Factors affecting quality management practices on building construction sites in Nigeria

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Abstract. This research evaluates the factors affecting quality management practices on building construction sites with a view to improve quality management on building construction sites. To achieve the aim a convenient sampling technique was used to select the construction sites within the study area. The sampling frame comprise the professionals in the built environments such as Architect, Quantity surveyors, Builder and the Engineers working on each site. A total number of 88 questionnaires was administered out of which 63 was returned completed representing 78.75 response rate. The Statistical Package for Social Science (SPSS) software version 21.0 was used to analyze the data. The result of the analysis showed that lack of adequate sanction by the standard assurance organization, non-implementation of National Building Code were among the topmost factors affecting quality management on construction sites in Oyo State. The study concludes that most of the factors affecting effective project quality management in Oyo State were generated by the government, professionals, quality organization agencies construction workers and other stakeholders in construction industry. The study recommends that adequate sanction should be impose on the non-compliance of quality by the standard assurance organization.

Key words: Quality, Quality management, Construction site, Quality practice

1. Introduction

Quality management in construction refers to keeping up the nature of quality works at satisfactory range in other to satisfy clients' craving that would bring long haul aggressiveness and business survival for the organization [1]. In the perspective of [2], [3], they stated that the term quality management as utilized in the construction incorporates the ideas, for example, quality control, quality confirmation, quality enhancement, quality measures and so forth. They further uncovered that the first type of formal quality management practice in construction can be traced back to the antiquated Greece and Rome. Further to this, [4] state that quality management practice incorporate all the efforts utilized by managers to guarantee the execution of their quality arrangements this quality control, quality affirmation and quality enhancement [5].

Further to this [6], uncovered that the quest to deal with quality issues and to fulfill the requirements of the client has progressively been received by construction organizations by grasping quality management. The study recommends that 'if at any time an industry is expected to take up the idea of Total Quality Management it is the construction industry'. Quality has remained a standout amongst the variables utilized for finding out, the rate of accomplishment or failure of a project. This has made it basic for all parties engaged with construction project to endeavor consistently to accomplish an acceptable quality standard [7].
As indicated by [2] quality execution of a project is estimated as the capacity to deliver the building or structure at the appointed time, cost and quality as well as accomplishing an acceptable state of customer fulfillment. Also [8] recommend that quality execution upgrades are required to raise contractor’s efficiency and gainfulness as well as enhancing customer fulfillment. Quality tasks conveyance isn’t an extravagance but a basic execution of the project designs with satisfactory supervision to guarantee project achievement [9]. As indicated by [10] reasonable measure of time, cash, and assets are squandered on construction projects because of inefficient or nonexistent quality management methods. Over the years construction industry has been confronting numerous critics for its poor execution and profitability compared with other industries [11]. In a comparable report, [12] uncovered that the rate of building breakdown in Nigeria has turned out to be so disturbing over the years and does not hint at any decrease, the majority of this type of building breakdown can be inferable from low quality management. The previously mentioned examination and reports plainly exhibits the importance of quality management on the performance of building/structure. It is against this background that this study tries to assess the factors affecting quality management practice on building construction sites in Nigeria so as to enhance quality of construction works and improve the performance of building.

2. Literature review

Over the last two decades quality management implementation in construction firms has not been given reasonable consideration. According to [13] there is existence of repeating quality issues in some industries due to recurrent causes which hinders project goals not excluding the construction industries.

In their effort [11] discovered that the three essential hindrances to the accomplishment of successful quality management in construction project are: poor execution, the nature of construction work, and the construction industry itself.

Similarly [14] carried out a literature review on the overview of total quality management (TQM) in service organization. The discoveries of the study give a superior comprehension of TQM, its practices and present the explanations behind development of service organization. Results additionally feature some significant results from the most recent investigations on TQM in service organization. In conclusion, the investigation proposes a ten stage approach for powerful execution of TQM in the service organization.

Likewise [6] completed an investigation on the advantages and boundaries of quality management in construction industry. The research adopt both interview and questionnaire survey method. Results demonstrate that contractors do comprehend the potential advantages of quality execution but yet there
are still numerous hindrances to the implementation. It likewise depicts late advancements that may beat the obstructions. The examination infers that diverse stakeholders in construction industry need to comprehend that change is a moderate and regularly excruciating procedure and that much exertion is required to execute quality in construction industry.

In the same vein [15] directed an exploration on the effect of total quality management on performance and the barriers to total quality management practice. A total number of 242 questionnaires were administered to construction professionals who are randomly selected in Turkey. Result uncovered that essential snags that the organizations in Turkey confront were absence of worker contribution, mindfulness and responsibility of the representatives, wrong firm structure, and absence of adequate resources. It is suggested that organizations should proceed with implementing total quality management (TQM) with all variables to enhance performance. Firms ought to enhance workers’ involvement/duty/attention to TQM, improve firm structure, and allocate resources to defeat the obstructions that counteract proper execution of TQM practice.

Also [16] did an examination on quality management arrangement of Pakistan construction organizations. Questionnaire was administered to construction professionals, contractors and other stakeholders. The outcomes demonstrates that there is expanding mindfulness among the major stakeholders; however the instruments and strategies utilized for quality control are not dependable and steady. It recommends that there is a need to additionally institutionalize the methods and procedures. Also there is need for the Pakistan construction industries to embrace the Total Quality Management in its totality

In their effort [17] directed an examination on basic variables influencing quality execution in construction industries. To achieve their aim the factors were grouped into failure and success factors, the study identify 27 success factors and 28 failure factors. It later infers that the degree of the commitment of different achievement factors varies with the performance appraisals of the organization. Also project supervisor’s skill is seen to be the most noteworthy factor at all levels of the quality performance rating.

Likewise [18] conducted a correlation and regression test on project performance and effectiveness of quality management system practice. The discoveries demonstrate that customer fulfillment and time difference have positive and huge association with quality management system (QMS) while other project performance indicators does not indicate noteworthy outcomes.

Similarly [19] conducted a research on paradigm for total quality management in building maintenance operation. The investigation concludes and suggests periodical meeting arrangement on quality in
respects to maintenance issue, establishment of quality affirmation group to supervise maintenance activity, training personnel on evaluating quality nature of maintenance work done among others.

Failure to transform to new work techniques, nonchalant attitude of specialists on the site, and poor participation and absence of resources sharing among various gangs were among the human related driving reasons for quality issues on building site [20], [21].

3. Methodology

For the purpose of this research work cross-sectional survey research design was adopted. This according to [22] is the type of research design where the research variables are in existence and cannot be manipulated by the researcher and the survey is carried out at specific point in time. This type of research design according to [23], [21] allows researchers to gather information, summarize, present and interpret data for the purpose of clarification when applied in exploratory studies. The population for this research are the active building construction sites in Oyo State where construction work are currently in progress. Since the total active construction sites in Oyo State cannot be ascertain, a convenient sampling technique was used to select the construction firms within the study area; it is a technique in which a sample is drawn from that part of the population that is close to hand, readily available or convenient. The sampling frame comprise the professionals such as Architect, Quantity surveyors, Builder and the Engineers working on each site. The research instrument used was questionnaires with well-structured close-ended items designed based on the stated objectives of the study. A total number of 88 questionnaires was administered out of which 63 was returned completed representing 78.75 response rate. The Statistical Package for Social Science (SPSS) software version 21.0 was used for statistical analysis. In section A of the questionnaire, which was the respondents profile, percentile method were used for the analysis, while relative importance index (RII) was used to analyze section B and C. Also chi square test was conducted in order to test the hypothesis.

4. Results and discussion of findings

| Profile                        | Responses | Percentage (%) |
|--------------------------------|-----------|----------------|
| **Type of Organization**       |           |                |
| Public                         | 29        | 46.0           |
| Private                        | 34        | 54.0           |
| **Total**                      | 63        | 100.0          |

Table 1: Profile of the respondents and organization
Table 1, shows that 54.0% of the respondents are working within private organization while 46.0% are working with public sector. This indicated that quality management was an issue which affects both private and public sector in Oyo State.

The table also shows that majority of the respondents were Builders as it has 39.7%, followed by Quantity Surveyor, Architect and Engineer with 19.0%, 17.5 and 14.3% respectively. Other professional constitute the list percentage with 9.5%. This implies that the respondent were all professionals within the construction industry which means they were all eligible to fill the questionnaire. Table 1 as well shows that 57.1% of the respondents were degree certificated, while 23.8% were diploma certificated and others such as ordinary diploma and technical education.
constitute 19.0%. This means that 81.0% of the respondents possessed high education and were therefore competent to answer the questions correctly.

The table also shows that the respondent’s has adequate years of experience since the year of experience from 6-20 years and above constitute 73%. The table finally indicates that the nature of construction business engaged in by the respondents cut across building and Civil Engineering work. This shows that the respondent has adequate knowledge of the project focus which is quality management; therefore the data supplied were valid for this analysis.

**Table 2: Effect of quality management on building construction project performance**

| Identified variables                                             | RII  | Rank |
|------------------------------------------------------------------|------|------|
| Client satisfaction                                              | 0.81 | 1.5  |
| Getting more jobs as a result of previous good work done         | 0.81 | 1.5  |
| Reduction in maintenance cost                                    | 0.81 | 1.5  |
| Meeting general construction standards                           | 0.80 | 4    |
| Durability assurance                                             | 0.79 | 5    |
| Improve on the built environment                                 | 0.78 | 6    |
| Guaranty users comfort                                           | 0.76 | 7    |
| Excessive reduction of human resources wastage                   | 0.63 | 8    |
| Reduction of function-ability risk                               | 0.60 | 9    |
| Positive climate change effect                                   | 0.54 | 10   |

Table 2 shows the opinion of respondents on the effect of quality management on building construction project performance. Respondents are to rate on a likert scale 1-5 where (5= Very high, 4= High, 3= Moderate, 2=Low, 1=Very Low). It can be deduced in Table 2 that effect of quality management was more high on client satisfaction and Getting more jobs as a result of previous good work done as they were having the highest RII score of 0.81 and both ranked first in the table, followed by reduction on maintenance cost which was ranked second with RII score of 0.806. This implies that quality is one of the factors which determine client satisfaction on a building construction project and once quality product is achieved definitely the cost of maintaining such a building will be reduced to a minimum, and in return will increase the chances of the contractor in getting more jobs based on recommendations from previous clients. The effect of quality management was seen to be moderate on other variable such as meeting general construction standards, durability assurance, improve on the built environment and guaranty user’s comfort as they all have their RII score above 0.70. This implies that in order to meet general construction standard ensures durability and also guaranty users comfort quality management has a vital role to play. Finally the table shows that positive climate change effect has a low effect as it has RII score of 0.54 and was ranked least. This may be due to the fact that climate change effect on building was not only tied to quality of such building.
Table 3: Factors affecting quality management on construction sites

| Identified factors                                                                 | RII | Rank |
|-----------------------------------------------------------------------------------|-----|------|
| Lack of adequate sanction by the standard assurance organization                   | 0.95| 1    |
| Non implementation of National Building Code                                       | 0.92| 2    |
| Lack of proper inspection at every construction stages                              | 0.91| 3    |
| Award of contract to unqualified contractor                                         | 0.89| 4    |
| Lack of construction quality control inspection programme                           | 0.84| 5    |
| Lack of effective quality policy implementation                                    | 0.83| 6.5  |
| Inadequate personnel and craftsmen training                                        | 0.83| 6.5  |
| Poor specification                                                                 | 0.82| 8.5  |
| Bribery and corruption                                                             | 0.82| 8.5  |
| Usurpation of role among professional                                              | 0.82| 8.5  |
| Unrealistic project cost                                                           | 0.81| 11   |
| Unrealistic project time                                                            | 0.79| 12.5 |
| Non Compliance to Quality control                                                  | 0.79| 12.5 |
| Inadequate workers motivation                                                      | 0.78| 14   |
| Inadequate and poor coordination of project resources                               | 0.77| 15.5 |
| Lack of buildability analysis                                                      | 0.77| 15.5 |
| Inadequate and poor pre-design project meetings                                    | 0.77| 15.5 |
| Noninvolvement of all the concerned professionals at the design stage             | 0.76| 18.5 |
| Poor level of commitment to quality improvement among design professionals and construction team | 0.76| 18.5 |
| Poor communication among design and construction team                               | 0.76| 18.5 |
| Pilfering                                                                          | 0.75| 21   |
| Lack of adequate supervision                                                       | 0.74| 22.5 |
| Inadequate technical knowledge                                                     | 0.74| 22.5 |
| Insufficient quality control plan                                                  | 0.70| 24   |

Table 3 shows the level of agreement of respondents on factors affecting quality management on building construction sites. Respondents are to rate on a likert scale 1-5 where (5 = strongly agree, 4 = agree, 3 = slightly agree, 2 = disagree, 1 = strongly disagree). The table revealed that lack of adequate sanction by the standard assurance organization was ranked 1st with RII score of 0.95, followed by non-implementation of National Building Code with RII score of 0.92 which was ranked 2nd. Lack of proper inspection at every construction stages took the third position in ranking with RII score of 0.91. This implies that for quality management to be improved on construction sites adequate sanction has to be put in place for any contractor whose quality of work is found below the require standard, National Building Code should be fully implemented and passed into law and proper inspection should be ensured at every construction stage. Other factors agreed upon by the respondents to be affecting quality management on construction sites in sequential order were award of contract to unqualified contractor with RII score of 0.89, lack of construction quality control inspection programme having RII score of 0.84, lack of effective quality policy implementation with RII of 0.83, inadequate personnel and craftsmen training with RII of 0.83, Poor specification with RII score of 0.82, Bribery and corruption having RII score of 0.82, usurpation of role among professional
with RII score of 0.82 and unrealistic project cost with RII score of 0.81 as they were ranked from 4th to 11th respectively. This implies that in order to ensure proper quality management on construction sites all this factors must be given a due consideration as they all have one or two role to play in ensuring proper quality management on construction sites. Finally the table indicates that all the factors identified were slightly agreed upon by the respondents as factors affecting quality management in construction industry through the government, professionals, workers and other stake holders in the industry. This implies that all this factors has to be look into in order to ensure quality management on construction sites.

**Table 4:** Chi-square test on effect of quality management on building construction project

| Effect Variables                                | $\chi^2$ | Df | P value | Decision |
|------------------------------------------------|---------|----|---------|----------|
| Reduction on maintenance cost                  | 15.794  | 3  | 0.001   | Accept H₀ |
| Client satisfaction                             | 15.286  | 3  | 0.002   | Accept H₀ |
| Meeting general construction standards          | 3.524   | 2  | 0.172   | Reject H₀ |
| Durability assurance                            | 0.857   | 2  | 0.651   | Reject H₀ |
| Improve on the built environment                | 11.143  | 2  | 0.004   | Accept H₀ |
| Reduction of function-ability risk             | 69.143  | 4  | 0.000   | Accept H₀ |
| Excessive reduction of human resources wastage  | 24.429  | 3  | 0.000   | Accept H₀ |
| Positive climate change effect                  | 47.286  | 3  | 0.000   | Accept H₀ |
| Getting more jobs as a result of previous good work done | 0.857 | 2 | 0.651 | Reject H₀ |
| Guaranty users comfort                          | 7.524   | 2  | 0.023   | Reject H₀ |

$p \leq 0.01$, N= number of cases, df= degree of freedom,

Table 4 shows the result of Chi-square test on the hypothesis which says “There is no significant difference in respondents opinion on the effect of quality management on construction project” the result shows that there is no significant difference in respondent’s opinion regarding reduction on maintenance cost, client satisfaction, improve on the built environment, reduction of function-ability risk, excessive reduction of human resources wastage, positive climate change has they all have their P value below 0.01 therefore the null hypothesis was accepted. While the null hypothesis was rejected on meeting general construction standards, durability assurance, getting more jobs as a result of previous good work done and guaranty users comfort as they also have their P value above 0.01. This implies that the views of the respondents were the same on most of the identified effect and contrary on few, this is an indication that quality management has greater effect on construction projects.
5. Conclusion and Recommendations

The study revealed that top among the factors affecting quality management on construction sites both in public and private organization in Oyo State were Lack of adequate sanction by the standard assurance organization, Non implementation of National Building Code, Lack of proper inspection at every construction stages, Award of contract to unqualified contractor, Lack of construction quality control inspection programme, Lack of effective quality policy implementation, Inadequate personnel and craftsmen training, Poor specification, Bribery and corruption and Usurpation of role among professional. All this factors requires due consideration in order to ensure effective quality management on construction sites. Similarly the study revealed that the effect of quality management cannot be overlooked as it helps to reduce maintenance cost, ensure client satisfaction, improves built environment, reduce excessive human resources wastage among others. This study has clearly established the fact that most of the factors affecting effective project quality management in Oyo State were generated by the government, professionals, quality organization agencies, construction workers and other stakeholders in construction industry.

Base on the result gotten from the analysis, recommendations were put forward to provide some direction for improvement in this regard as follows:

I. Adequate sanction should be impose on the non-compliance of quality by the standard assurance organization.

II. Legislative arm of government should endeavor to pass National Building Code into law.

III. Proper inspection should be done at every construction stage so as to ensure adequate quality.

IV. Contractors should be well scrutinized before awarding contract.

V. Construction industry should implement quality control inspection programme and quality policy.

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