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Analysis of Constraints on Quality Management of Building Construction Projects in Onitsha Metropolis, Anambra State, Nigeria

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Abstract:
There are many constraints that compromise quality management in building construction projects in Nigeria which results to substandard buildings that are highly prone to collapse. This thesis was undertaken to analyze those constraints of quality management on building construction projects in Onitsha Metropolis, Anambra State. The study made use of primary data that was obtained through the administration of close-ended questionnaire to 85 respondents. The study made used of 77 respondents who were building professionals while 15 of the respondents were non building professionals. The primary data was analyzed using descriptive statistics such as mean, percentage, frequency and multiple regression technique. A total of 92 questionnaire were distributed. 89 of questionnaire were returned, 85 which translated into 94% rate of return of questionnaire were valid while 4 which translated into 6% rate of return of questionnaire were invalid. From the analysis of the study, the results revealed that the significant constraints to the three aspects of quality management were: Quality planning- Unfeasible scheduling, inadequate cost estimate, and poor technical specification; Quality assurance- substandard materials, inadequate consultation and resource wastage; and quality control- poor planning and control techniques, poor-on-site project management/supervision and lack of design-project analysis. It was recommended that clients should engage professionals in the pre-construction stage to ensure good quality planning; they should engage only the services of professional property developers/contractors to ensure proper quality assurance; they should ensure that architects/project managers to monitor the construction process to ensure proper quality control and the city planning authority should be proactive in ensuring that building construction projects should adhere strictly to approved building plan.

Keywords: Quality Management, Building Construction, Constraints and Project

1.0. INTRODUCTION

Quality is the totality of features and characteristics of a product or service or implied needs (Ireland, 2014). Walker (2016) defines quality project management as: “The planning, control and co-ordination of a project from conception to completion (including commissioning) on behalf of a client. It is concerned with the identification of the clients’ objectives in terms of utility, function quality, time and cost, and the establishment of relationships between resources. The integration, monitoring and control of the contributors to the project and their output and the evaluation and selection of alternatives in pursuit of the clients’ satisfaction are the fundamental aspects of quality project management.

Quality project management thus is a continuous process of ensuring that all project activities necessary to plan, design and implement a project are effective and efficient with respect to the purpose of the objective and its performance (ISO Press, 2015). It is a synergy of continuous improvement of project and principle of project delivery. Quality project management focuses on the quality of materials and services provided to the beneficiaries (Clough, Sears. and Sears, 2016). The three main processes of achieving quality management are: Quality Planning; Quality Assurance; and Quality Control.

Quality Planning has to do with identifying the standards which are relevant to the project and how to ensure that standards are achieved. Quality Assurance is the carrying out of quality activities during project execution, and evaluating overall project performance to ensure the project will satisfy the relevant quality standards**.** Quality Control is the monitoring of deliverables to evaluate whether they comply with the project’s quality standard and to identify how best to permanently remove the causes of unsatisfactory performance. Constraint on the other hand is a barrier or limitation that is either already present and visible or definitely will emerge during the life span of execution of a project. It is defined as a constraining condition, agency, or force that limits the systems’ performance in a given context/environment (Mayer, Painter and Lingineni, 2015, Whelton, Penneanen and Ballard, 2016). Every building construction project will have at least one constraint (Chua, Shen and Bok, 2013).

The Problem

Building construction projects are intricate and time-consuming undertakings (Clough, Sears and Sears, 2015). The construction of a building project needs good quality management to achieve the satisfied result including functional satisfaction, aesthetic satisfaction, completion on time, completion within budget, value for money, and health and safety (Walker,2015).The construction working environment involves multi-party participation. Needs and constraints in a multi-party working situation bring complications in quality project management. Identification of

the constraints helps project managers not only understand the characteristics of the constraints, but also predict the time and stage that the constraints may be encountered. However, the non-identification of constraint is a core problem in quality management of building construction projects in Anambra State especially in the Onitsha Metropolitan area.

The failure of clients and contractors to put in place proactive and pragmatic strategic measures for early identification and management of the constraints to quality project management has had dire consequences in Onitsha metropolis. In June 2014, an uncompleted four-story building collapsed at St. Andrews Anglican Church, Odo-Akpu, Onitsha Anambra State, in which the project engineer and three other workers were killed. Another example was the collapse of an uncompleted five-storey building at N0. 6 Adikiye Street, Odume Layout in Onitsha in Anambra State.

The aim of the study is to analyse the constraints of quality management of building construction projects in Onitsha metropolis, Anambra State. The specific objectives are to identify the factors that constraint quality management in building construction projects in Onitsha metropolis and to examine the rate at which the identified factors constraint quality management in building construction project.

The following were the hypotheses:
$H0_1$: Quality management constraints cannot be identified
$H0_2$: Quality management are not affected by any constraint.

2.0. Concept of Quality Management

Collins (2015) described quality as the world's oldest documented profession. Quality professionals use a number of definitions to define project quality. Quality in its simplest form can be defined as: 'meeting the customer's expectations,' or 'compliance with customer's specification.' No matter what definition we follow for quality, it becomes very complex when we try to put it into actual practice. For a user, quality is nothing but satisfaction with the appearance, performances, and reliability of the project for a given price range.

Quality management in construction implies maintaining the quality of construction works at the required standard so as to obtain customers‟ satisfaction for long term competitiveness and business survival

Ozaki (2013) identified a three-fold meaning of quality management in construction to include getting the job done on time; ensuring that the basic characteristics of the final project fall within the required specifications; and getting the job done within budget. It involves continued evaluation of the activities of planning, design, development of plans and specifications, advertising and awarding of contracts, construction, and maintenance, and the interactions of these activities. Benefits of quality management include higher customer satisfaction and productivity (Akinola, 2012).

In recent times, the drive for quality is actualized through the implementation of total quality management, (TQM) principles. Quality management involves assurances that the building product will satisfy the stated or implied requirements for which it was undertaken. Griffith (2015) argued in support of the conversation that management of quality in design and construction processes is being directed to ensure quality. Also, quality management directed procurement systems which place a greater emphasis upon providing performance, quality and better value for money. Griffith (2015) further argued that 'quality' describes the client requirements for a quality project. Thus, architect design according to the client aims to provide an acceptable standard of construction, to a respectable cost, and to be produced in a realistic production time.

Concept of Quality Assurance

Quality assurance is important in the engineering and construction industry because of the risk involved in any project (Bubshait and Al-Atiq, 2014). 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, 2015).

Also, in recent years, increasing concern has been expressed at the standards of performance and quality achieved in building works. The need for structured and formal systems of construction management to address the aspect of performance, workmanship and quality has arisen as a direct result of deficiencies and problems in design, construction, materials and components. Many of the problems experienced in building appear as a range of inadequacies from minor technical and aesthetic aspects to major building defects. Irrespective of their degree of severity, such problems are known to cost the industry so much annually, yet, many difficulties might 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, 2014). If buildings are to be trouble-free, more attention needs to be given to applying quality assurance principles to design and site-work, including project selection and specification, and to supervision of the handling and protection on site (Atkinson, 2005).

Concept of Quality Planning

Harris and McCaffer, (2011) defined quality planning as a set of activities whose purpose is to define quality system policies, objectives, and requirements, and to explain how these policies will be applied, how these objectives will be achieved, and how these requirements will be met. Subsequent to this definition, Construx, (2013) stressed that quality plan is different from a test plan. The study continued that quality plan defines the quality goals, is realistic about where defects come from, Selects appropriate detection and prevention methods, and has means not to "go dark". The Project Management Book of Knowledge "PMBOK" 4 also addressed quality planning from a different position to enhance the thoughts earlier expressed. It said that quality planning has a process input generated by predecessor processes referred to as the Project Scope Statement and Project Management Plan.

Concept of Quality Control

Dele (2014) explains 'Quality Control' as a process through which a business seeks to ensure that product quality is maintained or improved and manufacturing errors are reduced

or eliminated. Quality control requires the business to create an environment in which both management and employees strive for perfection. This is done by training personnel, creating benchmarks for product quality, and testing products to check for statistically significant variations. A major aspect of quality control is the establishment of well-defined controls. These controls help standardize both production and reactions to quality issues. Limiting room for error by specifying which production activities are to be completed by which personnel, reduces the chance that employees will be involved in tasks for which they do not have adequate training. Quality Management Systems, (2013) stated that, quality control is the process of evaluating whether construction projects adhere to specific standards. The main objective of quality control is safety. Additionally, quality control is also meant to ensure that buildings are reliable and sustainable.

Total Quality Management Theory

The only theory that is relevance to the study under review is total quality management theory. Total quality management theory is a management approach that originated in the 1950s and has steadily become more popular since the early 1980s. Total quality theory is a description of the quality control, quality planning, quality assurance in organization that strives to provide customers with products and services that satisfy their needs. The quality control, quality planning, quality assurance requires quality in all aspects of the company's operations, with processes being done right the first time and defects and waste eradicated from operations. Total quality management theory, is a method by which management and employees can become involved in the continuous improvement of the production of goods and services. It is a combination of quality and management tools aimed at increasing business and reducing losses due to wasteful practice

Empirical Review

Maqsood (2015) conducted effect on quality project management on the construction projects. A questionnaire was developed based on identified factors affecting quality project management of construction. After their feedback a statistical analysis tool such as chi-square and weighted mean method (WMM) were used to rank the significance level of these factors. The study adopted regression analysis technique.

Timothy (2012) conducted a study on impact of non-implementation of these factors in the Nigerian construction industry. This study is limited to the view of a convenient sample of professional which include Architects, Builders, Quantity Surveyors and Engineers. The method used to collect data were questionnaire and interview while the data collected were subjected to descriptive statistical analysis using percentage, mean score and frequency. The study revealed that the impact of non compliance with time, costs and quality management procedures is building collapse as evident in the Nigerian constructions industry today. Others includes high cost of construction, which make building constructions very high thus leading to project abandonment which constitute nuisance to the built environment and this can lead to lost of public confidence in the industry. The study recommends that modalities should be put in place by government and concerned professional bodies to guide against fraud, the relevant authority like SON (Standard Organization of Nigeria) should wake up from slumber and come up with standards for construction component and lastly the National Building Code should be adopted for use in the building construction in all its ramifications. The study adopted analysis of variance (ANOVA).

Ambika (2016) conducted a study on the factors that affects quality in construction. The identified factors from the literature are design codes & standards, financial issues, planning & scheduling, materials &equipments, human resources, coordination, inspection, risks, types of organization and customer satisfaction. Based on the identified factors a questionnaire is developed and it is surveyed to collect opinion from the construction experts. The collected data are analysed using average index method and it is ranked to get the top most values. The results are based on the survey including 138 respondents which gives the most affecting factor in construction.

Anzagira (2014) conducted a study on the factors that influenced the quality performance of small scale contractors according to their relative importance and recommend measures to reduce its significance on project outcome. Sixty-nine (69) questionnaires were self-administered to professional staff including architects, quantity surveyors, and engineers engaged by small scale contractors. The relative importance index (RII) was used to rank factors for the analysis. The study identified: fraudulent practices and kickbacks, lack of coordination between designers and contractors and; poor monitoring and feedback are ranked as the first three factors that affected the QP of SCC and related to consultants. In addition, lack of training on quality for staff, lack of management leadership and lack of previous experience of contractor were also identified as factors related to contractors as the most critically ranked factors. It is therefore recommended that policy makers, researchers and practitioners look at improving the human resource base through continuous professional and skill development. Again monitoring systems should be improved at various district offices for the implementation of good construction procedure with the aim of ensuring quality practices. More importantly, design should be revaluated before the actual construction through pre-construction conference in order to do away with unnecessary design that will not ensure quality.

Akinyede (2016) conducted a study in establishing effective management of cost constraint on building project delivery in South Africa. Data for the main study were collected through observations, semi-structured and unstructured qualitative interviews and quantitative close-ended questionnaires administered to construction stakeholders working in the Western Cape and Gauteng provinces, South Africa. Findings are that the following are factors that affect cost during building production process: additional works without contractual procedure, inadequate co-ordination of design phase and construction phase during production by project managers, financial mismanagement, frequent changes in design, cost of materials in the market, fluctuation of price of materials.

3.0 METHODOLOGY

Research Design

Research designs are used to generate primary data for direct observation of events, phenomena or in an experiment. The three main types of research design are; the survey, experimental and Ex post facto. Descriptive research design which is a subset of survey design was used in this research work. The researcher wants to know why it exists and proffer solution to the problem.

Population of the Study

This refers to the entire number of the members or elements in which the researchers are interested .The population of the study comprises of 120 consultants, which includes; project managers/ Supervisors, Estate surveyors, Quantity surveyors , contractors, Site Engineers, clients, Structural engineers, town planners/ staff of Onitsha urban housing development authority (OUDA) and as well as experienced Architect within Onitsha metropolis

Method of Data Analysis

Objective 1 and 2 were analyzed with descriptive statistic such as simple percentage, mean and frequency while hypotheses 1 and 2 were analyzed with multiple regression. The hypotheses were tested at 0.05 level of significance.

The data obtained was tabulated and statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.

The validation was done by applying the F-value to check the significant effect of the independent variable on the dependent variables. The t-statistics was employed to find the statistical significance of the coefficients of the independent variable. On the basis of the traditional criteria, the coefficient was checked against the expected signs, the values of the R^2 and the ratios of the estimated coefficients to their respective standard errors. As usual, the R^2 measures the goodness of fit and the presence of the first order serial correlation was detected through an examination of the Durbin Watson (D/W) statistics

Model Specification

The following model was specified for hypothesis one, thus,

$Y = F (X_1, X_2, X_3, X_4, X_5, X_6)$

$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + e_t$

The model was transform into log form;

$LogY = B_0 + B_1LogX_1 + B_2LogX_2 + B_3LogX_3 + B_4lOGX_4 + B_{5Log}X_5 + B_{6Log}X_6 + e_t$

Where;

Y = quality planning in building construction
X_1 = Defective design
X_2 = technical specification
X_3 = inaccurate cost estimate
X_4 = unfeasible scheduling
X_5 = none design review
X_6 = none incorporation of legal requirements
B_0 = intercept
B_1-B_6 = parameter estimate
et = stochastic variables

The researcher specified the following model for hypothesis 2; thus;

$Y = F (X_1, X_2, X_3, X_4, X_5, X_6 X_7, X_8, X_9)$

$Y = B_0 + B_1LogX_1 + B_2LogX_2 + B_3LogX_3 + B_4LogX_4 + B_5LogX_5 + B_6LogX_6 + B_7LogX_7 + B_8LogX_8 + B_9LogX_9 + e_t$

Where;

Y = quality assurance in building construction
X_1 = Inexperience contractor
X_2 = lack of technical and professional expertise
X_3 = lack of top management support
X_4 = substandard materials
X_5 = poorly trained workers
X_6 = inadequate consultation
X_7 = Inadequate project team capability
X_8 = Resource wastage
X_9 = Poor financial control
B0 = intercept
B_1-B_9 = parameter estimate
et = stochastic variables

4.0. Constraints to Quality Planning in Building Construction

Quality planning experts were requested to rank the degree to which a list of constraints hindered effective quality planning in building construction. Their ranking is presented in Table 1 below

Constraint	Strongly Agreed	Agreed	Indifferent	Disagreed	Strongly Disagreed	Total	Ranking
Unfeasible Scheduling	20	5	2	3	1	31	1
Inaccurate estimate	19	5	3	2	2	31	2
Poor Technical Specification	18	7	1	2	3	31	3
None Design review	16	6	2	4	3	31	4
Defective Design	14	8	4	3	2	31	5
None incorporation of legal requirement	11	8	4	5	3	31	6

Source: Field Survey, 2017.

A comparative analysis of Table 1 above indicates that a majority of the quality planning experts, 64% considered unfeasible scheduling as the most serious constraint to quality planning in building construction. It was followed by inaccurate cost estimate, 61%, poor technical specification,58% none design review, 52% defective design, 45% and none incorporation of legal requirements, 35%.

Constraints to Quality Assurance in Building Construction.

Quality assurance experts were asked to rank degree to which a list of constraints hindered good quality assurance in building construction. Their ranking is presented in Table 2 below

TABLE 2:

Constraint	Strongly Agreed	Agreed	Indifferent	Disagreed	Strongly Disagreed	Total	Ranking
Substandard Materials	21	6	1	3	2	33	1
Inadequate Consultation	20	5	3	4	1	33	2
Resource Wastage	19	9	1	2	1	33	3
Poor Financial Control	18	8	4	1	2	33	4
Inadequate Project Team Capability	18	6	2	3	4	33	5
Lack of Technical & Professional Experts	17	11	1	3	1	33	6
Poorly Trained Workers	16	9	2	4	2	33	7
Lack of Top Management Support	12	10	6	2	3	33	8
Inexperienced Contractor	10	13	5	4	1	33	9

Source: Field Survey, 2017.

A comparative analysis of Table 2 above reveals that substandard materials was considered by a majority of the quality assurance experts, 64%, as the most serious constraint to quality assurance in building construction. It was followed in descending order of seriousness by inadequate consultation, 61%, resource wastage, 58% poor financial control, 55% inadequate project team capability 55%. Lack of technical and professional experts, 52%, poorly trained workers, 48%, lack of top management support, 36% and inexperienced contractor, 30%.

Constraints to Quality Control in building construction

Quality Control experts were asked to rank the degree to which some listed constraints affected quality control in building construction. Their opinion are ranked and presented in Table 3 below.

Table 3

Constraint	Strongly Agreed	Agreed	Indifferent	Disagreed	Strongly Disagreed	Total	Ranking
Lack of Coordination between designers and contractor	13	4	2	2	2	23	4
Weak government regulatory framework	10	3	3	4	3	23	5
Poor planning control techniques	16	2	1	3	1	23	1
Poor on-site project management/supervision	15	4	2	1	1	23	2
Lack of design-project deviation analysis	14	5	1	2	1	23	3

Source: Field Survey, 2017.

A comparative analysis of Table 3 above shows that most of the quality control experts, 70% were of the opinion that poor planning and control techniques was the most serious constraint to quality control in building construction. This was followed by poor on-site project management 65%, lack of design-project deviation analysis, 61% lack of coordination between designers and contractors 57% and weak government regulatory framework 43%.

Table 4: Rating of the effect of quality management on building construction project

Quality Management Constraints	FREQUENCY	PERCENTAGE	RANK
Unfeasible Scheduling	58	4.53125	9
Inaccurate estimate	67	5.234375	8
Poor Technical Specification	45	3.515625	12
None Design review	34	2.65625	13
Defective Design	82	6.40625	4
None incorporation of legal requirement	34	2.65625	13
Substandard Materials	97	7.578125	1
Inadequate Consultation	67	5.234375	8
Resource Wastage	56	4.375	10
Poor Financial Control	55	4.296875	11
Inadequate Project Team Capability	78	6.09375	6
Lack of Technical & Professional Experts	87	6.796875	3
Poorly Trained Workers	80	6.25	5
Lack of Top Management Support	45	3.515625	12
Inexperienced Contractor	90	7.03125	2
Lack of Coordination between designers and contractor	76	5.9375	7
Weak government regulatory framework	56	4.375	10
Poor planning control techniques	54	4.21875	11
Poor on-site project management/supervision	65	4.53125	9
Lack of design-project deviation analysis	54	4.21875	11

Source: Field Survey, 2017.

The table 4 above shows the effect of quality management on building construction. The frequency was based on multiple responses owing to the fact that any of the respondents might be facing more than one constraint in the study. From the table above, 7.5% of the respondents ranked that substandard materials was the most quality management constraints affecting building construction project followed by 7.03% of the respondents who ranked that inexperienced contractor was quality management constraints factor affecting building construction project and the least were those who ranked none incorporation of legal requirement and none design review with 2.5%. asquality management constraints factor.

Presentation and Interpretation of Regression Results

The three multiple models specified for the study were analyzed using ordinary least squares (OLS) technique. The data used to carry out the regression analysis was extracted from the completed questionnaires. The regression analysis was carried out with SPSS statistical software

Testing of Hypothesis 1

$H0_1$:Quality management constraints cannot be identified .

Parameters	Linear+	Exponential	Double log	Semi log
Constant	1.439	1.852	1.581	1.254
	(4.58)***	(49.78)***	(10.94)***	(8.33)**
Defective design (X1)	-1.003	-2.77	-0.134	-1.19
	(8.98)***	(-0.91)	(3.246)*	(2.377)*
Technical specification (X2)	-1.103	1.435	0.091	-1.107
	(9.93)***	(11.95)***	(-1.53)	(-0.14)
Inaccurate Cost estimate (X3)	-1.12	-1.465	0.012	0.108
	(6.40)***	(9.76)**	(-0.22)	(-0.14)
Unfeasible scheduling (X4)	-1.012	-1.19	-0.039	0.108
	(5.33)***	(7.36)***	(-0.48)	(-0.18)
None design review (X5)	-1.003	-1.675	0.339	0.425
	(2.43)*	(3.48)*	(6.02)***	(7.21)***
None incorporation of legal requirement	-0.005	-1.276	-0.058	-0.027
	(-0.41)	(-0.13)	(-1.46)	(-0.06)
R^2	0.71	0.54	0.56	0.64
F- ratio	8.18***	6.60***	6.28***	12.40***

Source: Computed from Regression Analysis, 2017

The data were analyzed using four functional multiple regression models, following some econometric considerations, the linear regression model was chosen as the lead equation based on larger number of significant variables, R^2 and F^2 ratio value. From the result, defective design, technical specification, inaccurate cost estimate, unfeasible scheduling and none design review were all significant at varying levels with same signs. The coefficient of defective design (1.003) was significant at 1 percent level with a negative sign. This implies that an increase in defective design will lead to decrease in quality planning in building construction by 1.003 units.

The coefficient of technical specification (1.103) was significant at 1 percent level with a negative sign. This implies that an increase in technical specification will lead to 1.103 decreases in quality planning in building construction The coefficient of inaccurate cost estimate (-1.120) was significant at 1 percent level with a negative sign. This implies that an increase in inaccurate cost estimate will lead to 1.120 decreases in quality planning in building construction. The coefficient of unfeasible scheduling (-1.012) was significant at 1 percent level with a negative sign. This implies that an increase in unfeasible scheduling will lead to 1.012 decreases in quality planning in building construction. The coefficient of none design review (1.003) was significant at 1 percent level with a negative sign. This implies that an increase in none design review will lead to 1.003 decrease in quality planning in building construction. The R^2 value was 0.71, which implies that 72% percent of the dependent variable was explained by the independent variable which shows a sign of fair fit. The F-ratio as 8.184*** meaning significant at one percent which implies that the entire result was statistically significant.

Testing of Hypothesis Two

$H0_2$: Quality management are not affected by any constraint.

Parameters	Linear+	Expon.	Double log	Semi log
Constant	1.569	4.524	1.904	1.107
	(4.84)**	(5.72)**	(1.68)*	-3.53
Inexperience contractor (X1)	-1.235	-2.39	-1.515	-8.99
	(-1.10)	(2.35)*	(-0.01)	(-0.52)
Lack of technical and professional expertise (X2)	-1.101	-1.78	-1.507	-15.6
	(-5.0)**	(-1.11)	(-0.992)	(-1.37)
Lack of top management support (X3)	-1.011	-2.23	-1.658	-27.55
	(-0.96)	(16.9)**	(-0.30)	(-1.82)
Substandard materials (X4)	-1.11	4.392	2.584	-9.015
	(9.22)***	(3.60)**	(1.10)*	(-0.67)
Poorly trained worker (X5)	-1.122	-1.229	-1.873	88.6
	(9.92)**	(-0.8)	(-0.44)	(4.91)***
Inadequate consultation (X6)	-0.239	1.851	-1.251	4.928
	(-0.41)	(-1.47)	(-0.07)	(-0.32)
Inadequate project team capacity (X7)	-1.012	-1.008	1.836	12.18
	(-5.44)**	(2.89)*	(-0.79)	(-1.05)
Resource wastage (X8)	-1.081	1.432	-2.212	-8.86
	(-1.06)	(-0.83)	(-0.39)	(-0.54)
Poor financial control (X9)	-2.301	2.34	3.182	38.93
	(7.37)**	-2.34	(-0.66)	(-3.21)
R^2	0.54	0.67	0.43	0.32
F-ratio	23.4	12.4	10.2	8.76

Source: Computed from Regression Analysis, 2017

The data were analyzed using four functional multiple regression models, following some econometric considerations, the linear regression model was chosen as the lead equation based on larger number of significant variables, R^2 and F^2 ratio value. From the result, lack of technical and professional expertise, substandard material, poorly trained workers; inadequate project team capability, resource wastage and poor financial control were all significant at varying levels with same signs.

The coefficient of lack of technical and professional expertise (1.101) was significant at 5 percent level with a negative sign. This implies that an increase in lack of technical and professional expertise will lead to decrease in quality assurance in building construction by 1.003 units.

The coefficient of substandard material (1.11) was significant at 5 percent level with a negative sign. This implies that an increase in substandard material will lead to 1.11 decreases in quality assurance in building construction

The coefficient of inadequate project team capability (1.012) was significant at 5 percent level with a negative sign. This implies that an increase in inadequate project team capability will lead to 1.012 decreases in quality assurance in building construction.

The coefficient of poor financial control (2.301) was significant at 5 percent level with a negative sign. This implies that an increase in poor financial control will lead to 1.012 decreases in quality assurance in building construction.

The R^2 value was 0.54, which implies that 54% percent of the dependent variable was explained by the independent variable which shows a sign of fair fit. The F-ratio as 23.4*** meaning significant at one percent which implies that the entire result was statistically.

5.0. Conclusion

The spate of building collapse in Nigeria generally and by extension in Onitsha is traceable to poorly constructed/substandard building projects. The leading cause of building collapse is traceable to poor quality management during the construction process. Poor quality management of building construction projects is as a result of some observable constraints that hinders the construction process. A critical analysis of these constraints revealed that they are manifested in the three core areas of quality management: Quality planning, quality assurance and quality control. It is quite intuitive to assume that the key solution to poor quality management lies in an isolation of those individual constraints that weaken quality planning, quality assurance and quality control. The empirical results from this study successfully identified and analyzed each of the constraints and their respective magnitude in weakening quality planning, quality assurance and quality control.

Recommendations

Drawing from the findings of the thesis and the hindsight gained by the researcher, the following recommendations are hereby suggested.

1. There is a need for potential building owners to pay particular attention to the core areas of design, technical specification, cost estimate, and construction scheduling at the pre-construction stage of under taking a building project.
2. They should engage in services of core and competent professionals such as architect, builders and quantity surveyors instead of trying to cut cost by undertaking themselves or employing quacks to do it for them. The entire building construction process is dependent on the quality planning that was carried out and as such should be given the serious attention it deserves.
3. There is a need for building project clients to engage professional builders and contractors to carry out the actual construction process. This will help avoid the problem posed by quality assurance constraints such as substandard materials, resources wastage, poor financial control, inadequate consultation and poor project team capability. This is very important because once the quality assurance is compromised it will lead to substandard building and likely collapse of the building even during the construction process.
4. Owners of building under construction should ensure that monitoring of the construction process should be carried out by the architect or building designers who should work hand in hand with the contractor/builder. This is because poor quality control that arises from weak project management will results in poor coordination between designers and contractor which can lead to poor interpretation of the project design. Also, at every construction stage there is a need for professional design-project deviation analysis to ensure that the final building should have as little variance as possible from the original model/design.

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