DERIVATION OF SOME QUALITY CONTROL MEASURES FOR ACHIEVING STANDARD IN BUILDING CONSTRUCTION INDUSTRY IN MINNA METROPOLIS

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Abstract

The purpose of this study is to investigate the factors required for quality control measures in order to achieve standard in building construction industry. Two research questions and hypothesis guided the study. The study made use of survey research design. It was carried out in Niger State, Minna metropolis. The population of the study was 57 made up of 25 building site engineers and 32 contractors in 32 building construction firms in Minna metropolis. There was no sampling due to relatively small size of the population. The instrument used for data collection was a 25-item structured questionnaire which was validated by three experts. Cronbatch alpha reliability method was adopted to determine the internal consistency of the questionnaire items and a coefficient of 0.83 was obtained. Fifty seven copies of the instrument were administered; all were successfully retrieved and analyzed using weighted mean and standard deviation. The hypotheses were tested using t-test statistic. It was found out that all the 25 questionnaire items identified as factors for quality control measures for achieving standard in building construction firms were required. It was also discovered from the test of hypotheses that there is no significant difference in the mean rating of building site engineers and contractors in the 25 questionnaire items. The study therefore recommended that building the construction industry should embrace adequate planning right from the design of a structure to execution level in order to achieve required quality standard of work in building construction project.

Introduction

Defects and failure in any construction infrastructures can be as a result of poor quality control during the entire construction process. Quality has been defined by Mcnulty (1992) as an "aesthetic sense of harmony" or the definition can be limited to "an absence of malfunction and failure". The letter definition is the minimum accepted in any type of work and is tempered by the consideration of the risk of malfunction and the time expected before such a malfunction will become apparent to the degree that needs correction. While quality control in construction facilities according to satter (2007) are critically important to a successful construction of project and should be adhered throughout the project from the conception and design to construction and installation. Quality control means making sure things are done according to plans, specifications and permit requirement.

Quality control and safety are increasingly important factors for almost all

construction managers in the building industry. Quality Control according to Addison (2002) in building industry typically involves insuring compliance with minimum standards of material and workmanship in order to ensure the performance of the facilities according to the design. These minimum standards are contained in the specifications of the project. For the purpose of insuring compliance, random sampling and statistical methods are commonly used as the basis for accepting or rejecting work completed and batches of material. Awarim (1998) stressed that total quality control in building construction is a commitment to quality expressed in all parts of an organization and typically involves many elements. Design review to insure safe and effective construction procedures is a major element, while other elements include extensive training of personnel, shifting the responsibility for detecting defects from quality control inspectors to workers and continually maintaining equipments.

Similarly, Fademiro (1996) describe quality control as a fitness purpose, i.e. providing a product (building) which provides an appropriate quality for the purpose for which it is intended. The price to be paid for the building is a reflection of the expectation of quality. A cheaper building probably used inferior materials and is likely to be less attractive and less durable and by implication can be risky and the quality is also related to the timing of when it is delivered.

Statement of the Problem

Building collapse during and after construction which subject the construction participants and users of the facilities to series of risks such as death, injuries, fatalities, large cost of reconstruction, etc. These are all as a result of failure to achieve the required quality and operational requirements.

Similarly, defect and operational requirements can result in legal embarrassment. Even with minor defect reconstruction may be required and facility operation impaired. Increased costs and delay for the completion of the project may also result. As with the cost control, the most important decisions regarding the quality of a completed facility are made during the design and planning stages rather than during construction. Quality control during construction consists largely of insuring conformance to its original design and planning decisions.

Lanfor and Tunker (1987) found several problems from planning in construction project, first, the motivation for planning come from outside sources, legal consideration and owners' requirement. Consequently today, most construction managers pay no attention to the adequate planning of construction projects. They also seem not to adequately assign superintendents to supervise work thereby allowing defects and risks to ruin the project.

Levit and samelson (1999) observed that most accidents and collapse of buildings in the developed and developing countries are as a result of poor planning and inadequate supervision of the building project. He added that most project superintendents' compromise standard, and consequently resulting to casualties. It is however believed that when effective planning and supervision of building projects are encouraged, it will ensure standard in the entire building construction process. Based on the above assertion, the researchers feel that there is need to carryout this study in order

to improve the quality control measures in the building construction industry in Minna metropolis.

Methodology

Two research questions were developed to guide the study, while two hypotheses were formulated and tested at $P < 0.05$ level of significance. The study adopted survey research design. Survey research design in the opinion of Olaitan and Nwoke (1999) is that in which the same information is gathered from an unbiased representative group of interest. It is a very valuable tool for assessing opinions and trends from representatives group of population being investigated. The study was carried out in Niger State; specifically in Minna metropolis. The population for the study is 57 made up of 25 site engineers and 32 contractors in 32 building construction industries in Minna metropolis while some of the building construction industries have no site engineers. The instrument used for data collection was a 25-item structured questionnaire. The structured questionnaire has 4 point response scale of highly required, slightly required, averagely required and not required with a corresponding value of 4, 3, 2, and 1. The instrument was face validated by three experts, one from the Department of Industrial and Technology Education, and two from Building Technology Department all in Federal University of Technology. Their suggestions were used to improve the final copies of the questionnaire. Cronbach alpha reliability method was adopted to determine the internal consistency of the questionnaire items; a Cronbach coefficient of 0.83 was obtained. Fifty-seven copies of the instrument were administered on the respondents. The entire 57 copies administered were retrieved and analysed. Mean and standard deviation were used to answer the research questions while t-test statistics was used to test the hypotheses at $P < 0.05$ level of significance and at 55 degree of freedom. The values attached to the response option of the questionnaire were

Highly Required (HR) = 4
Averagely Required (AR) = 3
Slightly Required (SR) = 2
Not Required (NR) = 1

The arithmetic mean for the values was computed as $4 + 3 + 2 + 1 = 10/4 = 2.50$. therefore, any item with weighted mean of 2.50 was regarded as required and any item with weighted mean less than 2.50 was regarded as not required. For testing the hypotheses, 2.00 was critical value of 55 degree of freedom; any item that has its t-cal equal to or less than t-critical was considered accepted and any item that its t-cal value is above the t-critical was considered rejected.

Research Question I

What are the organizational roles required as quality control measures for achieving standard in building construction industry?

Hypothesis 1

There is no significant difference in the mean ratings of the responses of the

building site enquirers and contractors on organizational roles as quality control measures for achieving standard in the building construction industry in Minna metropolis.

The data for answering research question 1 and for testing hypothesis 1 are presented in table.

Table 1: Mean rating and t test analysis of the responses of the building site engineers and contractors on organisational role required as quality control measure for achieving standard in the building construction industry

S/No	ITEM STATEMENT	X	SD	t – Cal.	t – tab.	REMARKS	
						RQ	H_o
1	Making programme of work available in building site.	3.75	0.062	0.430	2.00	Rqrd	NS
2	Providing required information both safety and operational to enable workers discharge their duties deligently.	3.83	0.194	-1.923	2.00	"	"
3	Forming work group to ease supervision of work for quality assurance.	3.83	0.194	-1.923	2.00	"	"
4	Provide avenue for effective coordination of work of various unit for job continuity and quality.	3.33	0.090	0.469	2.00	"	"
5	Provide first aid room and boxes in the construction site	3.91	0.123	-1.200	2.00	"	"
6	Requirement of qualified workers for quality and safety	3.85	0.078	0.684	2.00	"	"
7	Effective material and equipment storage system on the site.	3.94	0.078	0.593	2.00	"	"
8	Provision of adequate platform working such as scaffold, ladder e.t.c	3.89	0.136	-1.523	2.00	"	"
9	Effective site supervision to ensure quality control and safety on the site.	3.87	0.096	0.682	2.00	"	"
10	Provision of adequate tools/apparatus for material testing to ensure quality control.	3.88	0.096	-1.458	2.00	"	"
11	Sequencial and interrelated activities are always properly considered	3.88	0.063	0.901	2.00	"	"
12	Timely organisational orientation on operational activites and safety is always observed	3.53	0.087	-0.503	2.00	"	"

Note: X = Mean H_0 = Null Hypothesis SD = Standard Deviation Rqrd = Required
RQ = Research Question NS = Not Significant

Data in table 1 above revealed that the 12 organisational role items had their means ranged from 3.53 to 3.94. This indicated that their mean were all above the cut off point of 2.50. These mean values indicated that all the twelve items were required as organisational roles for quality control measure for achieving standard in the building industries. The hypothesis tested in table 1 revealed further that the 12 organisational roles items had their calculated t values ranged from 1.923 to 1.166 which were less than t table value of 2.00 at 0.05 level of significance and 55 degree of freedom. This indicated that there is no significant difference in the mean ratings of the responses of the two groups of respondents on the 12 organisational roles items required by building construction industry in Minna metropolis. With this result, the null hypothesis of no significant difference was upheld for the twelve organizational role items.

Research Question 2

What are the planning roles required as quality control measures for achieving standard in building construction industry?

Hypothesis 2

There is no significant difference in the mean rating of the responses of the building site engineers and contractors on the role of planning as quality control measures for achieving standard in building construction industry in Minna metropolis.

The data for answering research question 2 and for testing hypothesis 2 are presented in table 2

Table 2: Mean rating and t test analysis of the responses of the building site engineers and contractors on planning role required as quality control measure for achieving standard in the building construction industry.

S/No.	ITEM STATEMENT	X	SD	t – Cal.	t – tab.	REMARKS RQ	REMARKS Ho
1	Good work and material specification is in planning	3.79	0.106	0.850	2.00	Rqrd	NS
2	Provision of safety education to construction personnel in the building site.	3.77	0.085	1.325	2.00	"	"
3	Allow architech to do his function of design work within allowable time as stipulated in building regulation	3.89	0.501	0.373	2.00	"	"

4	Production building were quality is related to the price	3.81	0.124	1.307	2.00	"	"
5	Faults and defects can be minimized to reduce construction cost through planning	3.88	0.102	0.426	2.00	"	"
6	Planning avoid delays in project completion and improve quality	3.01	0.209	0.426	2.00	"	"
7	Planning enhance adequate supervision of site work and material for quality control	3.69	0.122	0.785	2.00	"	"
8	Reduction of the reoccurrence of accident and risk is ensured through effective planning	3.75	0.173	-0.223	2.00	"	"
9	Planning ensure good material usage, handling and storage	3.76	1.042	0.171	2.00	"	"
10	Determination of project cost estimate and reduction of wastage is ensure through effective planning	3.83	0.096	0.502	2.00	"	"
11	Labour requirement schedule is ascertain through planning	3.93	0.084	-0.311	2.00	"	"
12	Contractor, architect and site engineer were involved in site planning	3.90	0.230	0.169	2.00	"	"
13	Building design are carefully studied by all construction team before the commencement of the project	3.59	0.132	0.192	2.00	"	"

Note: X = Mean H_0 = Null Hypothesis SD = Standard Deviation Rqrd = Required
RQ = Research Question NS = Not Significance

Data in table 2 showed that the 13 items had their means ranged from 3.59 to 3.93. This indicated that their means were all above the cut off point of 2.50. These mean values indicated that all the thirteen items were planning roles required in achieving standard in the building construction industry. The data presented on hypothesis testing in table 2 also revealed that the 13 planning roles required had their calculated t values ranged from -0.311 to 1.325 which were less than t table value of 2.00 at 0.05 level of significance and 55 degree of freedom. This indicated that there is no significant difference in the mean ratings of the responses of the two groups of respondents on the 13 role of planning required by building construction industries in Minna metropolis. With this result, the null hypothesis of no significant difference was upheld for the thirteen planning roles items.

Discussion of Result

The results of this study revealed that the building site engineers and contractors agreed that all the twenty five (25) items on quality control measure for achieving standard are required by the building construction industry. The result is in conformity with Fadamiro and Ogunsemi (1996) that pointed out the importance of site organization in building construction industry. They describe site organization as the process where human and material resources are properly positioned for their effective usage. Site organization promotes optimal utilization of resources (material and human) reduces time wastage as result of movement, reduce double handling, minimizes risk of theft, encourages fast delivering of material, encourages record keeping (inventory) of material brought in and the one that has been used, creates relationship between workers and promotes safety and quality in the industry. Also Hinze and Figone (1998) state that the time and effort, the construction managers and contractors devote in organizing through proper co-ordination of workers to ensure that they do a safe and qualitative job during their time on site will pay off dramatically in safety, quality and productivity both for the sub-contractors and for the project as a whole. Organizing activities in building construction industry have a significant role to play in ensuring quality control and achieving standard construction, risk-free and effective productivity. When construction resources are properly organized, right person for a right job would be achieved and the question of what workers should do could easily be achieved. Meanwhile, where right people are employed in the construction site quality work can easily be achieved with high efficiency. The result of the study agreed with the submission of Hinze, Jimmee, and Lassau (1999) affirmed that construction planning is a fundamental and challenging activity in building construction industry for effective execution of project. They pointed out that for construction to achieve its objectives effective planning must be considered; it involves the choice of technology, the definition of work tasks, the estimation of the require resources, duration for individual tasks and the identification of any interaction

among the different work task. Planning has also been seen as a tool for quality control in building construction industry. Hinze also asserted that the essential aspect of quality planning includes; generation of required construction activities, analysis of the implication of these activities, choice among the various alternatives, means of performing the activities, formulating supporting plans in conformance with specification.

The findings of the study from the test of hypotheses further indicated that there was no significant differences in the mean responses of building site engineers and contractors on organizational and planning roles required for quality control measure for achieving standard in building construction industry in Minna metropolis. The implication of this is that it helps to validate the questions raised and answered by this study. It also revealed that the work experience of two groups of respondents did not significantly influence their perceptions on the factors identified in the study.

Conclusion

From the findings of the study, the following conclusions were drawn; that there are factors that are associated with planning and organization of construction activities as quality control measures for achieving standard in the building construction industry. These factors include proper planning to enhance good constructional work, material specification and also there is a strong need for proper organization to control quality of work and ensure standard in the building construction industry.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Building construction firms should always have good planning right from the design of the structure to execution level to achieve quality of work
2. There should be adequate planning and organization to enhance effective labour and coordination of work at various units for continuity, safety and standard at all the term
3. There should be a long term planning to eliminate faults and defects to minimize construction cost that may pose construction delay, minimize structural failure and improve the standard
4. Construction firms should have plans for material and equipment storage system on the site for their effective usage and achieving standard in the entire construction procedure throughout the project period
5. Construction firms should periodically organise orientation for their workers while on the construction site in an attempt to maintain and achieve quality standard

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