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Compliance to Quality Standards in the Construction of Infrastructural Services in Lagos State, Nigeria.

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Abstract
The study evaluates contractors' compliance level to quality standards in the construction of infrastructural services in Lagos State. The implications of non-compliance, the processes and criteria used in the awarding of contract were also examined. A total of 47 respondents currently engaged in the construction of infrastructural services were selected for the study using stratified random sampling technique. The data were analysed using descriptive statistics. The survey carried out indicated that most contractors in Lagos do not comply with quality standards during the construction of infrastructural services. Factors such as clarity and buildability of project design, criteria adopted in awarding contracts, materials and skilled labour availability were identified as factors affecting compliance to quality standards. Processes and criteria of awarding contracts such as due process, quota system, relationship, political power and compensation were identified to have affected compliance level to quality standards. It was deduced that non-compliance to quality standards leads to cost overrun, untimely project delivery and poor infrastructural services. This study concludes that with effective enforcement of quality standards at every phase of projects, contractors will achieve a significant improvement on their job delivery. The study recommends that all stakeholders in the industry must understand and comply with quality standards at all times.

Keywords: *Infrastructures, Quality Standard, Compliance, Quality System, Lagos State.*

1.0 Introduction

The incidences of infrastructural failures and collapses all over the country have assumed an alarming proportion and it would be understandable for many to assume that little is being done to arrest all these. The Nigerian engineers and in particular the professional builders, specifically trained to ensure total compliance of quality standard and delivery of safe infrastructures, have been working hard at implementing measures to reduce these occurrences. The recent widely reported infrastructural collapses in Port-Harcourt and Lagos serve as a clarion call to all parties involved in the construction of infrastructural services that changes need to be made, and made urgently. There is now, more than ever before, a need to stimulate the relevant authorities and, indeed, all Nigerians to, proactively, put hands on deck to nip this in the bud (Adenuga, 1999).

Infrastructures constructed within the country that follow the stipulated procedure are at par with what obtains in other countries and should not collapse unless subjected to unusual unforeseen forces. The general public should therefore help ensure that they contribute in whatever manners they can in making sure that the laws of the land are strictly followed. The general public has a major role in helping to prevent the incidences of infrastructural collapses. There are too many developers who are putting up infrastructures and buildings within the country without the necessary approvals and necessary technical expertise of a Professional Builder and Structural Engineer (Iyagba, 2005)

Compliance to quality standards in the construction of infrastructural services is a critical factor in successful

infrastructural management at the design and construction stages. Past literature shows that little efforts have been made to ensure compliance to quality standards in the Nigerian construction industry. This is reflected in publication of only two codes of practice for use in the construction industry in 1973 by the Standard Organisation of Nigerian (SON) since its inception. These codes are outdated in relation to 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 has not been seen (Bamisile, 2004).

Quality in construction is concerned with meeting the requirements defined by the owner, designer and regulatory agencies (America Society of Civil Engineer Journal, 1990). The responsibility of meeting these requirements lies squarely on compliance of the design consultants and contractors to standards, but these requirements are not always met (Adetokunbo, 2001).

Especially in Lagos state, and other parts of the country, many infrastructures are built without approved plans and do not comply with laid down quality standards and building regulations. Even when approved plans exist, the developers or owners have refused to follow standards and specifications as contained in the plan.

The construction of a building is expected to be managed by qualified professionals including builders, structural engineers, mechanical engineers, electrical engineers, architects and quantity surveyors, etc. Site supervision is important as it is required to ensure quality control of all the materials used, and compliance with approved plans and standards. Non-qualified people have however infiltrated the construction industry in Nigeria at all levels leading to poorly constructed infrastructures across the country (Mabogunje, 2003).

Worried by the spate of collapsed infrastructures in Lagos, the Lagos state government embarked on fresh initiative which it hopes will arrest the ordeal and anguish of infrastructural failure and collapsed buildings in Lagos. The Lagos state government has determined that the cause of the collapse is the use of inferior building materials for the construction of both public and private properties. To this end, it has devised a plan to reactivate a little known agency in its administration known as Materials Testing Laboratory (MTL). This body will be testing in its laboratory, concrete and sandcrete blocks, iron rods, asphalt, soil and other related civil and building engineering materials. Despite all the effort by Lagos state government, the rate infrastructural failure and building collapse is still on the increase because compliance to approved quality standards are not properly enforced (Ademiluyi, 2008).

Aim of the study:

The aim of this research study is to assess the level of compliance to quality standards in the construction of infrastructural services and in the process identify the effect(s) on their performance.

Objectives of the study

1. To examine the level of compliance to quality standards in the construction of infrastructural services.
2. To assess factors affecting compliance to quality standards in construction of infrastructural services.
3. To examine the defect(s) caused by non-compliance to quality standards in the construction of infrastructural services.

The significance of the study

The significance of this research lies in the possibility of adding to the existing information on compliance to quality standards by contractors in the country generally, and particularly in Lagos state. Contractor's compliance to quality standards when properly evaluated will help to develop strategies to improve infrastructure quality, help consultant and client in pre-contract evaluation of the contractor. Also it will help the general public in measuring the success or otherwise of the project delivery and the contractors. Also, protecting the safety and health of infrastructure users and getting value for money is a major significance for this research work.

2.0 Literature Review

"Quality" is defined as meeting the requirements of the owner, design professional, and constructor as specified by contract, while complying with laws, codes, standards, regulatory rules, and other matters of public policy. A related term to compliance of quality standards is "Deviation". Which is defined as a departure from established requirements and may be classified as an imperfection, nonconformance, or defect based on its severity (Iyagba, 2005)

2.1 Compliance to Quality Standard

Quality compliance in construction is results oriented and seeks evidence of quality awareness within the operations and output of a contractor. Quality performance is also defined over the long term for the effects to be permanent (Yasamis, Artiti & Mahammadia, 2002). In other words compliance to quality standards is expected to increase the productivity and profitability of contractors as well as increasing client satisfaction.

Compliance to quality standards by contractor at the project level includes the quality of the constructed facility as well as the quality of the contracting service. This involves:

1. Product delivery performance (technical competence and conformance to specifications the contractor demonstrates during the construction process)
2. Service design performance (competence with which the contractor carries out the construction planning activities).
3. Service delivery performance (construction management and contractor administration skills demonstrated by contractor during the construction process). (Yasamis, Arditi & Mohammadi, 2002)

Compliance to quality standards can be evaluated based on the availability and implementation of required quality standards that will help a contractor to achieve the project quality attributes. Within quality performance framework quality is seen as an element that permeates every decision and it is reflected in a firm's output (Yasamis, Arditi & Mohammadi, 2002)

2.2 Quality Standard in Use

2.2.1 Development of Quality Standards in Construction

Bamisile (2004) states that the term "Quality Control" is more common than quality assurance. He notes that the U.S. introduced the term quality control in Japan, as a result of the need to rebuild after the World War 2. The Japanese in turn imbibed this culture and went on to improve on it through the use of quality circles to study and take responsibility for the individual parts of various equipments. Bamisile (2008) also states that the need to standardize quality control across board (including building components) in the United Kingdom led to the establishment of the British Standard Institution (BSI). This culminated in over 10,000 standards been specified by the BSI, cutting across all types of goods. In spite of the standardization it was observed that expectations were still not been met and missing link was found to be management. Thus quality assurance came into being as a means of assuming a high level of human management.

According to Bamisle (2008), in the 1980's the BS 5750 was established as the British standard for quality management system and as a result clients started insisting that any firm carrying out work with them must be compliant with the standard for which a certificate is given at the end of the process involving an intimate look at the firm's mode of carrying out its work both on site and in the office.

Quality assurance however was found to have its own drawback namely that the quality assurance system does not guarantee achievement of quality assurance at first attempt, thus the birth of Total Quality Management System (TQMS), which unlike quality assurance system is inward driven and takes everything involved in production into consideration. It purports to ensure that every single item produced must meet the required specification instead of just a percentage meeting the required specification.

2.2.2 British Standard of Institution (BSI)

British Standard of Institution (BSI) was the world's first national standards-making body and it is the topmost ranking standard in the world. The body works with manufacturing and service industry, businesses, government and consumers to facilitate the production of Britain. The BSI plays a prominent role in the promulgation of standards and is basically a non-profit distributing organization, where any profits are reinvested into the products and services it provides. (BSI 2006). The British Standard Institutions became known by that name in 1930, twenty nine years after a committee was formed by the institutions of civil engineers, mechanical engineers, naval Railway and shipping. Today, there are more than 20,000 new or revised British, European or international standards produced by the BSI each year. The world's most famous series of standards ISO 9000 began life as a British standard (BSI, 2006)

2.2.3 American National Standards Institute

The American National Standard Institute (ANSI) coordinates the development and use of voluntary consensus standards in the United States and represents the needs and views of U.S. stakeholders in standardization forums around the globe (American National Standards Institute, 2006) The American National Standards Institute (ANSI) co-ordinates the development

and use of voluntary consensus standards in the United States and represents the needs and views of U.S. stakeholders in standardization forums around the globe. (ANSI, 2006). The Institute oversees the creation, promulgation and use of thousands of norms and guidelines that directly impact businesses in early every sector from acoustical devices to construction equipment from dairy and livestock production to energy distribution, and many more. ANSI is also actively engaged in accrediting programs that assess conformance to standards including globally recognized cross-sector programs such as the ISO 9000 (quality) and ISO 14000 (environmental) management system (ANSI, 2006).

(ANSI) has served in its capacity as an administrator and coordinator of the United States private sector voluntary standardization system for more than 80 years. Founded in 1918 by five engineering societies and three government agencies, the Institute remains a private and public sector organization (ANSI, 2006). Conformity Assessment, the term used to describe steps taken by both manufacturers and independent third parties to determine fulfillment of standard requirements, also remains a high priority for the Institute ANSI's program for accrediting third-party product certification have experience significant growth in recent years, and the Institute continues its efforts to obtain worldwide acceptance of accredited performance in the US (ANSI, 2006).

2.2.4 The ISO 9000 Series

The ISO (International Standards Organization) 9000 series is a set of International standards for quality management and quality assurance. The standards were developed to help companies effectively document the elements they need to maintain an efficient quality system. They are not specific to any one industry (American Society for Quality, 2005) The ISO 9000 series was originally published by the International Organization for Standardization (ISO), underwent major revision in 2000 and now includes ISO 9000: 2000 (definitions). ISO 9001: 2000 (requirements) and ISO 9004: 2000 (continuous improvement). The revised ISO 9000: 2000 series of standards is based on eight management principles which senior management can apply for organizational improvements, namely customer focus leadership, involvement of people, process approach, system approach to management continual improvement, and factual approach to decision-making and mutually beneficial supplier relationship.

2.3 Construction Quality and Client Satisfaction

According to Yasami et al, (2002), the studies published in the literature concerning quality in construction mostly have been about the quality of design and the level of conformance design. Quality of design involves the degree to which the features of the facility conform to the client's needs. In traditional contracting, Yasami et al, (2002) notes that the quality of design is the responsibility of the architectural and/or engineering firm. Hence, it depends on the performance of the architect or the engineer or both which is beyond the scope of this paper. The level of conformance to design on the other hand indicates the degree to which the constructed facility delivered to design on the other hand indicates the degree to which the constructed facility delivered

by the contractor is consistent with drawings and specifications. In general, the level of conformance to design has been interpreted in the construction industry as much as it is interpreted in manufacturing based quality. As the manufacturing-based definition of quality is being modified to the individual needs of service type industries, so are the definitions of customer focus, fitness for use and quality of performance. Yasamis et al (2002) refers to the definition of quality of performance as encompassing the reliability of the original product and/or service as well as the competence, integrity and promptness of staff and support services. For owners to receive more value for their investment, definitions of quality in construction need to be expanded to include the performance of the company as a whole and the client satisfaction derived from that performance. There is a shift in business thinking from compliance mode to performance mode. While contractors are striving to improve their overall performance, the control and monitoring mechanisms that clients practice on contractors and their work should also be reengineered (Wilson and Pearson, 1995). This hypothesis is quite germane for the construction environment where contractors are confronted with many dynamic forces from competition to litigation that either does not exist in other industries or are at very different levels. Contractors operating in a much paradoxical business environment need to be assessed in a contemporary manner that will take into account the innovative characteristics that they are exhibiting as businesses. Performance measurement model customized for these environments need to be developed.

2.4 The effect of quality system audits and corporate level quality

The concept of total quality requires organizations to establish a well structured and explicit system that identifies, documents, co-ordinates and maintains all the key quality related activities throughout all relevant company and site operations. This system is referred to as the total quality system (Feigenbaum, 1993) defines a total quality system as the agreed company wide and plant operating work structure, documented in effective, integrated technical and managerial procedures, for guiding the co-coordinated actions of the workforce, the machines and the information of the company and plant in the best and most practical ways to ensure customer quality satisfaction and economical costs of quality. The mechanisms that provide control processes over quality systems and determine their effectiveness are termed 'quality audits and assessments. Upon analyzing the fundamental values that underline available quality audit systems, a list of quality attributes that should exist in a contractor company are complied to define corporate level construction quality. They are the cornerstones of a successful total quality management system, and are representative of the general characteristics of a quality-conscious organization. It is anticipated that their existence in a construction company should increase client satisfaction by providing an infrastructure for quality improvement in company operations. They create the quality vision of the contractor organization at top management levels.

3.0 Methods adopted for the study

The companies surveyed were based in Lagos state. The population for the study comprised of clients, consultants and contractors who had executed project within and outside Lagos state. This research involves a cross-sectional survey approach from which statistical data were collected to answer question in respect of the main subject of study. Instrument used is mainly questionnaires. Consultants, contractors and project managers with offices in Lagos were selected based on convenience from different professional areas and professional bodies. These include Nigeria Institute of Building (NIOB), Project Managers, Nigeria Society of Engineers (NSE), Nigeria Institute of Architects (NIA) and Nigeria Institute of Quantity Surveyors (NIQS).

Out of 60 questionnaires distributed, 47 respondents complete and returned their questionnaires representing a response rate of 71.8%. Descriptive statistics using mainly simple percentages were applied to collect data where applicable from variables in the study.

Table 2 indicates that 12.8% of the respondents have less than 10 years experience. 48.9% of respondents have 11-20 years experience and 38.3% of respondents have 21-30 years working experience. This statistics present in

Table 1: Description of questionnaires received

Organisation	Sample size	Questionnaires completed
NIOB (Builders)	15	13
NSE (Engineers)	15	11
NIQS (Quantity Surveyors)	10	6
NIA (Architect)	10	7
PMI (ProjectManagers	10	10

Table 2: Classification of respondent according to work experience.

Experience of respondents	Frequency	Valid (%)
Less than 10 years	6	12.8
11-20 years	23	48.9
21-30 years	18	38.3
Total	47	100.0

Table 3: Classification of respondents according to Profession.

Profession of the respondent	Frequency	Valid (%)
Professional Builder	16	34.0
Civil/Structural Engineer	13	27.7
Architect	8	17.0
Project Managers	10	21.3
Total	47	100.0

Table 4: Variety of project executed by respondents

Project Executed	Frequency	Valid (%)
Public Infrastructure	13	27.0
Residential	13	27.0
Commercial	8	17.0
Oil and Gas	4	8.5
Telecommunication	9	19.1
Total	**47**	**100.0**

Table 4.2.1 shows that majority of respondents are suitably qualified to make informed response, as over 87.2% of respondents have at least 11 years of work experience.

It can be seen from the responses received, 34% of respondents are Professional Builders, 27.7% are Civil / Structural Engineers, 8% are Architects and 21.3% are Project Managers. This shows that respondents of this study cut across different professionals involved in the construction of infrastructural services.

Table 4 shows that 27% of respondent specialize in the execution of public infrastructure and residential projects, 17% execute commercial projects, 8.5% carry out oil and gas, while 19.1% major in telecommunication projects.

Table 5: classification according to contractor's level of awareness of quality standards

Level of awareness	Frequency	Valid (%)
Never heard of it	0	0
Occasionally heard of it	0	0
Heard and attended training	28	72.3
Apply quality standard often	11	27.7
Total	**47**	**100.0**

Table 6: classification of importance to quality standards to contactor's organization

Importance of quality standard	Frequency	Valid (%)
Useful in time of crises	12	25.5
Add value to daily work	14	29.8
Apply in daily	21	44.7
Total	**47**	**100**

Table 7: How often quality standard are considered during project execution

Consideration for quality standard during project execution	Frequency	Valid (%)
Never considered	6	12.8
Considered occasionally	14	29.8
Considered when asked	20	42.6
Considered at every stage	7	14.9
Total	**47**	**100.0**

Table 5 shows that contractors engaging in the construction of infrastructural services are aware of quality standards in construction. 72.3% heard and have attended training on quality standard but only 27.7% apply quality standards during project execution.

Table 6 shows that 25.5% of contactor's organization considered quality standards important during crises only. While 29.8% accepted that it is important because it adds value to their organizational daily work. However, 44.7% of them considered quality standards very important and apply it on daily basis. Majority of the respondents claimed that they applied quality standards daily.

According to the responses received, 12.8% of the respondents never considered quality standards during project execution. 29.8% considered it occasionally, 42.6% only considered compliance to quality standards when asked to do so and 7% put quality standards into consideration at every

Table 8: The application of quality standards policies

Policy	Frequency	Valid (%)
Clear commitment of project quality	6	12.8
Recognize customer need	20	42.6
Ensure quality objectives are actualized	14	29.8
Quality standards is well understood by all	7	14.9
Total	**47**	**100.0**

Table 9: Prioritized project performance objectives accordingly

Performance objective	Frequency	Valid (%)
Quality	31	14.9
Completion Time	9	66.0
Cost	7	19.1
Dependability	0	0
Flexibility	0	0
Total	**47**	**100.0**

stage of their project execution. This shows that majority of contractors considered compliance to quality standard as optional and not so important in their daily work.

Table 8 shows that 12.8% of respondents have clearly commitment to project quality, 42.6% reorganize their customer need, 29.8% ensure that quality objectives are actualized while 14.9% of the respondent ensure that quality standards are well understood by everyone involved in project execution. This implies that many contractors are interested in pleasing their clients even when quality standards are compromised.

The responses indicated that 66% of the respondents' give quality priority in the construction of infrastructural services follow by completion time and project cost respectively with 19.1% and 14.9% respectively. Dependability and flexibility were not considered first by any of the respondent. Majority of the respondent gave priority to quality during project execution than any other performance objectives.

Table 10: below identified the phase of project life cycle at which organization

Project phase	Frequency	Valid (%)
Conception	6	12.8
Definition	9	19.1
Design	17	36.2
Construction	15	31.9
Total	**47**	**100.0**

From the response received, 12.8% indicated that compliance to quality standards begins at the conception phase of project life cycle. 19.1% indicated definition phase, 36.2% indicated design phase and 31.9% also indicated the construction phase. There is a clear indication that most contractors start considering compliance to quality standards during the construction phase.

Table 11: Organizational compliance level to quality standards

	Frequency	Valid (%)
Total compliance	6	12.8
Good compliance	8	17.0
Fair compliance	15	31.9
None compliance	18	38.3
Total	**47**	**100.0**

Table 11 shows that only 12.8% of the respondents have their organizations totally complied with their quality standard, 17% achieved good compliance. 31.9% achieved fair compliance whilst 38.3% achieved zero compliance.

Quality control methods

Table4.2.11 classification of contractors according to quality control methods adopted.

Quality control method	Total Compliance 5 Points	Good Compliance 4 Points	Fair Compliance 3 Points	Poor Compliance 2 Points	None Compliance 1 Point	MIS	RANKING
Inspection and testing of executed works	5	6	15	10	11	2.7	1st
Materials selection and usage	10	4	6	13	14	2.6	2nd
Construction process adopted	6	8	5	16	12	2.6	2nd
Use of code of conduct	4	8	5	12	10	2.1	3rd
Report of non conformity to quality standards	0	4	9	14	20	1.9	4th
Recording changes	0	0	12	8	27	1.7	5th

Table 12 shows that inspection and testing of executed works, materials selection and usage, adopted construction process were judged to have fair compliance. Respondents have judged poor compliance in the use of code of conduct, recording changes and report of non-conformity to quality standards. This implies that contractors and their organizations have failed to apply effectively to quality control methods during project executions.

Table 13 Classification according to how often these factors affect compliance to quality standards in the construction of infrastructural services.

Factors	Never 1 Point	Rarely 2 Points	Sometimes 3 Points	often 4 Points	Consistently 5 Points	Mean Score	RANK
Project design (clarity and buildability)	0	3	6	22	16	4.1	1st
Project cost	1	2	5	23	16	4.1	1st
Client (Private or Government)	1	1	8	20	17	4.1	1st
Procurement methods	3	2	7	15	20	4.0	2nd
Organizational structure	0	3	12	12	20	4.0	2nd
Criteria adopted in awarding contracts	2	4	5	18	18	4.0	2nd
Project type (complex or small)	2	0	15	14	16	3.9	3rd
Materials availability	4	1	8	24	10	3.7	4th
Availability of skilled labour	2	5	8	19	12	3.7	4th
Availability of construction Equipment and machinery	3	2	3	24	10	3.4	5th

Table 13 shows that all the factors above often affect compliance to quality except availability of construction equipments and machinery which affect compliance sometimes. Therefore, the above factors must be properly considered if compliance to quality standards need to be achieved.

Quality of infrastructure services deliverables

Table 14 Users satisfaction of the quality of finished projects.

Users rating of finished projects	Frequency	Valid (%)	Cumulative Percentage
Total compliance	5	10.6	10.6
Good compliance	8	17.0	27.7
Fair compliance	14	29.8	57.4
None compliance	20	42.6	100
Total	47	100	

Table 14 shows that respondent have judged 10.6% organizations (contractors) to have totally complied with their quality standard, 17% achieved good compliance. 29.8% achieved fair compliance whilst 42.6% achieved zero compliance. This implies that the quality standards of many finished projects do not satisfy the expected or required standards.

Process of awarding contracts

Table 15: Examines process of contract awards

Process of awarding contract	Frequency	Valid (%)
Due process	3	6.4
Quota system	11	23,4
Relationship/friendship bases	19	40.4
Political power/compensation	14	29.8
Total	47	100

Table 15 shows that only 6.4% of the respondent clients adopt the use of due process in awarding their projects. 23.4% adopt quota system, 40.4% award contract based on relationship and friendship bases, while 29.8% adopt political process in form of power or compensations to award contract. The result of the table above, implies that most contracts are awarded base on friendship or political reason not following due process, thereby leading poor compliance to quality standards.

Table 16: Criteria adopted by clients in awarding contracts to contractors

Criteria for awarding contract	**Frequency**	**Valid (%)**
Professionalism / Experience	8	6.4
Lowest bidder (least cost)	20	23,4
Contractors corporation and understanding (returns)	19	40.4
Total	**47**	**100**

Table 16 shows that 17% of our respondents agreed that their clients award contracts based on contractor's professionalism and past experience, 42.6% and 40.4% used lowest bidder and contractor's level of corporation/understanding as criteria for awarding contracts. It can be deduced that criteria for awarding contract have been compromised, mostly with government parastatals.

Table 17: effects caused by non-compliance of contractors and organizations during construction of infrastructural services.

Effect of non-compliance to quality standard	Very serious 1 Point	Serious 2 Points	Sometime serious 3 Points	Not so serious 4 Points	Not serious 5 Points	Mean Score	RANK ING
Cost overrun on projects	36	11	0	0	0	1.2	1
Poor infrastructural delivery	27	13	7	0	0	1.6	2
Untimely project delivery	21	26	0	0	0	1.6	2
Effects on developmental growth	21	19	4	2	1	1.8	3
Effects on reputation and competency	18	15	9	5	0	2.0	4

Table 17 shows that cost overrun has a very serious effect on contractor's level of compliance to quality standards. While untimely project delivery, poor infrastructural delivery, effect on reputation and developmental growth also have serious effect on contractors' compliance to quality standards. Therefore, this result shows that cost overrun is inevitable when compliance to quality standards is compromised.

Table 18: Measures to ensure effective compliance to quality standards

Measures for effective compliance	Frequency	Total	Percentage (%)
Provide training and seminar on quality assurance	41	47	87.2
Support setting up quality assurance department	35	47	74.5
Enforcement of quality standards by government in project delivery	47	47	100
Severe penalty for non compliance to quality standards	47	47	100
Enforce statutory requirement	47	47	100
Develop quality manuals	38	47	81.0

Table 18 shows that 100% of the respondent support enforcement of quality standards by government agencies, server penalty for non-compliance and enforcement of statutory requirement. Also, 87.2%, 74.5% and 81% of my respondent agreed on provision of training and seminars on quality standards, setting up of quality assurance department and developing quality manual respectively are very important during project construction.

Discussion of findings

The research finding seems 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). Wilson and Pearson in (1995) suggested that while

contractors are striving to improve the overall performance, the control and mechanism on site should be re-engineered to ensure compliance with quality standards in the construction of infrastructure services. This has been brought to the fore by the finding of this research which reveals that effective compliance to quality standards will lead to quality project deliverables.

It was established that majority of contractors and organizations participating in the construction of infrastructural services are aware of quality standards required, but fail to apply those standards during construction. Table 4.2.4 above shows that, more than 70% have heard of quality standards, and have been attended training on quality but only 11% apply them during project execution. The finding of this research show in table4.2.5 that 44.7% of the respondents agreed that quality standards should be applied daily during construction. While 25.5% agreed that it is only important whenever there are crises and 29.8% said it adds value to their daily work. However, if contractors and their organizations apply quality standards to their daily work, there is no reason to wait until crises arise. This leads to considering who is responsible for the enforcement of quality standards. Responses from this study, revealed that those stakeholders such as government agencies, clients, professional bodies, contractors and their organizations are responsible for the enforcement of quality standards. Some respondents also include end users as part of enforcement agency. The research finding shows that the compliance level of organizations and contractors to quality standards during the construction of infrastructure is very low, some do not comply to quality standards at all. Only 19.8% added together, had good and total compliance to quality standards compared to 80.2% being fair and also non compliance.

The result shows that contractors should base their judgment on approved quality standard when considering compliance to quality standards. In addition, it can be deduced from this research that most contractors and organization consider compliance to quality late during project life cycle. This study also examines some factors affecting compliance to quality standards. Some of these factors are; the complexity of project, type of client, the procurement methods, and criteria adopted in awarding the contract, clarity and buildability of project design, availability of equipment, skilled labour and materials, also project cost and organizational structure. Responses from respondents show that all these factors have significant effect and affect compliance to quality standards more often. It can be deduced from responses received that project designers should put into consideration clarity, buildability, availability of materials and skills required to achieve the proposed design so that quality compliance will not be neglected.

The processes and the criteria used in awarding contracts by private clients and government agencies were examined by this research. The responses from the survey show that due processes were not adopted in awarding most of the contract; instead quota system, relationship, political power and compensations have taken the place of due process, thereby resulting to poor quality standards of infrastructural deliverables. Also the required criteria for awarding contracts were identified by the research. However, contractors

level of returns; cooperation, understanding and search for the lowest bidder have displaced professionalism and experience as criteria.

The levels of defect caused by non-compliance to quality standards in the construction of infrastructural services were also investigated. Defects such as cost overrun, untimely project delivery, poor infrastructural delivery and overall defect on the quality of project development around. 88.0% of the respondents indicate that the impacts of these defects are serious and very serious. Some respondents attribute loss of lives and properties as defects of non-compliance to quality standards.

4.0 Conclusion

The level of compliance of contractors or their organization to quality standards has significant effects on the performance of infrastructural services. The knowledge of required quality standards by contractors and their certification by professional bodies does not guarantee compliance to quality infrastructural delivery without effective enforcement by government agencies and regulatory bodies.

5.0 Recommendation

All stakeholders in the construction industry need to understand the importance of complying with quality standards throughout the production phases of infrastructural services.

There should be constant evaluation of contractors and their organizations to determine their level of compliance to quality standards by public, private professional bodies and government agencies, and those who maintained specific level should be invited or selected for other projects.

Ranking of organizations and contractor's compliance to quality standards should be carried out and published for the public to know.

Enforcement of contractors to quality standards must be given urgent attention. Those that will be appointed to enforce quality must be professionals with integrity, not those who will compromise standards after taken bribes or 'settlement'.

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