been carried out on a small sample of ICDS centers, but its significance for analyzing the situation of the ICDS centers throughout the valley cannot be ignored. As most of the ICDS centers in the Kashmir valley are functioning in the same mode. We are of the view, that this study, in spite of being carried out at a micro level, can be quite helpful in conducting a research at a macro level. The addressing of issues and problems prevailing in these centers in terms of their functioning is just a beginning. It needs a comprehensive strategy involving various stakeholders including government agencies, NGOs and community for eradicating these problems at a state level. Besides huge allocation of funds for infrastructural development, government need to sensitize the common masses about importance, significance and services of the programme, so a common man will not treat it just Daal centre. Equal focus need to be provided on the delivery of other services too, so as to get the desired results as laid down in the guidelines of the programme.

Prudent poultry farming as a source of livelihood and food security in a changing climate: The case of Zhombe communal lands, Zimbabwe

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Abstract: Zimbabwe has been hard hit by successive droughts in the last 13 years leading to the plummeting of agricultural productivity in most of the areas and Zhombe communal land has not been spared. However, many households in Zhombe have ventured into prudent poultry farming as a source of livelihood and food security. Small-scale farmers have embarked into the raising of indigenous chicken breeds, guinea fowls and turkeys. Data for the survey was collected by the administration of a well- structured questionnaire, focus group discussions and observations. Purposive sampling was used to target households that are keeping these birds. The results indicate that these birds are being used to improve people's diet and as a source of income. Most farmers experience the problem of shortage of feeds, outbreak of diseases, shortage of vaccines and theft. The study points to the need to encourage farmers to grow small grain crops which are drought tolerant and can be used as chicken feed and farmers should also go for training workshops on poultry production so as to equip themselves with relevant skills. They should merge scientific methods and indigenous knowledge systems of poultry management so as to improve productivity.

Index Terms: Food security, prudent poultry farming, livelihood, and Indigenous knowledge systems

I. INTRODUCTION

The majority of farmers in rural areas of Zimbabwe rely on rain-fed agriculture which has been greatly affected by climate change. The frequency of droughts has increased with 10 drought years being recorded between 1990 and 2007 (Tawodzera in Fayne *et al*, 2012). This has led to food insecurity in the country due to the lowering of agricultural output, deterioration of pastures and death of livestock. Climate change is aggravating hunger, precipitating nutrition problems and compounding health issues among the rural poor subsistence farmers.

In Zhombe communal lands, most households have embarked on indigenous poultry farming as an asset adaptation strategy to climate change. Asset adaptation refers to the means and ways in which people use the assets that they have to anticipate and deal with challenges resulting from the change in climate Moser and Satterthwaite, 2008). Most households are involved in mixed farming which encompasses crop cultivation, livestock rearing and poultry farming. The majority of farmers who practice poultry farming keep indigenous domestic chickens (*Gallus domesticus*); domestic guinea fowls (*Numidia meleagris*) and turkeys (*Meleagris gallopavo*) in order to strengthen their resilience to climate change impacts on food security. Mapiye *et al* (2008) state that in Zimbabwe and other sub-Saharan African countries, 70% of the total chicken population is reared under the extensive system of production. The type of feeding is free-range because of resource scarcity to practice semi-intensive and intensive poultry farming.

Villagers in Zhombe communal lands are now involved in prudent poultry farming because they are particular about the health and security of their poultry. This has improved their livelihoods and access to nutritious foods. Miao (2005) stated that development of village chicken enterprises can be a sustainable way of improving food

security and livelihoods of the resource poor farmers. Indigenous chickens have high reproduction rate per unit time if breeds are selected appropriately, they are efficient in transforming feed protein and energy into human food and they use very low capital as they feed on flora and fauna and farmers can use ethno-veterinary medicine, they are less labour-intensive and need less space, which allows chicken production to be practiced even by landless individuals (Muchadeyi *et al*, 2004).

Indigenous domestic chickens are the most common, followed by domestic guinea fowls and lastly turkeys. The main focus of this study was on prudent poultry farming as a source of livelihood and food security in a changing climate.

II. Methodology

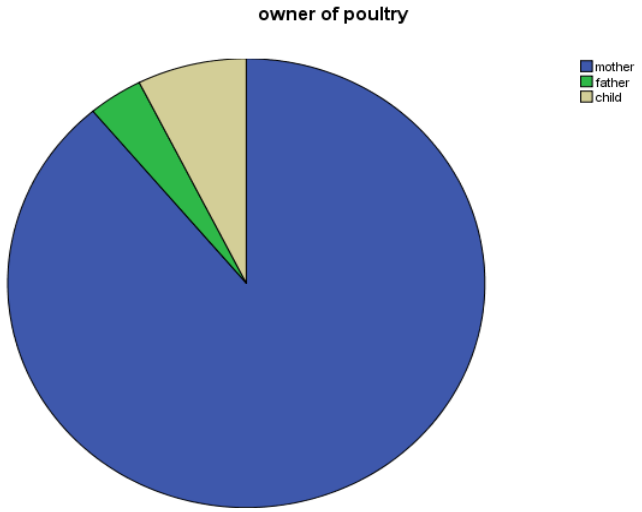
The researcher used simple random sampling to select two villages (Sinangeni and Gwenzi) in ward 11 where poultry farming is highly practiced. Purposive sampling was used to select 28 households (14 per village) who rear indigenous chickens, guinea fowls and turkeys. The data gathering instruments involved the administration of a well-structured questionnaire, focus group discussions and observations. Information collected included flock sizes and utilization, ownership, farmers' selection criteria and challenges and solutions.

III. Results

Flock ownership

The study revealed that women formed the largest group (88.9%) of farmers involved in poultry farming, followed by children (7.4%) and then men (3.7%). This is shown in figure 1 below.

Figure 1: Flock ownership



a. Flock sizes and selection

Figure 2: Flock size

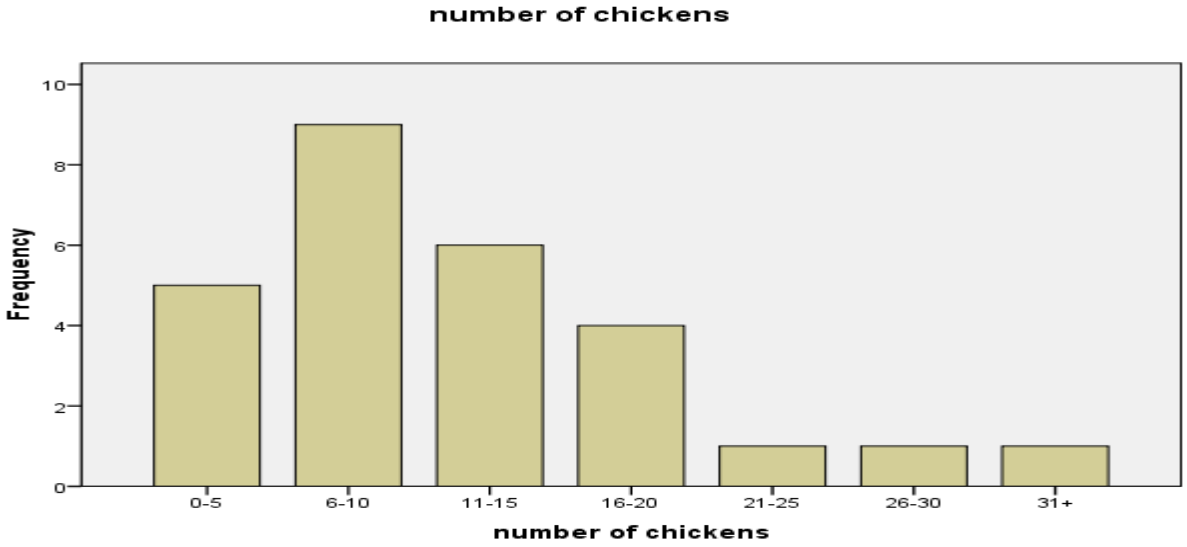


Figure 2: shows that the modal group is 6-10 chickens per household. Indigenous guinea fowls and turkeys tend to be lesser than chickens; their modal group is 0-5 per household. The majority of farmers prefer chickens to guinea fowls and turkeys.

3.3 Flock selection

Mixed breeds of chickens are very common in most of the households. 59.3% of the households keep mixed breeds, 14.8% keep chickens with bare necks, 11.1% keep red-brown chickens, 11.1% keep black chickens and 3.7% keep chickens with feathers on legs. Flock selection was based on breed quality in terms of productivity, resistance to diseases, size, plumage which made most of the chickens to be invisible to predators.

3.3 Flock utilisation and challenges

Poultry are a source of proteins (eggs and meat) for most households, they are a source of income and also manure. The challenges in poultry farming include outbreak of diseases, predators, theft, shortage of feed and housing problems at night.

IV. Discussion

Almost 100% of households in Zhombe communal lands practice poultry farming and it is done by women. This concurs with the results of the study which was carried out by Kusina and Kusina (1999) in Guruve district. Men tend to own the land and livestock. Fajemilehin (2010) asserts that village poultry production, if developed, can be employed as a tool to alleviate poverty, promote gender equality and ensure food security for economically disadvantaged peasant farmers. Poultry production empowers women who are normally a disadvantaged and vulnerable group to climate change.

Most households tend to prefer chickens to guinea fowls and turkeys. In most households, chickens range from 11-15 and guinea fowls and turkeys 1-5. Guinea fowls are difficult to house at night since they are very strong fliers creating difficulties in catching them. Turkeys tend to travel long distances and destroy crops during the farming season leading to quarrels between farmers. Guinea fowls are “watch animals” around homesteads because they have an excellent eye-sight, a harsh cry and shriek at the slightest provocation (Smith, 2000). Most farmers tend to use surrogate mothers, especially chickens and turkeys to hatch eggs for guinea fowls thereby reducing mortality rates for the keets.

Most of the farmers do not keep specific breeds of chickens. They are not genetically selected into specific breeds. Breeding and selection has been largely left to nature (Mapiye *et al*, 2008). Most of the breeds are mixed. Very few farmers kept black chickens and chickens with bare necks and the reasons for keeping these breeds was that they are big, lay a lot of eggs and are not visible to predators. This is a prudent selection of chickens because it is based on productivity.

Poultry farming has improved food security and nutrition status. It provides cheap, readily harvestable protein enriched white meat and eggs (Dolberg and Petersen, 2000). This reduces the prevalence of diseases associated with malnutrition. Some farmers stated that guinea hens can lay an average of 80-120 eggs per season. The other advantage of guinea fowls is that they are more heat tolerant and less susceptible to disease than chickens (Kusina *et al*, 2012). Turkeys provide a lot of meat due to their large sizes and also lay a lot of bigger eggs compared to those of chickens and guinea fowls.

The results show that poultry farming is highly used to generate revenue for most household. This is in contrast to Shumba and Whingwiri's (1988) assertion that the village chickens contribute less to rural economies. Households sell chickens and get money to pay school fees; medical expenses; buy clothes and some basic food stuffs and pay village taxes. They also provide manure. According to Das (2005) poultry manure is an extremely rich source of nitrogen and organic matter. It is used to improve soil fertility for high crop production.

Farmers care for their poultry by monitoring the outbreak of diseases such as new castle. There is wide use of ethno-veterinary medicine such as pepper, aloe and salt-and-sugar solution. The use of traditional medicine is due to its low cost, local availability, easiness of application and it does not require refrigeration (Muchadeyi *et al*, 2004). Farmers also provide supplementary feeding with locally produced feeds such as sunflower, maize, millet and sorghum. Supplementary feeds such as crushed sunflower and millet improve flock sizes, growth and fertility rates. Farmers also house their birds at night to reduce losses from predators such as owls, wild cats, snakes and domestic dogs. Some farmers reduce keets mortality by housing them for an average of one month and they also give them supplementary feeds.

V. Conclusion and Recommendations

The major findings of this study are that poultry farming has reduced food insecurity by providing meat and eggs and they are a source of livelihood as they generate revenue for households. Farmers experience problems such as the outbreak of diseases, predators and shortage of feeds. Farmers have attempted to solve these problems by providing local supplementary feeds, housing at night and the use of ethno-veterinary medicine. Farmers should participate in breeding programmes to be equipped with knowledge on quality breeds which are more productive. Large chickens with high fertility rates are more profitable. Shelters should be constantly sprayed to eradicate parasites such as mites and lice. Finally, farmers should keep more of guinea fowls as they are more resistant to diseases and parasites and they produce a lot of eggs per given season.

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Surgical and radiational outcome in a giant retroperitoneal liposarcoma

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Abstract- Liposarcoma is a malignant soft tissue tumor from fat tissue. Commonly it is found in the abdominal cavity or extremities, but they can be found anywhere in the body. They are typically large tumors and not usually spread beyond its local limits. The cause is unknown but has been linked to genetics and some inherited diseases. The tumor may be present for a long time before being diagnosed. Treatment usually involves surgery and potentially radiation. We report a case of giant retroperitoneal sarcoma in a 44 yr old female. Patient was treated effectively with surgery and radiation. Patient followed up to 16 months postoperatively with no local recurrence.

Index Terms- Liposarcoma, Retroperitoneal sarcoma.

I. INTRODUCTION

Liposarcomas represent one of the common type of sarcoma, mostly occupying limbs and retroperitoneum. Liposarcomas are neoplasms of mesoderm arising from fat tissue and comprise 10-14% of all soft tissue sarcomas. They represent <1% of all malignant tumors[1]. They usually have a late presentation as patients present with non specific pain in abdomen, mass per abdomen and also shows signs of weight loss and emaciation. These tumors may also compress the kidney or ureter. Surgery represents most important form of treatment for these tumors .Radiation therapy has been an important adjunct in treatment, although there are limits in view of surrounding delicate structure,s with chemotherapy having not much of comparable results [2].We present a case of giant retroperitoneal sarcoma treated effectively with surgery and radiation with no local recurrence followed up to 16 months postoperatively.

II. CASE REPORT

A 44 yr female presented with pain abdomen , loss of apetite and constipation of 4 months duration. Clinical examination revealed a diffuse mass occupying the left side of abdomen, firm in consistency and tender on palpation. CT scan of abdomen depicted a large well defined non enhancing fat containing lesion with septations, solid components 27.5x20x13.5 cms in size involving lumbar, umbilical, iliac, pelvic regions on left side in retroperitoneal region. FNAC of lesion was positive for malignant cells. Patient underwent exploratory laparotomy with total excision of tumor weighing approximately 5 kgs, intra-operatively it was a very vascular tumor.

Fig.1-Preoperative CT scan of abdomen showing retroperitoneal tumor

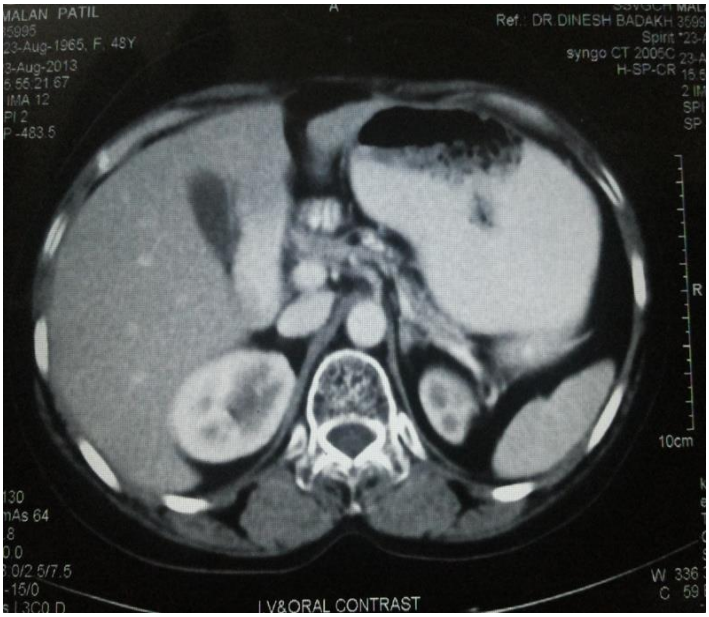

Fig.2- Postoperative CT scan 15 months after surgery and completed radiotherapy

Postoperatively patient recovered well and histopathological examination of lesion revealed features of sclerosing variety of liposarcoma.
Patient received 26 cycles of external beam radiotherapy to the operated area with no major complications, she is being followed up for 16 months with no evidence of local recurrence.

III. DISCUSSION

Most of liposarcomas are malignant in beginning, very rarely they can arise from benign lipomas. Their development varies greatly from case to case. Sometimes they remain indolent for months or years and sometimes grow rapidly and are locally aggressive tumors[3].They can develop in extremities or retroperitoneum in 12-40% of cases[4]-[5] Diagnosis is late because of retroperitoneal location, prognosis depends on the type of histological variant of liposarcoma the tumor size, the depth, and proximity to lymph nodes, 5 categories of liposarcomas: include well differentiated, which includes the adipocytic, sclerosing, and inflammatory subtypes, dedifferentiated, myxoid, round cell and pleomorphic variety.The well differentiated varieties have less local recurrences and poorly differentiated ones having poor prognosis including local recurrences and distant metastasis[6]. Recently radiotherapy along with local resection has been showing good results [7]. Well-differentiated liposarcomas treated with surgery and with radiation have a low recurrence rate of about 10%[8].
In our case of liposarcoma , complete total excision along with radiation gave good local control with no recurrence and metastasis in follow up period of 16 months.

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The Design of Low Noise Amplifiers in Nanometer Technology for WiMAX Applications

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Abstract- In this paper the design of two low noise amplifiers proposed for WiMAX applications is presented. The two low noise amplifier topologies implemented are: (1) cascoded common source amplifier, (2) Shunt feedback amplifier. The amplifiers are implemented in a standard 180nm CMOS process, and are operated with a 1-V supply voltage and 5.9GHz frequency, the cascoded LNA achieved the best performance with a simulated gain of 15.7dB and noise figure of 1.85dB. The Low noise amplifier has been simulated using cadence spectre.

Index Terms- CMOS; Low-noise-amplifier (LNA); WiMAX

I. INTRODUCTION

The rapid advancement in CMOS scaling and RF CMOS circuit design techniques in the past few years have made it possible to integrate all the elements of a transceiver on a single chip. Inexpensive CMOS technologies have been used successfully to implement all the necessary RF functionality for existing and emerging wireless area network standards, such as Bluetooth and WiMAX [1] [2].The CMOS system-on-chip (SOC) solution to enable a single chip phone, where the analog and digital basebands, power management, and the RF transceiver are fully integrated on a single monolithic CMOS Integrated circuit.
WiMAX is a telecommunications technology which stands for Worldwide Interoperability for Microwave Access. It belongs to the IEEE 802.16 family of standards, which aim to provide wireless broadband access. It provides data rates of up to 100 Mbps at 20 MHz bandwidth [3]. It has a very large coverage area of around 50 km. for one base station which makes it a viable option for implementation of last-mile connectivity. There are two types of WiMAX systems: Fixed WiMAX and Mobile WiMAX. The fixed WiMAX system does not allow handoff between base stations. Mobile WiMAX on the other hand provides both mobile and fixed services.

II. LOW NOISE AMPLIFIERS

The low noise amplifier (LNA) is the vital component in the receiver chain of the communication system. It is the first gain stage behind the antenna in the receiver chain and its noise figure is directly added to the whole system. The LNAs are used to amplify the very weak signals coming from the antenna.

A. Cascoded Common Source Amplifier

The most frequently used topology for LNA design is the cascoded common source amplifier with inductive source degeneration show in the Fig. 1[4]. The cascoded common source amplifier is also called as telescopic cascode amplifier because the cascode transistor is the same type as the input transistor [5].
The cascode topology gives a higher gain, due to the increase in the output impedance and it also has a better isolation between the input and output ports. The cascode common source amplifier has a higher reverse isolation [6]. The suppression of the parasitic capacitances of the input transistor also improves the higher frequency operation of the amplifier.

B. Shunt Feedback Amplifier

The shunt feedback low noise amplifier is show in the Fig. 4[4]. It has some attractive benefits, like supporting input and output match over a large frequency range and it is able to achieve a very high linearity. The linearity of the amplifier improves the gain, which is largely set feedback, becomes less sensitive to the gain of the amplifier. The feedback elements, which are composed of a resistor in series with a capacitor, linearize the gain and increase the bandwidth of the amplifier. The feedback is also suited for the CMOS low noise amplifiers since the input impedance of MOSFETs is large and mostly capacitive, which means that the input impedance can be controlled and set by the feedback. To improve the high frequency performance, an additional inductor can be positioned in series with the resistor and capacitor [7]. Finally, the high self resonance frequency of inductors, enabled by a post processing technique, has been exploited to achieve a wideband, high impedance drain load.

III. CIRCUIT DESIGNS

The performance requirement for a WiMAX receiver is listed in Table I. These receiver specifications are obtained from the IEEE 802.16 standard released in 2004 [8]. The next part of the design involves the mapping of the specifications from the IEEE standard to

relevant system level parameters such as Bit Error Ratio (BER), Signal to noise ratio (SNR), and receiver sensitivity. These system level specifications are then mapped into block level using link budget analysis [9].

Table II. Summarizes the block level specifications for the low noise amplifier. The LNA must be able to achieve high gain and low noise figure to relax the gain requirement of the mixer and at the same time give the whole receiver a low noise figure. The noise figure also determines the minimum input signal that can be resolved by the LNA while the linearity dictates the maximum input signal level that will not cause nonlinear operation. The LNA, having a finite reverse isolation and being connected directly to the antenna, needs a good input and output match to prevent signals from leaking back to the antenna and getting retransmitted causing unwanted interference.

TABLE I. WiMAX receiver requirements and specifications

Rx max input level on channel reception tolerance	≥ -30 dBm
Rx max input level on channel damage tolerance	≥ 0 dBm
1st adjacent channel rejection	≥ 4 dBm
2st adjacent channel rejection	≥ 23 dBm
Image rejection	≥ 60 dBm
Noise Figure	≤ 7dB

TABLE II. Low Noise Amplifier Specifications

Parameter	**LNA Design**
Technology	180nm
Frequency	5.9GHz
Gain	> 15dB
Power Dissipation	< 4mW
Noise Figure	< 3dB
S12 (dB)	- 45.86
S11 (dB)	-10.3
S22 (dB)	-14.5

A. Cascoded Common Source Amplifier

In schematic of the designed cascoded common source amplifier is shown in Fig. 1. The input impedance of the cascoded common source low noise amplifier circuit shown in Fig. 1 will be capacitive due to the gate source capacitance C_{gs}. To reduce the noise and improve the power gain in the circuit a lossless degenerating inductor L_s is added to the source of the cascode transistor M_1. The input impedance of the LNA can be computed based on (1) [4], with the value of source inductance L_s. The width of the cascode transistor M_2, was set equal to the width of the input transistor to take advantage of the reduced junction capacitance in the layout. The output matching network, composed of the drain inductor, L_d, and the output capacitors, C_1 and C_2, can be designed. Fig. 2 shows the final simulation design of the cascoded common source LNA with device sizes and bias voltages. Fig. 3 shows the layout design of cascoded common source LNA [10].

$$Z_{in} = \left(\frac{g_m}{C_{gs}}\right) * L_s \qquad (1)$$

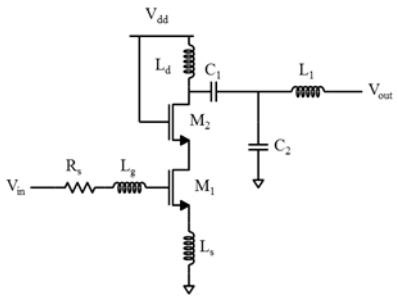

Figure 1. Schematic design of cascoded common source LNA

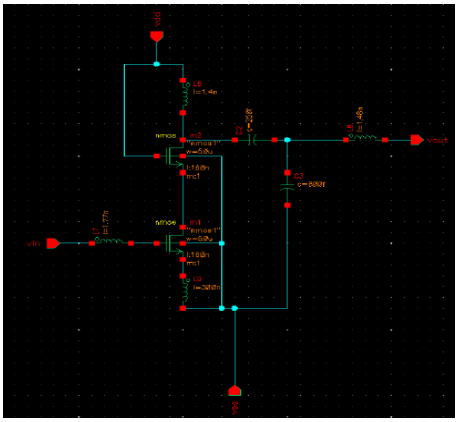

Figure 2. Simulation setup to analyse the design of cascoded common source LNA

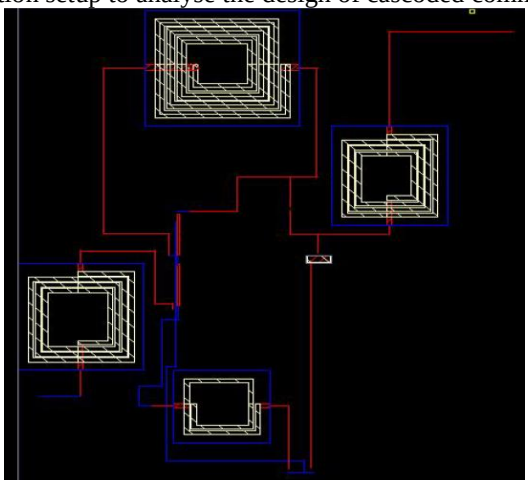

Figure 3. Layout design of cascoded common source LNA

B. Shunt Feedback Amplifier

The design of shunt feedback low noise amplifier is shown in Fig. 4, the value of the feedback resistor which sets the power gain is given in (2) [4], where R_f, Z_o, and S_{21} are the values of the feedback resistor, output impedance, and the transducer gain. A small inductor was placed in the gate of the transistor to aid input matching. A load inductor was placed in the drain of the transistor to tune out the junction capacitances in the drain of the transistor. The value of the feedback capacitor, which is used for biasing purposes, was set large enough to not have a significant effect on feedback. The Fig. 5 and Fig. 6 shows the simulation and the layout design of the shunt feedback LNA.

$$R_f = Z_o (1+ |S_{21}|). \quad (2)$$

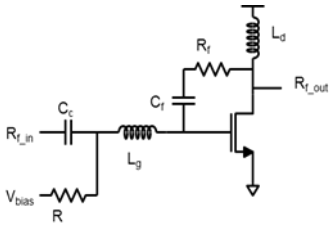

Figure 4. Schematic design of shunt feedback LNA

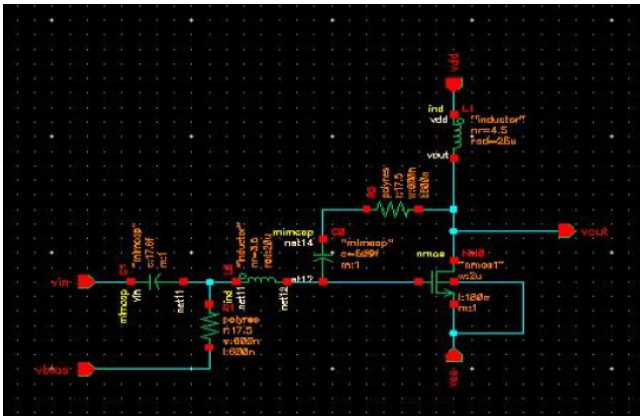

Figure 5. Simulation setup to analyse the design of shunt feedback LNA

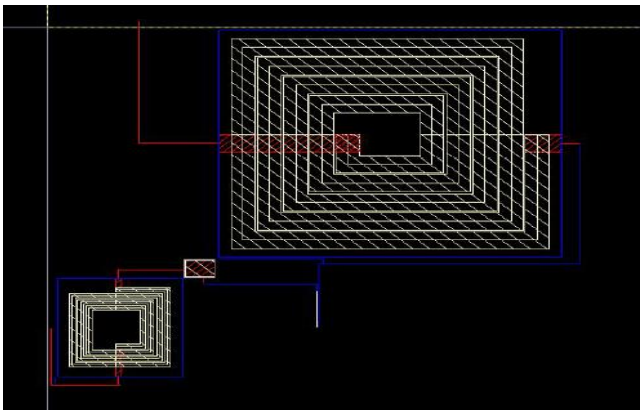

Figure 6. Layout design of shunt feedback LNA

IV. CALCULATION AND ANALYSIS

The LNA topologies were implemented in a standard 180- nm CMOS process. The extraction of all device parameters for use in simulations was done using Virtuoso Schematic Composer and Spectre Simulator from Cadence Design System. The low-noise amplifiers were designed to operate at the frequency band of 5.725 GHz to 5.925 GHz and the measurements in the plots were taken at 5.9 GHz.

A. Inductive Source Degeneration Input Matching

The first constraint on the LNA was to assure that the input impedance matches the source impedance, i.e. the LNA presents a purely resistive load of 50Ω to the antenna, in order to maximize the power transfer.

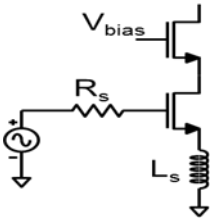

Figure 7. Schematic of a cascode LNA design with source degeneration

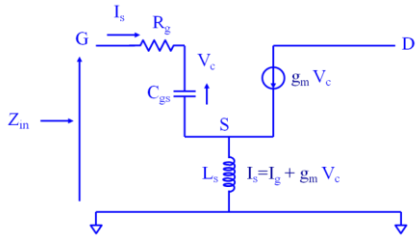

Figure 8. Equivalent model with source degeneration

$$Z_{in} = \frac{V_g}{I_g} = \frac{I_g R_g + V_c + j\omega I_s L_s}{I_g}$$

$Z_{in} = \frac{L_s \cdot g_m}{C_{gs}}$ where Z_{in} may be say 50ohms

In most LNA designs the value of Ls is picked and the values of gm and Cgs are calculated to give the required Z_{in}.

B. Degeneration Inductor L_S

The value of this inductor is fairly arbitrary but is ultimately limited on the maximum size of inductance allowed by the technology.

$$\omega_T = \frac{g_m}{C_{gs}} = \frac{R_s}{L_s} = \frac{50}{1nH} = 50GHz$$

C. Optimal Q of Inductor

Optimal Q is given by:

$$Q_L = \sqrt{1 + \frac{1}{p}}$$

Where $p = \frac{\delta \cdot \alpha^2}{5 \cdot \gamma}$

The parameters for p are dependent on the CMOS technology but typically α is assumed to be 0.8 -1 (take to be 0.9)

δ is set to 2 - 3 times the value of (normally 4)

y is set between 2 - 3 (normally 2)

Where $p = \frac{4 \cdot (0.9)^2}{5.4} = 0.162$

$$Q_L = \sqrt{1 + \frac{1}{0.162}} = 2.67$$

D. Evaluation of L_G

$$L_g = \frac{Q_L R_s}{\omega_o} - L_s$$

Where $\omega_O =$ centre frequency

$2\pi.5.9G = 3.7E^{10}$ rad/sec

$L_g = \frac{2.67 \times 50}{3.7\ E^{10}}$ - 1nH = 2.6nH

E. To Find C_{GS} (Gate-Source Capacitance)

$$C_{gs} = \frac{1}{\omega_o^2 (L_{gs} + L_s)}$$

$C_{gs} = \frac{1}{(3.7\ E^{10})^2(2.6nH + 1nH)}$ = 0.205pF

F. To Find W

$W = \frac{3\ Cgs}{2\ Cox\ .Lmin}$

$W = \frac{3 \times 0.205pF}{2 \times 3.419E^{-3} \times 0.6E^{-6}}$ = 158.7um

L_{min} = 0.6E^{-6} m; T_{ox} = 1.01 E^{-8} m

$\varepsilon_{ox} = \varepsilon_{ox} . \varepsilon_o$

Where

ε_s = dielectric constant for silicon = 3.9 and

ε_o = dielectric constant for free space = 8.854E^{-14} F/cm

$C_{ox} = \frac{\varepsilon ox}{Tox} = \frac{3.9 \times 8.854\ E^{-14}}{1.01\ E^{-8}}$ = 3.419E^{-3} pF/um^2

G. To Calculate g_m

$g_m = \omega_T . C_{gs}$

g_m = 50GHz x 0.205pF = 0.01025A/V

H. To find V Effective

$V_{eff} = (V_{gs}\text{-}V_T) = \frac{g_m . L_m}{\mu_n . C_{ox} . W}$

μ_n = device mobility = 433cm/V

$V_{eff} = \frac{0.01025 \times 0.6E^{-6}}{433 \times 3.419E^{-3}\ pF/um2 \times 158.7um}$

V_{eff} = 0.25uV

V_T = 0.7v

$V_{eff} = (V_{gs} - V_T)$

$V_{gs} = V_{eff} + V_T$

V_{gs} = 0.25 + 0.7

V_{gs} = 0.95V ~ 1V to the gate

I. Bias Current I_D

$I_D = g_m . V_{eff}$ = 0.01025A/V x 0.25V =2.565mA

J.Estimated Optimum Noise Figure

$NF_{opt} = 1 + \frac{2\gamma}{\alpha}\left(\frac{\omega_o}{\omega_T}\right)\sqrt{p}(|c| + \sqrt{p} + \sqrt{1+p})$

Take |c| = 0.4

$$NF_{opt} = 1 + \frac{4}{0.9}\left(\frac{3.7\,E^{10}}{50G}\right)\sqrt{0.16}\left(0.4 + \sqrt{0.16} + \sqrt{1 + 0.16}\right)$$

NF_{opt} = 4.2 =10 log (4.2) = 6.3dB

V. SIMULATION RESULTS

A. Power Gain (S21)

To compensate noise contribution of subsequent stages in the receiver chain, it is desirable to have a LNA with power gain (S21) more than 15 dB. So, the shunt feedback amplifier has the highest gain with 19.9 dB and the cascoded common source amplifier has the gain with 15.7 dB is achieved at 5.9 GHz. As can be seen on the plot of the power gain, the shunt feedback amplifier has a relatively wideband characteristic compared to the cascode amplifiers. The linearizing effect of feedback gives the shunt feedback amplifier its wideband characteristic compared to the narrowband characteristic of the cascode amplifiers is illustrated in Fig. 9.

B. Noise Figure (NF)

The plot of the noise figure is shown in Fig. 10. The extracted noise figures of the LNA topologies are as follows: 1.85 dB for the cascoded common-source and 2.63 dB for the shunt feedback amplifier. All the LNA topologies achieved a noise figure below 3 dB. As with the power gain plot, the cascoded common source amplifier achieved the less noise figure compared to the shunt feedback amplifier.

C. Input Matching (S11)

In general, it is difficult to achieve both noise matching and power matching simultaneously in an LNA design, since the source admittance for minimum noise is usually different from the source admittance for maximum power delivery. The input matching of the designed low noise amplifiers should be less than –10 dB while maintaining lowest noise figure. In the designed cascoded common source LNA has -9.5dB and shunt feedback LNA has -11.2dB is achieved at 5.9GHz as presented in Fig. 11.

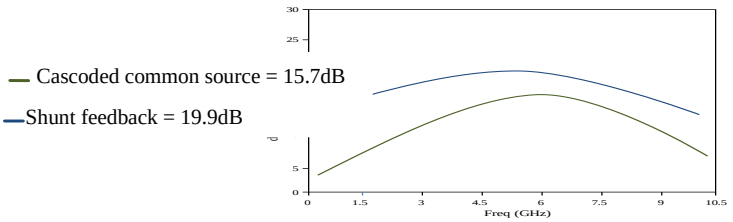

Figure 9. Power Gain

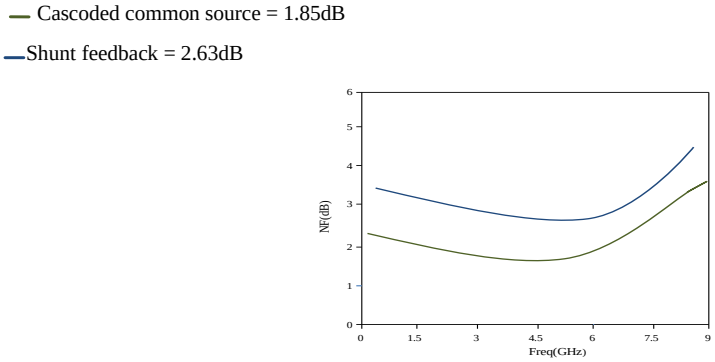

Figure 10. Noise Figure (NF)

Cascoded common source = -9.5dB

Shunt feedback = -11.2dB

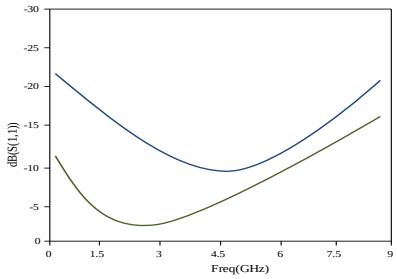

Figure 11. Input Matching (S_{11})

D. Output Matching (S22)

The output matching network does not change the DC bias of the active device. Since the low noise amplifiers are having very low output impedance, it is very easy to achieve the required output matching without any filter network at the output. The shunt feedback LNA has -22.8dB is achieved at 5.9 GHz is as shown in Fig. 12.

Cascoded common source = -14.4dB

Shunt feedback = -22.8dB

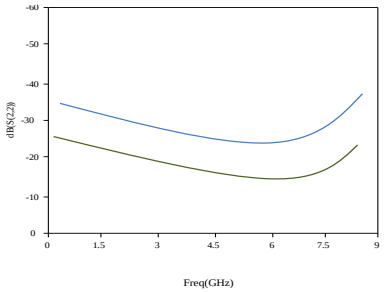

Figure 12. Output Matching (S_{22})

E. Reverse Isolation (S12)

The reverse isolation is very important parameter to ensure better stability. Since the cascode stage eliminates the Miller capacitance, it is chosen to provide better isolation. The shunt feedback LNA achieved the best reverse isolation with -32.5dB at the frequency of 5.9GHz a

Cascoded common source = -23.6dB

Shunt feedback = -32.5dB

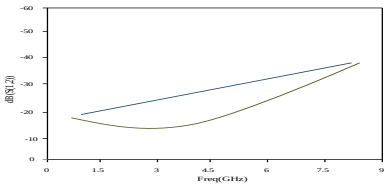

Figure 13. Reverse Isolation (S_{12})

F. Stability Factor (Stab Fact)

The stability of an amplifier is a very important consideration in a design of an LNA and can be determined from the S parameters, the matching networks, and the terminations [16]. The stability factor, `*K'* is calculated over the frequency band 5.725GHz to 5.925 GHz by using the equation (3).

$$K = \frac{1+|S_{11}S_{22}-S_{12}S_{21}|^2-|S_{11}|^2-|S_{22}|^2}{2|S_{12}S_{21}|} \qquad (3)$$

The plot of the stability factor is shown in Fig. 14. The two amplifiers are unconditionally stable with stability factor greater than 1 at the frequency of 5.9GHz.

Reference	Circuit Designs	V_{DD} [v]	f_c [GHz]	Gain [dB]	NF [dB]	P_{DC} [mW]	S11 [dB]	S22 [dB]	S12 [dB]	IIP3 [dBm]
This Work	Cascoded CS Amplifier	1	5.9	15.7	1.85	19.31	-9.5	-14.4	-23.6	-5.5
	Shunt Feedback Amplifier	1	5.9	19.9	2.63	56.8	-11.2	-22.8	-32.5	-5
[4]	Folded Cascode Amplifier	1	5.9	12.8	1.99	48.28	-12.3	-8.98	-25.9	-6.2

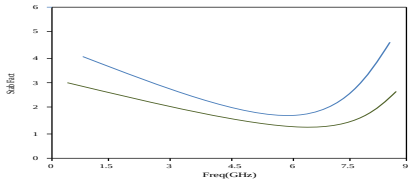

Figure 14. Stability Factor (Stab Fact)

G. Linearity (IIP3)

The amplifier's linearity was measured using the input referred third-order intercept point (IIP3). Fig. 15, Shows the linearity plots for the two amplifiers. The two amplifiers achieved the target IIP3 of -10 dBm. The improved linearity due to feedback gave the shunt feedback amplifier the best linearity among the two amplifiers with an IIP3 of - 5.07 dBm at the frequency of 5.9GHz.

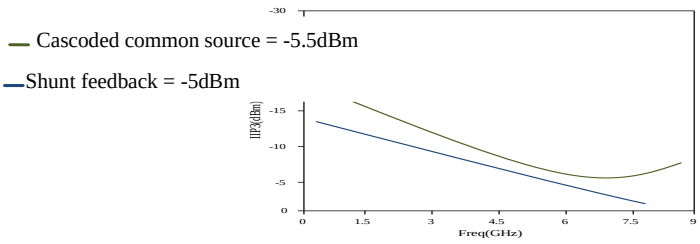

Figure 15. Input referred third-order intercept point (IIP3)

The Table III. Illustrates the summary of the simulation results for the LNA designs. The performance of the designed LNA is compared with the performance of the recently reported Low noise amplifiers.

TABLE III. Comparison of the low noise amplifier designs

[11]	Current Reuse Amplifier	1.5	5	13	5.7	4.8	-10.3	-14.5	-45.8	-5.6
[12]	Distributive Amplifier	1.8	9	12.5	2.9	21.6	-12	-8	-25	-5.9
[12]	Common Gate Amplifier	1.8	10	15	4.4	12	-9	-12.4	-24	5.1
[12]	Differential Amplifier	1.4	5	12	5.2	22	-10.4	-14.7	-47.5	6.7

VI. CONCLUSION

In this paper, the designs of low-noise amplifiers are implemented for a WiMAX receiver. The amplifiers were implemented in a standard 180-nm CMOS process using 1V as supply voltage. The targeted operation frequency is in the range of 5.725 GHz to 5.925 GHz.

The cascoded common source achieved the lowest noise figure compared to other amplifier due to the noise optimization in the implementation of the input matching using inductive degeneration. The cascoded common-source also achieved the lowest power dissipation since it contains only one current branch. The low voltage operation capability of the cascode was offset by its high power consumption and further optimizations in the design are needed if it will be used in low-power applications. The shunt feedback amplifier achieved the highest gain, which is easily controlled by changing the value of the feedback resistor. The shunt feedback amplifier's highly linear performance makes its choice in the implementation of a wideband receiver. The shunt feedback amplifier has a slightly higher noise figure compared to the cascoded common source amplifier.

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A CASE STUDY OF RISKS PRIORITIZATION USING FMEA METHOD

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Abstract

Nowadays, Customers are placing tremendous pressure on vendor companies for high quality, reliable products. The rising capabilities and functionality of many products are creating it additional complex for producer to keep up the quality and reliability, which not only satisfies him but also delights him. Considerable research has been carried out and literature available in the field of Supply Chain Management since 1990. Successful supply chains use integrated measurement systems as a tool to achieve their organizational objectives. A comparative analysis of various risks factors reduces the chance of its occurrence. It indicates that validity of many of the measurement frameworks need to be established through further study. The process of choosing appropriate supply chain performance measures is difficult as a result of the complexity of these systems. The main motive of this paper is risk Prioritization using FMEA method, which are more severe for the Company.

The vital motive of this analysis to review the literature in the field of various risk factors for supply chains to understand current practices and to help Industry to sustain its continue win in flat market where the competition is slit throat in current market.

To accomplish this objective following steps have been performed:

1) Literature review on supply risk as well as FMEA Method

2) SMEs (Subject Matter Experts in industry) inputs

3) A Failure Mode and Effects Analysis (FMEA) method is being used for getting risks Prioritizations.

Index Terms- Supply Chain, FMEA, RPN, Risk, Supply Chain Management, Prioritization

FMEA= Failure Mode and Effects Analysis
RPN= Risk Priority Numbers.

I. INTRODUCTION

Risk management is a critical component of strategy development and execution, and a driver of firm success. A survey of researchers found that 74.2% of respondents believe supply chain risk management (SCRM) is a subset or extension of ERM (Sodhi et al., 2012). While there has been an increasing amount of SCRM research, there is no consensus on the definition or scope of SCRM (Sodhi et al., 2012). For example, a three-step SCRM process has been proposed: (1) specifying sources of risks and vulnerabilities, (2) assessment, and (3) mitigation (Kleindorfer and Saad, 2005). Other researchers proposed a four-step processes (Hallikas et al., 2004; Juttner et al., 2003), while others propose a five-step process (Manuj and Mentzer, 2008). Though common elements appear across all these frameworks, there is not yet agreement on what components and definitions constitute a "standard" SCRM process.

Failure Modes and Effects Analysis (FMEA) is a technique for evaluate possible reliability troubles in the early hours at the progress cycle where it is simpler to acquire actions to overcome these matters, thereby improving consistency through design. FMEA can be apply to recognize probable failure modes, conclude their effect on the process of the product, and categorize actions to diminish the failures. A vital step is anticipating what might go incorrect with a product.

Whereas anticipating each failure mode is not possible, the improvement squad ought to invent as extensive a record of likely failure modes as probable.

Near the beginning and steady use of *FMEAs* in the design process let to the engineer to drawing out failures and manufacture dependable, protected, and customer satisfying goods. *FMEAs* also carry chronological information for use in upcoming product development.

In this paper, presenting a model for prioritizing risk in supply chains based on the Failure Mode and Effects Analysis (FMEA) method. The FMEA supports managers in prioritizing the risks, put all the risk on severity scale to identifying risk optimization requirement. It is followed by the discussion of FMEA methodology and prioritization of factors for coordinated supply chain. Eventually, it discusses results and conclusion.

II. METHOD AND PROCEDURE

In this Paper, FMEA (Failure Mode and Effects Analysis) methodology has been applied to the evaluation of risk related to supply chain management in a manufacturing firm. Five risks for the company are evaluated and defined. The criteria weights can be more precisely defined in a scale of 1 to 5.where 5 is highest and 1 is lowest.
FMEA is the methodology designed to identify potential failure modes for a product or process before the problems occur, to assess the risk. Ideally, FMEA's are conducted in the product design or process development stages, although conducting an FMEA on existing products or processes may also yield benefits.

For calculating the risk Prioritization in *FMEA* method, Risks have been evaluated by set of Questionnaire respond from SME (Table 1).Risks have been evaluated in three components which are multiplied to produce a Risk Priority Number (*RPN*):

1) Severity (*S*): Severity is described on a 5-point scale where 5 is highest.
2) Occurrence (*O*): Occurrence is described on a 5-point scale where 5 is highest.
3) Detection (*D*): Detection is described on a 5-point scale where 5 is highest.

RPN= S*O*D.

Note: All the Calculations/Tables are below in Appendix

III.RESULT ANALYSIS

The FMEA method in this study is formed to prioritize the various risks within the organization. As per this method first priority considers the severity of risk and then Occurrence of that risks comes in precedence, last but not least is Detection of risk. Higher the RPN value, higher the priority of risk. Thus the firm has Risk Priority by the use of FMEA method (see table 3) Here the most critical risks are industrial risk and then Decision Making risk according to their RPN value (see in table 2) that require optimization at maximum level. The industrial risk must be dealt with to reduce the losses to the supply chain management. The sub factors associated with the industrial risk should be solved according to their ranking.
Therefore it is advised to the company to deal with reducing the most ranked risks so that the supply chain of the firm can function without loss.
* Note: There is no threshold value for RPNs. In other words, there is no value above which it is mandatory to take a recommended action or below which the team is automatically excused from an action.

IV.CONCLUSION

The FMEA concepts in manufacturing supply chain should be considered with meticulousness which is the need of the time, as manufacturing supply chain is becoming less vertically integrated and the manufacturer is focusing on its core competency. Using FMEA method the study of various risks is done here that which risk is more critical here for any industry. Therefore, a structured, simple and efficient proposed decision framework is proposed and has the ability to show the direction to determine the degree of impact level of each RF (Risk Factor). The degree of impact level of each RF of the firm will give idea for optimally allocating the efforts to gain maximum benefit. A case situation is revealed in order to reinforce the salient features of the proposed framework. The results indicate that the industrial risk and then Decision risk have got the highest impact on successful implementation of Supply Chain.

Further research is suggested to develop a decision framework that can able to find out optimal number of solutions for identifying and mitigating the most influencing Risk factors of the supply chain in a specific environment.

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Appendix

Step 1: Structuring the Questionnaire for each risk factor:

This phase involve formulating the questionnaire for each risk factor, the goal of our problem is risk Prioritization and various risk factors as Product ,planning and design risk, environment risk, industrial risk ,product risk and Decision making risk..

Step 2: Collating the inputs from SMEs for each questionnaire:

After creating the questionnaire, the next step is measuring and collecting the data, the risk factors (RF) are identified through literature review and in consultation with expert opinions from managers, senior engineers and engineers from Indian Manufacturing Industries. In order to prioritize the RFs, RFs are sub-divided themselves on the basis of the questionnaire. Therefore, FMEA method is used for prioritization of RFs (See table 1).

Table 1 – Risk Evaluations on the basis of SME (Subject Matter Expert) Inputs

S.NO	PARAMETERS	Severity (1-5)	Occurrence (1-5)	Detection (1-5)
1	PRODUCT PLANNING AND DESIGN RISKS			
1.1	Master planning & scheduling mistakes	3	2	1
1.2	Manpower shortage	2	3	2
1.3	Manufacturing risks	1	1	2
1.4	Quality tools unavailability	1	1	1
1.5	Quality control mistakes	2	2`	1
	AVERAGE	1.8	1.8	1.6
2	PRODUCT RISK			
2.1	Inaccuracy in machining	3	3	1
2.2	Machine fault	2	4	2
2.3	Quality of raw materials	5	3	2
2.4	Faulty Design of product	3	1	1
2.5	Scarcity of raw materials	5	1	1
	AVERAGE (18/5)	3.6	2.4	1.4
3	ENVIRONMENTAL RISK			
3.1	Political uncertainty	1	3	5
3.2	Social uncertainty	2	3	4
3.3	Economic uncertainty	2	3	4
3.4	Natural threats	1	2	3
3.5	Environment laws	1	1	1
	AVERAGE	1.4	2.4	3.4
4	INDUSTRY RISK			
4.1	Input market uncertainty	5	4	4
4.2	Product market uncertainty	5	5	5
4.3	Competitive uncertainty	5	4	5
4.4	New norms of industry	3	4	4

4.5	Direct competition from existing firms	5	4	4
	AVERAGE	4.6	4.2	4.4
5	DECISION MAKING RISK			
5.1	Knowledge/ skills	5	4	5
5.2	Information seeking	1	1	2
5.3	Rules and procedures	1	1	2
5.4	Non feasibility of the decision	4	2	2
5.5	Sudden change in the actual practice	4	1	2
	AVERAGE	3	1.8	2.6

Step3: Calculation of Risk Priority Number (RPN): It derive by multiplication of average of each risk severity, Occurrence and Detection of Defect.

Table 2 - Calculation of RPN

S.No.	Severity (S)	Occurrence (O)	Detection (D)	RPN (S*O*D)
PPR	1.8	1.8	1.6	5.2
PR	3.6	2.4	1.4	12.1
ENR	1.4	2.4	3.4	11.4
INR	4.6	4.2	4.4	88.0
DMR	3	1.8	2.6	14.0

Step 4: Prioritization of Risks: Higher the RPN value of risk mean that risk is very critical and require immediate attention of organization.

Table 3 – Prioritization of Risks

RPN (S*O*D)	Prioritization of Risks
5.2	V (Lowest)
12.1	III
11.4	IV
88.0	I (Highest)
14.0	II

A CASE STUDY OF RISKS OPTIMIZATION USING AHP METHOD

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Abstract- Worldwide Competitiveness today, means that the customer is Utmost. As the customer is supreme, only those enterprises are going to be prosperous which are able to provide goods and services to the customer in timely, cost effective manner and also provide quality, which not only satisfies him but also delights him. Considerable research has been carried out and literature available in the field of Supply Chain Management since 1990. Successful supply chains use integrated measurement systems as a tool to achieve their organizational objectives. A comparative analysis of various risks factors reduces the chance of its occurrence. It indicates that validity of many of the measurement frameworks need to be established through further study. The process of choosing appropriate supply chain performance measures is difficult as a result of the complexity of these systems. The main motive of this paper is risk identification and determining risk optimization, which are more severe for the Company.

The vital motive of this analysis to review the literature in the field of various risk factors for supply chains to understand current practices and to help Industry to sustain its continue win in flat market where the competition is cut throat these days.

To accomplish this objective following steps have been performed:

1) Literature review on supply risk as well as a series of industry interviews

2) From Risks factors, a Hierarchical Risk Factor classification structure is created

3) An Analytical Hierarchy Processing (AHP) method with enhanced Consistency to rank risk factor for suppliers is created for getting risks optimization requirement.

Index Terms- Supply Chain, Analytical Hierarchy Process (AHP), Risk, Supply Chain Management, Optimization

I. INTRODUCTION

Risk management is a critical component of strategy development and execution, and a driver of firm success. A survey of researchers found that 74.2% of respondents believe supply chain risk management (SCRM) is a subset or extension of ERM (Sodhi et al., 2012). While there has been an increasing amount of SCRM research, there is no consensus on the definition or scope of SCRM (Sodhi et al., 2012). For example, a three-step SCRM process has been proposed: (1) specifying sources of risks and vulnerabilities, (2) assessment, and (3) mitigation (Kleindorfer and Saad, 2005). Other researchers proposed a four-step processes (Hallikas et al., 2004; Juttner et al., 2003), while others propose a five-step process (Manuj and Mentzer, 2008). Though common elements appear across all these frameworks, there is not yet agreement on what components and definitions constitute a "standard" SCRM process. Even without agreement on broad SCRM frameworks, a variety of supply risks and risk management strategies have been identified. Supply risks have been classified as supplier, market and item risks (Zsidisin, 2003) for example. Specific risks include order fulfillment errors, information distortion,labor disputes, natural disasters, capacity shortages, supplier bankruptcy, exchange rate risks,government regulations, single sourcing, and port delays for example (Blackhurst et al., 2005;

Manuj and Mentzer, 2008; Tummala and Schoenherr, 2011; Zsidisin and Hartley, 2012). Different risks require different SCRM processes (Zsidisin and Wagner, 2010). Supply chain risk management strategies include environmental scanning (Zsidisin et al., 2004), use of capable suppliers (Manuj and Mentzer, 2008), dual sourcing (Khan and Burnes, 2007), contingency planning (Kleindorfer and Saad, 2005), supplier credit analysis (Kern et al.), inventory buffers (Tang, 2006),integration of information systems and supply chain modeling (Giannakis and Louis, 2001), and speculation, hedging and forward buying (Zsidisin and Hartley, 2012) for example. Firms face multiple supply risks, whether in combination or isolation. Each risk might require a specific SCRM technique (Zsidisin & Wagner, 2010). SCRM treatment options include evaluation and trust building (Laeequddin, Sardana, Sahay, Abdul Waheed, & Sahay, 2009), use of dual sources (Khan & Burnes, 2007), environmental scanning (Zsidisin, Ellram, Carter, & Cavinato, 2004), combined capacity reservation contracts and spot markets (Inderfurth & Kelle, 2011), qualification and use of capable suppliers (Manuj & Mentzer, 2008), supplier quality management initiatives (Holschbach & Hofmann, 2011), buffer inventory (Tang, 2006), contingency plans (Kleindorfer & Saad, 2005), credit analysis (Kern, Moser, Hartman, & Moder),strategic sourcing and flexibility (Chiang, Kocabasoglu-Hillmer, & Suresh, 2012), forward buying or hedging (Zsidisin & Hartley, 2012) and supplier development (Matook, Lasch, & Tamaschke, 2009) for example. Despite the plethora of risks and risk management approaches, few firms have a structured SCRM approach (Martin, Mena, Khan, & Yurt, 2011).

In this paper, presenting a model for assessing risk in supply chains based on the Analytic Hierarchy Process (AHP). The AHP supports managers in prioritizing/optimization the supply chain objectives, identifying risk indicators, put all the risk on severity scale to identifying risk optimization requirement. It is followed by the discussion of AHP methodology and prioritization of factors for coordinated supply chain. Eventually, it discusses results and conclusion.

II. METHOD AND PROCEDURE

In this Paper, AHP (Analytical Hierarchy Process) methodology has been applied to the evaluation of risk related to supply chain management in a manufacturing firm. Five risks for the company are evaluated and defined. The criteria weights can be more precisely defined by the AHP methodology using "Saaty scale" than using the digital logic method. However, subjectivity is playing a great role in both of methods. Subjectivity is included to the comparison of alternatives by the original AHP methodology, also. Contrary, by using other method there is no subjectivity concerned of alternatives comparisons because of dealing with transformed values of criteria. The ranking of all alternatives can be performed, by obtaining the priorities. Criteria (sometimes called objectives or attributes) are the quantitative or qualitative data (judgments) for evaluating the alternatives. In AHP methodology, the term properties is equivalent to the term criteria. The weights of the criteria present the relative importance of each criterion compared to the goal. Finally, alternatives present the group of feasible solutions of the decision problem. Alternatives are evaluated against the set of criteria.

Different phases of method are as follow:

IV. Structuring the problem and building the AHP model.
V. Collecting the data from expert interview.
VI. Pairwise comparison of each factor.
VII. Calculation of consistency index to rank Optimization requirement of each risk.

Note: All the Calculations/Tables are below in Appendix

III.RESULT ANALYSIS

The AHP model in this study is formed to prioritize the various risks within the organization. Pairwise compa rison is done according to the table of scale 1 to 5 (see in table1). Consistency ratio (CR) is calculated to the degree of consistency of pair wise compression Risks are ranked according to highest Principal Vector**.** If CR is less than 10%, judgments are considered consistent. And if CR is greater than 10%, the quality of judgments should be improved to have CR less than or equal to 10%. In this study, the CR is 0.0141 which is less than 10% .It implies that decision taken by expert is satisfactory for further analysis. Thus the firm has consistent risk by the use of AHP method. Here the most critical risks are industrial risk and then product related risk according to their principal vector value (see in table 3) that require optimization at maximum level. The

industrial risk must be dealt with to reduce the losses to the supply chain management. The sub factors associated with the industrial risk should be solved according to their ranking.

Therefore it is advised to the company to deal with reducing the most ranked risks so that the supply chain of the firm can function without loss.

IV.CONCLUSION

The AHP concepts in manufacturing supply chain should be studied with precision which is the need of the hour, as manufacturing supply chain is becoming less vertically integrated and the manufacturer is focusing on its core competency. Using AHP method the study of various risks is done here that which risk is more critical here for any industry. Therefore, a structured, simple and efficient proposed decision framework is proposed and has the ability to show the direction to determine the degree of impact level of each RF (Risk Factor). The degree of impact level of each RF of the firm will give idea for optimally allocating the efforts to gain maximum benefit. A case situation is revealed in order to reinforce the salient features of the proposed framework. The results indicate that the industrial risk and then product risk have got the highest impact on successful implementation of SC. Further research is suggested to develop a decision framework that can able to find out optimal number of solutions for identifying and mitigating the most influencing factors of the supply chain in a specific environment.

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Appendix

Phase 1.Structuring the hierarchy model of factors

This phase involve formulating the hierarchy of AHP model consisting of goal ,factors & sub factors, the goal of our problem is risk management/optimization and various risk factors as planning risk, product risk, environment risk, industrial risk ,productivity risk and those are father divided into several sub factors.

Phase2. Collecting the data through expert interview:

After building the AHP model the next step is measuring and collecting the data, which involves the group of expert and assigning pair wise comparison to the various risks, using the table of five point scale (this scale is called the Saaty Scale), a questionnaire set is prepared that consists of all the factors and sub factors .The expert will assign a score to each risk compare to other risk from the range of 1 to 5 (Table 1).

Table-1 Scale for Rating

Intensity of importance	**Definition**	**Explanation**
1	Equal importance	Two factors contribute equally to the objective.
2	Somewhat more important	Experience and judgment slightly favor one over the other.
3	Much more important	Experience and judgment strongly favor one over the other.
4	Very much more important	Experience and judgment very strongly favor one over the other. Its importance is demonstrated in practice.
5	Absolutely more important	The evidence favoring one over the other is of the highest possible validity.
	Reciprocal	While comparing reversely one risk to other, value would be 1/original comparison.

The risk factors (RF) are identified through literature review and in consultation with expert opinions from managers, senior engineers and engineers from Indian Manufacturing Industries. In order to prioritize the RFs, RFs should be compared among themselves on the basis of the questionnaire. Therefore, AHP is used for prioritization of RFs as it has the ability to capture both quantitative and qualitative decision criteria. Analytic Hierarchy Process (AHP) was developed in 1972 as a practical approach in solving relatively complex problems. The AHP allows decision maker to model a complex problem as a hierarchical structure that shows the relationship between the goal, primary criteria, sub-criteria and alternatives. It is used for multi-criteria problems in a number of application domains. The step by step algorithm used is shown below.

Step 1: The pair-wise comparisons among the RFs are developed on the basis of expert judgments. A scale of 1 to 5 as shown below Table 2 is used for pair-wise comparisons. The pair-wise comparisons are done in terms of which a RF dominates another. These judgments are then expressed as integers. If RF A dominates over RF B, then the whole number integer is entered in row A, column B and reciprocal is entered in row B, column A. If the RFs being compared are equal, a one is assigned to both positions.

Step 2**:** Construct a set of pair-wise comparison matrices for RFs on the basis of the opinions of all pre decided number of experts.

Step 3: There are several methods for calculating the eigenvector. By making each column of matrix normalized by dividing each value of column by sum of column, this would normalize the values.

Step 4: The next stage is to calculate λmax (max Eigen Value), multiply on the right the matrix of judgments by the eigenvector, obtaining a new vector. The product Aω and the AHP theory says that Aω = λmaxω (For such a Aω Square matrix, ω is said to be an eigenvector (of order n) and λ is an eigenvalue) so we can now get estimates of λmax by the simple expedient of dividing each component, by the corresponding eigenvector element,check consistency the pair-wise comparison matrix using the Eigen value.

Step5: In Analytic Hierarchy Process (AHP) method Finally, a Consistency Index can be calculated using formula **(λmax- n)/(n- 1)**. That needs to be assessed against judgments made completely at random and Saaty has calculated large samples of random matrices of increasing order and the Consistency Indices of those matrices. A true Consistency Ratio is calculated by dividing the Consistency Index for the set of judgments by the Index for the corresponding random matrix. Saaty suggests that if that ratio exceeds 0.1 the set of judgments may be too inconsistent to be reliable. In practice, CRs of more than 0.1 sometimes have to be accepted. If CR equals 0 then that means that the judgments are perfectly consistent.

Phase 3. Pairwise comparison of each factor.

Table 2 - Pair wise compression matrix

	PPR	PR	ENR	INR	DMR
PPR	**1.00**	**1/3**	**2.00**	**1/4**	**1/2**
PR	**3.00**	**1.00**	**4.00**	**1/2**	**2.00**
ENR	**½**	**1/4**	**1.00**	**1/5**	**1/3**
INR	**4.00**	**2.00**	**5.00**	**1.00**	**3.00**
DMR	**2.00**	**1/2**	**3.00**	**1/3**	**1.00**
SUM OF COLM	**10.5**	**4.08**	**15**	**2.28**	**6.83**

Table 3 – Normalized matrix

	PPR	PR	ENR	INR	DMR
PPR	**0.10**	**0.08**	**0.13**	**0.11**	**0.07**
PR	**0.29**	**0.25**	**0.27**	**0.22**	**0.29**
ENR	**0.05**	**0.06**	**0.07**	**0.09**	**0.05**
INR	**0.38**	**0.49**	**0.33**	**0.44**	**0.44**
DMR	**0.19**	**0.12**	**0.20**	**0.14**	**0.15**

Phase 4. Calculation of consistency index to rank Optimization requirement of each risk

Table 4- Average value matrix

Factors	Eigen Vector	Principle Vector	Optimization Ranking
PPR	**0.10**	**0.23**	IV
PR	**0.26**	**0.62**	II
ENR	**0.06**	**0.15**	V
INR	**0.42**	**1**	I
DMR	**0.16**	**0.38**	III

Table 5- Average Eigen value

FACTORS	New Vector	λ (New Vector/PV)
PPR	**0.49**	**5.02**
PR	**1.34**	**5.10**
ENR	**0.31**	**5.03**
INR	**2.13**	**5.11**
DMR	**0.81**	**5.06**

Consistency Index (CI) = (λ max - *N*) / *N* – 1

Consistency Ratio (CR) = CI/RI corresponding to *N*

λmax = average of the RFs of λ.(see table 5)

Where RI: Random Consistency Index (see Table 6) and *N*: Number of RFs

Table 6-Random consistency index

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	**0**	**0**	**0.58**	**0.9**	**1.12**	**1.24**	**1.32**	**1.41**	**1.45**	**1.49**	**1.51**	**1.48**	**1.56**	**1.57**	**1.59**

λ_{MAX} = 5.06

N = 5

$$CI = \frac{\lambda_{MAX} - N}{N - 1} \qquad CI = 0.0158$$

$$CR = \frac{CI}{RI} \qquad CR = 0.0141$$