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Factors Affecting Quality in the Delivery of Public Housing Projects in Lagos State, Nigeria

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ABSTRACT

The research work delves into the origin of public housing in Lagos, Nigeria and its development over the years. It identifies the challenges of public housing but focuses on appraising the quality assurance practices in the construction industry. The objectives are to examine the factors that hinder effective quality assurance practices; and to ascertain who should be largely responsible for ensuring/enforcing effective quality assurance practices in public housing projects. In achieving the objectives, a field survey involving a sample size of 73 respondents, mainly the professionals in the built environment working directly with Lagos State and those managing the housing projects awarded to different contractors using structured questionnaires. The study reveals that the aims and objectives of quality assurance are easily compromised and frequently lost since it relies heavily upon the individual contributions to implementation from each designer, contractor, supplier and sub-contractor. The study concludes that all have major roles to play in ensuring quality work in public housing projects; enforcement of quality standards by government agencies, setting up of quality assurance department in construction firms and enforcing statutory requirements as well as providing trainings and seminars on quality standard. Severe penalty for non compliance to quality standards be put in place by government and professional bodies. Clients must demand proof of contractors' credentials for quality assurance capability before compiling their tender lists, and professionals on the project must try to work together in attaining desired quality.

Keywords: *Quality Assurance, Public Housing, Housing Project, Quality Standard and Compliance.*

1. INTRODUCTION

Quality assurance is important in the engineering and construction industry because of the risk involved in any project (Bubshait and Al-Atiq, 1999). The risk involved in not completing the project on time is high, because many external factors will affect the performance of the project. Construction industry is ever changing, unique and complex in nature. The differing needs and priorities of the clients, differing sites and surroundings, and differing views of designers on the best design solution is making the nature of each building or facility as "one-of-a-kind" (Warszawski, 1990). It is vital that a built-in quality assurance system is developed to avoid any inefficiency that could result in poor quality of product and services being delivered to the customer. According to Bubshait and Al-Atiq, (1999) quality systems involve internal and external aspects. An internal quality system covers activities aimed at providing confidence to the management of an organization that the intended quality is being achieved. This is called a "quality management system." Successful implementation of quality management systems can contribute to an increase in product quality, improvements in workmanship and efficiency, a decrease in wastage, and increase profit. An external quality system covers activities aimed at inspiring confidence in the client that the supplier's quality system will provide a product or service that will satisfy the client's quality requirements. This is called a "quality assurance system". The quality system can work effectively only when the top executive responsible for engineering or production takes full responsibility for interpretation and implementation of the quality assurance program. A contractor's quality assurance system is very important to her/his clients, who will gain confidence that "getting it right the first time" will be the contractor's norm.

However, a review of UK research studies have shown that there have been a number of research projects surrounding the concept of quality and its assurance in recent years. Some of these have focused on performance of buildings through the quantification of building faults and defects, whilst others have qualitatively assessed the significance of design, project communication, management and supervision upon the nature and extent of problems concerning quality occurring during construction projects. From these researches, it was observed that in the USA, a study of performance problems in housing has been undertaken following the identification of severe moisture related building defects in timber-framed dwellings, timber frame being a form of construction used for many years across much of the USA. In South America, Africa and the Far East, which in construction terms, remain developing countries, research

studies have focused upon identifying the basic problems in their respective designs and construction processes which affect the quality of their National construction outputs. Iyagba (2005) states that the Nigerian Engineers and in particular the professional builders, who are the professionals specifically trained to ensure total compliance of quality standard and delivery safe infrastructures, have been working hard at implementing measures to reduce these occurrences due to incidences of infrastructural failures and collapses all over the country having assumed an alarming proportion, according to Akeju (2007). The Lagos state government embarked on fresh initiative by devising a plan to reactivate a little known agency in its administration known as Materials Testing Laboratory (MTL). This agency is to be responsible in carrying out testing of concrete and sandcrete blocks, iron rods, asphalt, soil and other related civil and building engineering materials in its laboratory. The aim is to prevent or at best minimize the rate of infrastructural failure and building collapse in the state.

From the foregoing, it can be seen that the issue of quality has been and is still of universal interest. Standards of quality achieved pose many problems at national and international level in countries be it developing or developed, or whether the construction industry is large and complex or small and simple (Griffith, 1990). In spite of Government's apparent concern over the quality of construction outputs in Nigeria, Bamisile (2004) noted that little efforts have been made to ensure compliance to quality standards in the Nigerian construction industry and this is reflected in the publication of only two codes of practice for use in the construction industry in 1973 by the Standard Organization of Nigerian (SON) since its inception. These codes are outdated in relation to the present development in construction materials, design and site techniques. The first version of BS5750 Quality systems was published in 1979 by the British Standard Institute (BSI). BS5750 was reviewed in 1987 to be in harmony with the International Standards Organization (ISO 9000) series. SON has officially adopted ISO 9000 series for quality management in Nigeria. The impact of its implementation and certification in the Nigerian construction industry is yet to be seen.

Mabogunje (2003) is of the opinion that many infrastructures are built without approved plans and do not comply with laid down quality standard and building regulations. This is because despite all the efforts by the Nigerian government, the rate of infrastructural failures and building collapse is still on the increase because compliance to approved quality standards, a management discipline, is not properly enforced. Griffith (1990) says that even when approved plans exist, the developers/owners refuse to follow standards and specifications as contained in the plan and cut corners probably because quality assurance is not always a cost effective activity though it is essential if fitness for purpose is the measure of performance and where the satisfaction of the client or customer is to be placed first and foremost. Quality assurance is firmly dependent upon clients knowing their specific needs and communicating these unambiguously to the designer, upon the designer accurately representing these requirements in the design concept, upon the contractor faithfully reproducing these requirements in the work on site, and taking quality assurance to its end, upon the occupier using the building correctly to achieve maximum performance. From the pre-independence period, the colonial administration had put in place some organizations to realize the objectives of its housing policies which were initially directed at the provision of staff quarters in government residential areas (GRA) particularly for expatriates and layer for indigenous top Civil servants (Iyagba, 2005). In the mid-fifties however, the Lagos Executive Development Board (LEDB) which was established in 1928 to adequately prepare a comprehensive planning of Lagos got involved in public housing estates. In 1971, long after independence, the National Council on Housing was established and in 1972 embarked upon the National Housing Programme. The aim according to Adetokunbo (2001) was to provide affordable housing for all income groups and achieve a housing situation in which an average worker would not have to pay more than 20% of his monthly income on rent. Findings have however shown that this policy has not yielded the desired results due to various problems identified by Olotuah (2000) such as the provision of housing units being grossly inadequate when demand for it is considered in the light of the United Nation's Organization's General Assembly declaration of 24th October 1970 and the increasing population growth. Ometan (2002) also identified the problem of high cost of building materials stalling the individual quest to build at an affordable cost irrespective of various Government policies to bring cost within reach such as zero tariffs and bulk purchases. Mabogunje (2003) went further to list the problems confronting housing provision in Nigeria as: (i) problems of inadequacy of housing units distribution, (ii) high cost of building materials, (iii) inappropriate technology, (iv) unavailability of mortgage funds and housing loans, (v) the land use system, (vi) infrastructures development and (vii) rural to urban migration. These are just some of the problems confronting public housing provision in Nigeria. This research project however seeks to address this problem from the angle of quality assurance in the management and delivery of public housing projects as it is also a major problem facing the construction industry as well.

2. STATEMENT OF RESEARCH PROBLEM

Establishment and achievement of acceptable levels of quality in construction projects has long been a problem (Arditi & Gunaydin, 1997) but despite a significant amount of investigation already being undertaken to examine quality failures and their causes, construction

projects are still encountering numerous quality problems (Heravitorbati, et al. 2011). According to Xiao (2002), poor quality performance that results in increased rework and has significant impacts on cost and schedule is among the major defects experienced in construction projects. There have been instances of building failures in different parts of the country, cases of abandonment of housing projects mid-way and projects failing to meet the requirements even after execution. All these have been attributed to various causes but the success of projects can only be measured in terms of the achievement of quality, quality being defined as the ability of products and processes to conform to established requirements.. Quality, as well as project success, in construction projects should be capable of being regarded as fulfillment of expectation of those contributors and stakeholders involved in such projects (Heravitorbati et al. 2011**).** Compliance to quality standards in public housing projects is therefore a very critical factor if the management and execution of such projects is to be a success. As such, this research work intends to appraise the adherence to quality standard in the management of public housing projects in Lagos, Nigeria and find out the factors affecting it.

3. AIM OF STUDY

The aim of the study is to find out the factors affecting quality in the delivery of public housing projects in Lagos, Nigeria.

3.1 Objectives of the Study

The specific objectives are:

1. To evaluate factors that hinder quality assurance practices in public housing projects.

2. To determine the effects of not adhering to quality assurance practices in public housing projects**.**

3.2 Scope of the Study

The scope covers various participants involved in the delivery of public housing projects in Lagos, Nigeria. These include the client, consultants, contractors, sub-contractors and end-users whose individual and collective level of compliance to quality standards contribute to public housing project delivery.

3.3 Significance of Study

The processes and criteria involved in awarding public housing project contracts to contractors are very important if we are to have a successful delivery of projects in terms of good quality. As such, incorporation of quality assurance programmes in the management and delivery of public housing projects could contribute to achieving a higher level of success in the delivery of such projects. Also, since the cost of quality could be very high if compromised, a minor defect in the quality standards in the case of structures can bring about a whole lot of damage to lives and properties of end users. It is therefore very important that quality assurance measures be put in place. The significance of this research thus lies in the possibility of adding to the existing information on quality assurance practices in public housing projects in Lagos state in particular and in the country at large and as well as proposing solutions to the inherent problems associated with the non-compliance to quality standards in the management and execution of public housing projects.

4. LITERATURE REVIEW

4.1 Public Housing in Lagos, Nigeria

Public housing refers to a form of housing provision, which emphasizes the role of the government and its agencies in helping to provide housing, particularly for the poor, low-income and more vulnerable groups in the society. One of the major responses to housing challenge all over the world has been public housing and it has taken varied forms in different geographical contexts. Other descriptive terms are often used in its place such as social housing, state housing, state-sponsored housing, welfare housing, non-profit housing, low-cost housing, affordable housing, and mass housing (Van Vilet, 1990). Housing being one of the most important necessities of life is a priority for the attainment of living standard and it is core to the environment be it rural or urban (Ademiluyi et.al, 2008). It is a critical component in the social and economic fabric of all nations. No country is yet satisfied that adequate housing has been delivered to the various economic groups that make up its populace. Thus, most nations, in one form or another continue to claim a housing problem. Despite wealth of greater variety of materials available to urban-based residents, housing in developing countries such as Nigeria is generally low in quality and less spacious than housing in developed countries and government efforts to upgrade housing conditions are progressing slowly. For instance, the National rolling plan of 1990-1992 estimated housing deficit and government promised to increase it from 4.8million to 5.9million by 2000 (Ademiluyi, 2008). The 1991 housing policy estimated 700, 000 housing units are to be built each year if housing deficit is to be cancelled. The documents indicated not less than 60% of the new houses are to be built in urban centres. In 2006, the minister of Housing and Urban development declared that the country needs about 10million housing units before all Nigerians can be sheltered. Between 1975 and 1980, there is a plan of delivering 202,000 housing units to the public but only 28,500 units, representing 14.1% was achieved. Also, out of 200,000 housing units planned to be delivered between 1981 and 1985, only 47,200 (23.6%) was constructed. Under the National Housing Fund (NHF) programme initiated in 1994, to produce 121,000 housing units, it was believed that less than 5% was achieved. Reviewing government activities and

performances in the housing industry, Onibokun (1982) observed that before and after independence, there have been flaws in government direct housing construction, as well as problems associated with loan inadequacy, narrow conception of housing need and polarization of programme. A review of achievement of previous projects shows that little has been achieved after spending 30% of N1.9 billion budgets for housing.

Public housing began in Nigeria with the establishment of *Lagos Executive Development Board* (LEDB) in 1928 in response to the ravages of epidemics, the incidence of communicable diseases and the need to combat the filthy, poor and unhealthy living conditions as existed then in Lagos. Before then, the only planned public residential areas of Nigeria's cities were the government-reserved areas (GRAs) for expatriate colonial administrators and executives of foreign firms. The LEDB's first attempts at low-cost housing were the *Yaba Estate*, which were sold to workers, and the *Lagos Housing Scheme (LHS)* in Surulere, built on a bigger scale and on rental basis – also for low-income workers. LEDB also implemented the *Lagos Central Planning Scheme (LCPS)*, to rid Lagos Island of its slums, and the *Surulere Rehousing Schemes I & II*, scheduled to accommodate people displaced from Central Lagos (Fadahunsi, 1985). The immediate post-Independence days witnessed minimal public intervention in housing, as the activities of housing agencies were limited to the regional capital towns of Ibadan, Enugu, Benin, Kaduna, and Lagos, the then national capital. The major beneficiaries were the middle-class 'bureaucrats'-senior civil servants (Onibokun, 1985).

Public sector believes in producing houses not for profit alone, but to help in solving inadequate housing problems. But Okpala (1985) observes that public sector constructed houses are very expensive and inaccessible to most people with limited varieties in facilities and cost. So, public housing produces too few houses and more often than not, the wrong kind. However, current trend in the world shows that private sector led growth is more rapid compared to public sector, this is because private sector has a superior record of ensuring efficient resource allocation, utilization and management, leading to lower cost on the part of the management but inaccessibility to the purchase of built houses by the people due to exorbitant price in acquiring or rentage (Ademiluyi, 2008). Salau (1992) states that the majority of the rental housing units in Nigeria which provide accommodation for city dwellers belong to the informal-private sector. Ogunpola and Oladeji (1975) examined the housing situation in metropolitan Lagos, with particular reference to housing stock, quality, occupancy rate, rental prices in relation to income and communally provided facilities, relating these to internationally accepted standards of housing and concluded that there is a shortage of houses for the poor and for some low and middle-income earners. Homeless people have shelters on the streets, under bridges, on top of flyovers, churches, mosques, offices and parks and even in filling stations in Nigeria.

Therefore, for sustainable housing delivery in our urban centres, particularly Lagos metropolitan area, there is the need for both public and private developers to facilitate the provision of housing units in sufficient numbers and at reasonable costs and quality standards.

Over the years, various methods have been used for procuring buildings and other infrastructural facilities. Some of the internationally recognized procurement methods for building projects include: Traditional method; Design and construct; Design and manage; Project management; Management contracting; Turnkey Build operate, transfer etc. Well-organized clients and developers usually adopt any one of these methods. The responsibilities and liabilities of all contracting parties are clearly spelt out in the contract documents. Also the issue of quality management is stated in the contract documents. This is regarded as a formal procurement option. However, there is an informal procurement option which is prevalent in the Nigerian construction industry. This involves most private clients and/or developers who are not particularly well organized for building procurement. They sometimes engage the services of draughtsmen to produce both architectural and engineering drawings, directly engaging the services of tradesmen such as plumbers, bricklayers, steel fixers, carpenters, electricians etc. to carry out the construction work and to look after the construction process themselves. They do this instead of employing the services of qualified professionals. In this informal option, it is difficult to assign responsibilities and liabilities as there is no identifiable and reliable construction methodology and project quality management plan (Bamisile, 2004). This leads to a compromise of quality in such projects. Public housing projects are therefore faced with severe problems in terms of quality of buildings being churned out. A lot of times quality is either not being considered or it is compromised in such projects particularly in developing countries such as ours.

In summary, many of the problems experienced in public housing projects appear as a range of inadequacies from minor technical and aesthetic aspects to major building defects all resulting from bad quality management at all levels. Irrespective of their degree of severity, such problems are known to cost the industry greatly, yet, many difficulties may be alleviated through greater care and attention to standards of performance and quality at the briefing, design and construction stages of the building process (Griffith, 1990).

4.2 Factors Responsible for Quality Defects

A variety of authors have provided different categorizations of quality problems, but there have been few attempts to collect together and unify the major

sources and factors that affect quality in a comprehensive manner (Heravitorbati et al. 2011).

The authors therefore classified the quality problems in the extant literature and therefore bring together a set of most notable factors influencing quality and categorizing under four main headings as shown in table 1. This classified list provides a source of arranged information that can be used as a foundation for proposing an improved quality framework for implementation in building construction projects.

Table 1: Quality Defects Sources

Quality Problems Factors	
- Lack of contractor supervision	(Arditi & Gunaydin, 1998; Wong & Fung, 1999)
- Poor relationship and partnering among project participants	(Arditi & Gunaydin, 1998; Jha & lyer, 2006; Tang et al., 2009)
- Reduced Subcontractor responsibility	(Leonard, 2008; Pheng & Wei, 1996; Wong & Fung, 1999)
- Inappropriate method of contractor	(Arditi & Gunaydin, 1998; Pheng & Wei, 1996)
- Poor quality procedure and department	(Chan & Tarn, 2000; Moody, 2005; Saraph, et al., 1989)
- Lack of auditing system	(Pheng & Wei, 1996; Samuels, 1994)
- Poor Training system	(Arditi & Gunaydin, 1998)
- Low quality continues improvement	(Joaquin et al., 2008; Pheng & Wei, 1 996)
- Lack of process improvement	(Pheng & Wei, 1996; Saraph, et al., 1989)
- Lack of Management commitment	(Hiyassat, 2000; Marosszeky, et al., 2002; Yung & Yip, 2010)
- Lack of quality policy	(Arditi & Gunaydin, 1997; Joaquin, et al., 2008)
- Low effective project management system	(Anderson, 1992; Chan & Tarn, 2000; Yung & Yip, 2010)
- Bureaucracy	(Marosszeky, et al., 2002)
- Supplier impact	(Arditi & Gunaydin, 1997; Wong & Fung, 1999)
- Low quality drawing and specification	(Arditi & Gunaydin, 1998; Pheng & Wei, 1996)
- Design complexity	(Chan & Tarn, 2000)
- Difficult data collection system	(Arditi & Gunaydin, 1997)
- Poor performance of quality tools	(Arditi & Gunaydin, 1997; Leonard, 2008)
- Difficult application of quality system	(Mohammed & Abdullah, 2006; Serpell, 1999)
- Nature uniqueness	(Chan & Tarn, 2000; Kanji& Wong, 1998)
- Project size and complexity	(Chan & Tam, 2000; Jha & lyer, 2006)
- Material/Equipment specification	(Hiyassat, 2000; Pheng & Wee, 2001)
- Project Environment	(Chan & Tam, 2000)
Low quality and poor availability of	(Joaquin, et al., 2008; Yung & Yip, 2010)
- Lack of motivation	(Marosszeky, et al., 2002; Pheng & Wee, 2001; Serpell, 1999)
- Incompatible tendering procedures	(Jha & lyer, 2006)
- Low tendency to teamwork	(Marosszeky, et al., 2002)

Stakeholder Managerial

Technical

al/materiaEnvironmentl Equipment

Cultural/ Political

Source: Heravitorbati, et al. , 2011

The vast majority of building failures are thought to occur from faults due to the quality of design and the construction process. Irrespective of their nature, such faults are due to lack of management or to the quality of management. These can range from minor problems such as snagging items whilst others can be latent defects resulting in protracted litigation. These problems pervade due to: Historic separation of design from construction; Poor communication of design requirements; Design is difficult to build; Poor labour skills and supervision; Complex contract documentation and Unrealistic time and cost assessments.

4.3 The Value of Quality Standard

Quality assurance systems must be based upon developing a design and construction process that assures quality in the design, in the materials and components used, in the site procedures used for communicating performance standards from design to the workplace, and in effective monitoring, control and feedback mechanisms. Effective quality assurance will lead to advantages, both for the design process and construction phase. The

implementation of formal quality assurance procedures can bring:

- Better design
- More effective planning
- Improved site management
- Increased project performance
- Efficient management of construction problems
- Improved quality
- Fewer delays and disruptions
- Lower cost of remedial and repeat works
- Provision of feedback for future projects
  Enhanced reputation for good design and construction

Within the traditional form of building procurement, quality assurance relies upon the individual contribution to implementation from each party involved in public housing projects; from the client to the consultant to the contractor, to the supplier and sub-contractors and even to the end-users. Given that each professional party acts ostensibly in isolation, the aims and objectives of quality assurance are easily compromised and frequently lost. The adoption of non-traditional procurement practices can however make a useful contribution to quality improvement (Griffith, 1990).

5. RESEARCH METHODS

The research approach adopted in this study comprises of a quantitative research defined as an inquiry into a social or human problem, based on answering certain questions. This research involves a cross-sectional survey approach from which statistical data were collected to answer questions in respect of the main subject of study. Questionnaires are the main instruments used.

The population for the study comprises professionals in consulting, contracting and housing development firms who have been involved in the management and execution of public housing projects where quality assurance practices are of paramount effect within the study area. The population was determined by selecting respondents at random. Some of these corporations/firms include Lagos State Development and Property Corporation (LSDPC), Haggai homes, Lagos State ministry of works and housing etc. This resulted in a total sample size of 100. Out of 100 questionnaires distributed, 73 of them were completed, returned and considered useable. Primary data was collected through questionnaires whilst secondary data was extracted from journals, text books, seminar papers, lecture notes and occasional publications. The data were processed and analyzed using SPSS statistical analysis software. Descriptive statistics, using mainly simple percentages (%) were applied to collect data where applicable, from variables in the study. This helped in clarifying results.

5.1 Presentation of Results

Table 2. Response to questionnaire administered

Questionnaire	No	Percent
Total administered	100	100
Total returned	73	73
Not returned	27	27
Used for the study	73	73

The results of the analysis in Table 2 shows that seventy-three percent of the questionnaires administered were duly completed and returned. This result is regarded as high therefore; the response of the population of the study to the questionnaire administered is regarded as encouraging.

Table 3. Respondent's organization

Organization	Frequency	Percent
Architect	7	9.6
Civil engineer	13	17.8
Builder	12	16.4
Project manager	6	8.2
Quantity surveyor	29	39.7
Estate surveyor	6	8.2
Total	73	100.0

Table 3 shows that 9.6% out of the professional respondents are Architect, 17.8% are Civil engineer, 16.4% Builder, 8.2% are Project manager, 39.7% are quantity surveyors, and 8.2% are Estate surveyor. This shows that Quantity surveyors were the highest respondents.

Table 4. Academic qualification of respondents

Academic qualification	Frequency	Percent
Diploma	3	4.1
First degree	31	42.5
Second degree	31	42.5
Higher degree	8	11.0
Total	73	100.0

Table 4 above shows that 4.1% are Diploma graduates, 42.5% are First degree, 42.5% of Second degree, and 11.0% are higher degree. This shows that First degree and Second degree are the highest respondents.

Table 6. Industrial experience of respondents

Industrial Experience	Frequency	Percent
Under 10 years	40	54.8
10-20 years	23	31.5
21-30 years	7	9.6
Over 30 years	3	4.1
Total	73	100.0

Table 6 above shows that 54.8% respondents have less than 10 years industrial experience, 31.5% respondents have experience between 10-20 years, 9.6% respondents have between 21-30 years while 4.1% have Over 30 years. This implies that the highest scale of respondents is Under 10 years.

Table 8. Type of Organization

Organization	Frequency	Percent
Contracting	23	31.5
Consulting	24	32.9
Housing developing firm	26	35.6
Total	73	100.0

Table 8 above shows that 31.5% respondents are Contractors, 32.9% are consulting and 35.6% are Housing developing. This implies that the highest scale of respondents is Housing developing firm.

Table 12. Frequency table of compliance to quality control measures

Quality control method	Total Compliance	Good Compliance	Fair Compliance	Poor Compliance	None Compliance	MIS	RANK
	5 Points	4 Points	3 Points	2 Points	1 Point		
Use of code of conduct	23	39	11	0	0	4.15	3rd
Materials selection and usage	26	42	5	0	0	4.30	1st
Construction process adopted	22	40	11	0	0	4.15	3rd
Recording changes	14	22	28	6	3	3.50	6th
Report of non conformity to quality standards	12	37	15	6	3	3.65	5th
Inspection and testing of executed works	29	30	14	0	0	4.20	2nd

Materials selection and usage ranked highest in quality control measures used in evaluating compliance level to quality assurance standards. Recording changes ranked lowest. This implies that respondents pay more attention to the type of materials used for projects and how they are used than taking note of and recording changes which may occur as projects progress. Still trying to determine the level of awareness of quality assurance practices in public housing project, the phase of project life cycle when quality control is first considered was considered. Table 12 reveals that 38.4% of the respondents introduce a form of Quality control measure at the conception phase of projects, 27.4% at the design phase while 34.2% are concerned with quality assurance during the construction phase.

Table 15. Ranking of how often identified factors affect quality housing project delivery

Factors	Never	Rarely	Sometimes	Often	Always	MS	Rank
	1point	2points	3points	4points	5points		
Separation of design team from construction team	9	10	24	19	11	3.20	10th
Poor communication of design requirements by clients	0	0	15	15	43	4.40	1st

Lack of clarity in project design and buildability problems	0	7	12	21	33	4.10	3rd
Poor labour skills and supervision	0	12	12	17	37	4.30	2nd
Complex contract documentation	9	14	26	15	9	3.00	14th
Unrealistic time assessment	6	15	19	23	10	3.20	10th
Unrealistic cost assessment	0	12	33	20	8	3.35	7th
Procurement method	6	14	18	23	12	3.30	9th
Criteria adopted in awarding contract	2	12	32	14	13	3.35	7th
Organizational structure	5	14	31	16	7	3.10	12th
Type of Client (private or government)	9	11	28	12	13	3.10	12th
Availability of construction equipment and machinery	7	0	23	20	23	3.70	6th
Availability of materials	9	3	15	16	30	3.75	5th
Availability of skilled labour	7	3	14	22	27	3.80	4th

Poor communication of design requirements by clients ranked the highest in the factors that affect quality with a mean item score of 4.40 followed closely by poor labour skills and supervision and then lack of clarity in project design and buildability problems ranking second and third with the following MIS 4.30 and 4.10 respectively. Every other factor identified, however, also has significant effect on quality achievement and none can be ignored. Thus, in determining the next objective, the effects of these factors were measured and respondents' perceptions are measured.

Table 16. Ranking of the effects of not adhering to quality standards

EFFECTS	Very serious	Serious	Sometimes serious	Not so serious	Not serious	MIS	RANK
	5 Points	4 Points	3 Points	2 Points	1 Point		
Cost overrun on projects	23	35	15	0	0	4.10	3rd
Untimely project delivery	16	27	20	10	0	3.65	5th
Structural failures leading to death	50	18	5	0	0	4.60	1st
Poor infrastructural deliverables	22	39	12	0	0	4.15	2nd
Damage to reputation	20	29	21	3	0	3.90	4th
Affects the nation's development growth	13	27	25	8	0	3.60	6th

Table 16 above shows that the Mean Item Score (4.60) of Structural failures leading to death ranks first. The MIS (4.15) of Poor infrastructural deliverables ranks second. The MIS (4.10) of Cost overrun on projects ranks third, Damage to reputation MIS (3.90) ranks 4th, Untimely project delivery MIS (3.65) ranks 5th while the MIS (3.60) of the nation's development growth being affected ranks the least among the selected factors. The result reveals that Structural failure leading to death is the most devastating result of not ensuring quality assurance whiles the effect on the nation's development growth though important is not as crucial. However, there are certain benefits/advantages that stand to be gained if Quality Assurance practiced and/or inculcated in public housing projects.

Table 17. Ranking of the benefits to be derived from application of quality standard

Benefits	Never 1point	Rarely 2points	Sometimes 3points	Often 4points	Always 5points	MIS	Rank
Production of better designs	2	1	11	13	46	4.35	1st
More effective planning	2	1	11	19	40	4.30	2nd
Improved quality of deliverables	3	0	13	14	43	4.30	2nd
Enhanced reputation for good design and construction for contractors	1	2	19	14	37	4.15	4th
Improved site management	2	1	20	20	30	4.05	5th
Increased project performance	1	2	15	20	35	3.95	6th
Efficient management of construction problems	2	1	21	22	27	3.95	6th
Fewer delays of projects and disruptions	1	5	14	37	16	3.85	8th
Lower cost of remedial and repeat works	2	0	27	24	20	3.80	9th
Provision of feedback for use in future projects	1	8	25	19	20	3.65	10th

Production of better design ranks first with a MIS of 4.35, more effective planning of projects and improved quality of deliverables both rank second with a MIS of 4.30. Enhanced reputation for good designs and construction ranks 4th with MIS of 4.15. Improved site management ranks 5th with MIS of 4.05 while provision of feedback for use in future projects ranked last with a MIS of 3.65. This shows that when quality assurance is practiced better designs are produced, projects are better and more effectively planned, contractors' reputations are enhanced and there is improved site management. Also, there is an increase in project performance, efficient management of construction problems, fewer delays and disruptions, lower costs of remedial and repeat works and provision of feedback for future projects, though ranking lower, are also benefits to be derived in quality assurance practices in public housing projects.

Having ascertained the benefits of practicing Quality Assurance in public housing projects, the next objective goes further to determine who should be largely responsible for ensuring effective compliance to the afore identified Quality control measures.

Table 18. Frequency table indicating who should be responsible for ensuring/enforcing quality assurance practices

Stake holders	Frequency	Total	Percentage (%)
Government agencies	67	73	91.8
Management of companies	69	73	94.5
Professional bodies	68	73	93.2
Clients	69	73	94.5

From the above frequency distribution, it would seem that most of the respondents are of the opinion that Government agencies, Management of companies, Professional bodies and even public housing clients all have major roles to play in ensuring/enforcing quality assurance practices in public housing projects as they all have very high percentages of 91.8%, 94.5%, 93.2% and 94.5% respectively. The next table, however, shows a frequency distribution of respondents' opinion on measures that could be taken to ensure effective compliance to quality standards in public housing projects.

Table 19. Frequency table showing what measures could be adopted to ensure effective compliance to

quality standards in public housing projects

Necessary Measures	Frequency	Total	Percentag%)
Provide training and seminar on quality assurance	57	73	78.1
Support the setting up of quality assurance department in construction firms	59	73	80.8
Enforcement of quality standards by government and/or other agency in project delivery	65	73	89.0
Severe penalty for non compliance to quality standards by government/professional bodies	57	73	78.1
Enforce statutory requirement	59	73	80.8

Table 19 shows that 89.0% of the respondents support enforcement of quality standards by government agencies, 80.8% support setting up of quality assurance department in construction firms and enforcing statutory requirements while 78.1% are of the opinion that training and seminar on quality assurance be provided and severe penalty for non compliance to quality standards be put in place by government and/or professional bodies.

5.2 Discussion of Findings

Perceived roles of project participants in ensuring quality of projects reveals that the bulk of the responsibility revolves between the client, consultants and the contractors. Their roles or responsibilities are inter-dependent such that each one needs to co-operate with the other to achieve the same goal. From the client to the consultants, contractors to the manufacturers of building components up to the end-users, all must work together in order to attain the desired quality of projects. The finding of this study reveals that effective application of quality standard generate positive results. Of the identified benefits of practicing quality assurance, production of better designs ranked the highest followed closely by improved quality of deliverables and more efficient planning.

Lastly, the analysis of the respondents' perceived opinion on who should be largely responsible for enforcing/ensuring effective quality assurance practice in public housing projects reveals that Government agencies, Management of companies, Professional bodies and even public housing clients all have major roles to play in quality assurance in public housing projects. To ensure effective compliance to quality standards in public housing projects, enforcement of quality standards by government agencies, setting up of quality assurance department in construction firms and enforcing statutory requirements as well as providing trainings and seminars on quality assurance be provided and severe penalty for non compliance to quality standards be put in place by government and/or professional bodies.

The research findings seem to justify past research findings which conclude that the level of compliance to quality standards is responsible for the quality of finished projects or deliverables (Yasamis et al. 2002). This has been brought to the fore by the finding of this research which reveals that effective application of quality standard will enhance quality of housing project deliverables. Griffith (1990) is of the opinion that quality assurance can only be applied under strictly controlled environmental conditions and often, there is inaccuracy in its interpretation and difficulty in its application. With the traditional form of procurement which is prevalent in Nigeria, the aims and objectives of quality standard are easily compromised and frequently lost since it relies heavily upon the individual contribution to implementation from each designer, contractor, supplier and sub-contractor as each acts in isolation.

6. CONCLUSIONS

From the findings above, the study concludes that ensuring quality in project deliverables is firmly dependent upon clients knowing and communicating their specific needs to the consultant/designer who accurately represents it, on to the contractor faithfully reproducing the requirements on site and finally the end-user using the building correctly. Quality assurance practice should not be limited to some specific persons as it is a concern of all if it is to be effective. Finally, without effective enforcement by government agency and/or regulatory bodies and clients demanding thorough proof of contractors' credentials for quality assurance capability before compiling their tender lists, a gap will continue to exist between the level of awareness and the quality of housing project deliverables in the country.

7. RECOMMENDATIONS

The following recommendations are made in view of the results of the study:

1. All stakeholders in the industry need to understand the importance of quality standard and inculcate it throughout the production phases of public housing projects and not just at the actual construction phase.
2. Construction and consultancy firms should be encouraged to registere with SON as this is a

conclusive guarantee that the firm is committed to quality. There may be need to attend trainings or seminar on quality assurance practices.

3. There should be constant evaluation of contractors and their organizations to determine their level of compliance to quality standards as set down by government regulations and/or regulatory bodies by the public, private professional bodies and government agencies.
4. Selection of contractors should no longer be based mainly on speed of delivery, lowest cost or favouritism but rather should be based on competency and potential for performance and quality.
5. Enforcement of quality standards must be given urgent attention and those that will be appointed to enforce quality must be professionals with integrity.

REFERENCES

[1] Abdul-Aziz, A.R. (2002) The Realities of Applying Total Quality Management in the Construction Industry. Structural Survey, 20(2), 88-96.

[2] Ademiluyi, Isreal A. and Bashiru A. Raji (2008), Public and Private Developers as Agents. In Urban Housing Delivery in Sub-Saharan Africa: the Situation in Lagos State.

[3] Adenuga, O.A. (1999) Building maintenance in Nigeria: Structural Determination, Recognition, Diagnosis of causes and Remedies *Shelter Watch*, 1(1), 5-10.

[4] Adetokunbo O. I (2001) "The legacy and challenge of public housing provision in Lagos, Nigeria

[5] Akeju, A.A. (2007) "Challenges to Providing Affordable Housing in Nigeria*", Paper presented at the 2nd Emerging Urban Africa International Conference on Housing Finance in Nigeria, Abuja,* Oct. 17-19, 2007.

[6] America National Standards Institute (2006). Retrieved from World Wide Web in May 2011.

[7] American Society for Quality (2005)" The History of Quality-Overview". Culled from the World Wide Web in May 2011.

[8] Anderson, S. D. (1992). Project quality and project mangers. *International Journal of Project Management*, 10 (3), 138-144.

[9] Anosike, M.N. and Oyebade,A.A. (2012) Sancrete blocks and quality management in Nigeria building industry. Journal of engineering, project and production management 2012, 291), 37 – 46

[10] Arditi, D and Gunaydin, H. M. (1998) "Factors that affect process quality in the life-cycle of buildingprojects".Construction Engineering and Management, ASCE, 124(3), 194-203.

[11] Arditi, D and Gunaydin, H. M> (1997). "Total quality management in the construction process". International Journal of Project Management, 15(4), 235-243.

[12] Arditi, D, Gunaydin, h. M., (1999): Perceptions of process quality in building projects. Journalof Management in Engineering, 43-53

[13] Arzai Bin Idrus and Mahmoud Sondagi (2009) "Framework for evaluating quality performance of contractors in Nigeria" International *Journal of Civil and Engineering* IJCEE-IJENS 10(1), 65-80

[14] Ashworth A.C (1994) *Cost Studies of Building.* Longman Scientific and Technical Company Ltd, London.

[15] Bamisile A. (2004) Building Production Management Foresight Press Ltd. Lagos

[16] Bamisile, A (2008) A. An Approach to Application of Total Quality Management In Building Maintenance Operation.

[17] Bubshait, A.A. (1999). ISO 9000 Quality Standard in Construction, Journal of Management in Engineering,15 (6), 41-46

[18] Chan, A. P. C., & Tam, C. M. (2000). Factors affecting the quality of building projects in Hong Kong. *International Journal of Quality & Reliability Management*, 17, 423 – 441.

[19] Construction Industry Research and Information Association (1985), CIRIA report 109, CIRIA, London.

[20] Crosby, P. B. (1967). Cutting the cost of quality. Farnsworth Publishing Company, Boston

[21] Crosby, P/. B. (1992) Completeness: Quality for the 21st Century. Penguin, New York.

[22] Dahlgaard, J.J., & Dahigaard-Park, S. (2006) Lean Production, Six Sigma Quality. TQM and Company Culture. The TQM Magazine, 18, 263-281.

[23] Fadahunsi, S.O. (1985) Fifty years of housing in Nigeria. In P. Onibokun (ed.) Housing in Nigeria, (105-132). Ibadan: Nigerian Institute of Social and Economic Research.

[24] Farooqui, R.U., & Ahmed, S.M. (2009a) A Stepping Stone to Total Quality Management for Construction Companies. Paper presented at the Seventh LACCEI Lain American and Caribbean Conference for Engineering and Technology, San Cristobal, Venezuela.

[25] Ferguson, H. and Clayton, L. Eds (1988). Quality in the constructed project. A guideline for owners, designers and constructors. Vol. 1, ASCE, New York.

[26] Foster, D., & Jonker, J. (2003) Third Generation Quality Management: The Role of Staheholders in Integrating Business into Society. Managerial Auditing Journal, 18(4), 323-328.

[27] Griffith, A (1990). Quality Assurance in Building Macmillan Education, London.

[28] Hiyassat, M. A. S. (2000). Applying the ISO standard to a construction company: A case study. *Elsevier, International Journal of Project Management*, 18, 275- 280.

[29] Iami, M. (1986). Kaizen, the key to Japan's competitive success. McGraw-Hill, New York.

[30] Iyagba, R. O. A. (2005): The menace of sick buildings – a challenge to all for its prevention and treatment. *An Inaugural lecture delivered at University of Lagos, Lagos.*

[31] Jha, K. N., & lyer, K. C. (2006). Critical factors affecting quality performance in construction projects. *Total Quality Management*, 17(9), 1155-1170.

[32] Joaquin, D., Hernandez, D., & Aspinwall, E. (2008). A framework for building quality into construction projects-Part I. *Total Quality Management*, 79(10), 1013-1028.

[33] Juran, J. M. Ed (1988). Juran's quality control handbook, 4th Ed., McGraw-Hill, New York.

[34] Kanji, G. K., & Wong, A. (1998). Quality culture in the construction industry. *Total Quality Management*, 9, 133-140.

[35] Lam, K. C (2000). Quality Management in Building Service Maintenance. Management Review, 29-38.

[36] Latham, M. (1994) *Constructing the Team*, HMSO, London

[37] Leonard, D. (2008). Quality management practices in the US homebuilding industry. The TQM Journal, 22(1), 101-110.

[38] Mabogunje, A.L. 2003): The New Mass Housing and Urban Development Policy: Social and Economic Impact." *Being text of a Public Service Lecture delivered to the Top Echelons of the Federal Civil Service. Abuja, Nigeria*. September 30, 2003 (2003).

[39] Marosszeky, R. T. M., Karim, K., David, S., & McGeorge, D. (2002). *The importance of project culture in achieving quality outcomes in construction*. Paper presented at the IGLC, Brazil.

[40] Marr, B. (2001) Scored for life, *Financial Management*, April 30

[41] Mathews,J., Pellew, L., Phua, F., &Rowlinson, S. (2000). Quality Relationships: Partnering in the Construction Supply Chain. International Journal of Quality &Reliability Management, 17, 493-510.

[42] Mohammed, A. H. b., & Abdullah, M. N. b. (2006). *Quality management system in construction*. Paper presented at the ICCI, Johor Bahru-Johor, Malaysia.

[43] Moody, D. L. (2005). Theoretical and practical issues in evaluating the quality of conceptual model: current state and future directions. *Data and Knowledge Engineering*. Elsevier, 55, 243-276.

[44] Ogunpola, A., and Oladeji, O. (1975) Housing as an Indicator of urban poverty: the case of Metropolitan Lagos. *Paper presented at Annual Conference of the Nigerian Economic Society.*

[45] Okpala, D.C.I. (1985) *Potentials and Perils of Public Urban Land Management: A Case Study of the L.E.D.B., 1928-1972. Unpublished PhD Thesis*, Cambridge: MIT.

[46] Olotuah, A.O. (2000) The Challenge of Housing in Nigeria, in O.B. Akinbamijo, A.S. Fawehinmi, D.R. Ogunsemi, and A. Olotuah (eds), Effective Housing in the 21st Century Nigeria, Akure: The Environmental Forum, Federal University of Technology, pp.16-21.

[47] Ometan, B. O (2002) Materials for structural Elements of Building. Being a paper presented at the 2 day Seminar of the Nigerian Institute of Building held at Art and Culture Centre, Abuja on 25th – 26th April, 2001.

[48] Onibokun, A.G. (1985) A critical review of the Nigerian government housing policy and programmes. *Paper presented at the 2nd International Conference on Housing, Ibadan (April).*

[49] Onibokun, P. (1982) Issues in Nigerian Housing: A Bibliographic Review, Ibadan:NISER.

[50] Pheng. L. S.. & Wee D. (2001). Improving maintenance and reducing building defects through ISO 9000. *Journal of Quality in Maintenance Engineering*, 7(1), 6-22.

[51] Pheng. L. S.. & Wei. P. K.-. (1996). A framework for implementing TQM in construction. TQM, 8, 39-46.

[52] Rao, A. (1996). *Personnel and Human Resources Management: Text, Cases and Games.* Delhi: Konark Publishers PUT Ltd.

[53] Salau, A. T. (1992) Urbanisation, housing and social services in Nigeria: The challenge of meeting basic needs, in Porter R. B. and Salau A. T. (eds) Cities and development in the Third World, England: Magnet Publishers.

[54] Samuels, A. F. (1994). Construction facilities audit: quality system- performance control. *Journal of Management in Engineering*, ASCE, 10(4).

[55] Saraph, J. V., Benson, P. G., & Schroeder, R. G. (1989). An instrument for measuring the critical factors of quality management. *Decision Science*, 20.

[56] Serpell, A. (1999). Integrating quality systems in construction projects: the Chilean case. Elsevier, *International Journal of Project Management*, 17(5), 317-322.

[57] Tang, W., Qiang, M., Duffield, C. F., Young, D. M., & Lu, a. Y. (2009). Enhancing total quality management by partnering in construction. *Journal of Professional Issues in Engineering Education and Practice*, ASCE, 129-141.

[58] Van Vliet, W. (1990) (ed.) International Handbook of Housing Policies and Practices, Westport, CT: Greenwood Press.

[59] Warszawski, A. 1990. Industrialisation and Robotics in Building: A managerial Approach. Harper & Row, New York, pp 466.

[60] Wong, A., & Fung, P. (1999). Total quality management in the construction industry in Hong Kong: A supply chain management perspective. *Total Quality Management*, 10(2), 199-208.

[61] Xiao, H &Proverbs, D (2002) The performance of contractors in Japan, the UK and the USA. International Journal of Quality and Reliability Management, 19 (6), 672-687.

[62] Yasamis, F., Arditi, D., and Mohammadi, J. (2002). Assessing contractor quality performance. *Construction Management and Economics*, 20(3), 211-223.

[63] Yung, P., & Yip, B. (2010). Construction quality in China during transition: A review of literature and empirical examination. *International Journal of Project Management*, 28, 79-91

