Development of a Quality Assessment System for Building Contractors in Lagos State, Nigeria

Ngozi Marykate Okoye, Kevin Chuks Okolie; Eudora Ndidiamaka Okolie
Department of Building, Nnamdi Azikiwe University, Awka-Anmabra State

ABSTRACT: *In the past few decades, Nigeria has witnessed increases in activities in the construction sector, but there have not been developed a robust quality assessment system for building contractors in Lagos State, Nigeria. The aim of this study is to develop a quality assessment system for building contractors in Lagos state. In order to realize this aim, the study assess an adopted conceptual framework as well as areas of improvement with regard to how their organization does quality assessment.The study employed a descriptive case study design where data was collected from senior managers, project managers, engineers, architects, quantity surveyors, and technical managers working with building construction companies in the Lagos Metropolitan Area using the mixed method approach. Quantitative data was collected using questionnaire from 109 randomly selected participants and analysed using descriptive and inferential statistics. Qualitative data was collected through interviews with 9 purposively selected respondents and analysed using the thematic analysis technique. The improvement areas identified were: Staff education and training, Information technology, Involvement of senior leaders, customization of existing quality assessment tools, partnering with contractors, suppliers and other stakeholders, change management and involving other stakeholders. This study recommends that developing a model for guiding the process of assessing quality among Lagos and Nigerian contractors should incorporate prescribed steps, methods, tools, and procedures that local contractors should use in the assessment of quality. This model will help to standardize the processes of assessing quality within the Lagos construction industry*
**KEYWORDS:** development, quality assessment, system, building contractors, Lagos State, Nigeria.

INTRODUCTION

In the past few decades, Nigeria has witnessed increases in activities in the construction sector (Adeyemi, Aina and Olanipekun, 2006). In the last three years for example, Ajayi and Thwala (2015) observe that the industry achieved double digit growth rates, thereby outgrowing all other sectors of the Lagos economy. According to a report by the Global Construction Perspectives and Oxford Economics (2015), Nigeria is likely to continue experiencing a boom in the construction

industry even as other nations in the world are struggling to emerge from the recent economic crisis (Atomen, Chuka, Emeka and Samuel, 2015). Indeed, estimates by Babatunde and Low (2015) indicate that the growth in the construction sector in Nigeria exceeds India's and China's growth rate in the same sector. With these projected growth, it is crucial to establish reliable quality assessment systems in order to guarantee health and safety of the public and to stimulate continued growth (Brown, 2015). Currently, the construction industry in Nigeria produces more than 70% of the nation's fixed capital formation (Ding, 2008).

LITERATURE REVIEW

Chan (2001) developed the Consolidated Framework for Measuring Project Success in the construction industry. The model encompasses eight dimensions: cost, time, safety, participants' satisfaction, user satisfaction, environmental performance, commercial value, and technical specification. The model also proposes several key performance indicators including construction time variation, cost variation, net present value, environment impact assessment scores, end-user satisfaction scores, and construction team satisfaction score. The model provides a comprehensive way of assessing the performance of project oriented organizations such as construction companies.

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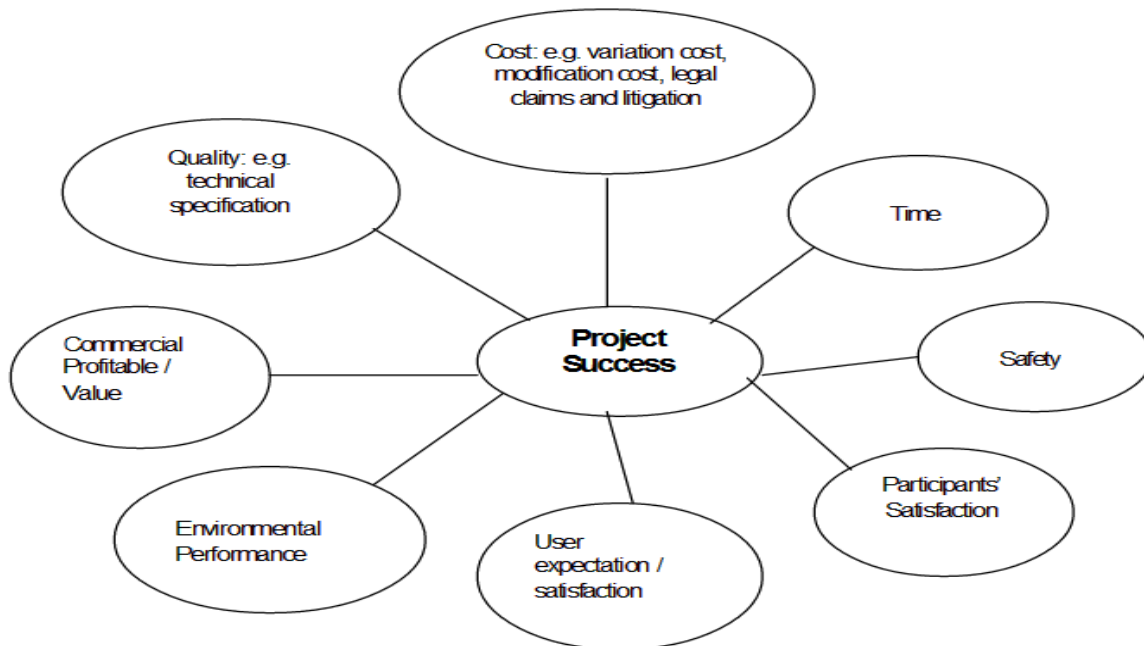
The Quality Assessment System Model for Building Contractors in Lagos

A model is simplified framework designed to illustrate complex processes (Sturmer and Pohlheim, 2012). It represents a set of variables that make up the process as well as the logical relationship between the variables. Modeling processes is often the best way to simply it and make its implementation easier. Model can be divided in two broad categories: descriptive models and prescriptive models. Descriptive model just describe the structures of a given system or process leaving it to the decision-maker to determine how to solve problems within the given process or system (Divekar, Bangal, and Sumangala, 2012). On the other hand, a prescriptive model is design to direct the decision-maker on how to implement a given process. In this section, a prescriptive model for assessing quality within the Lagos construction industry is presented. The aim of the model is to make the process of assessing quality more systematic as well as unify this process across all building contractors in the state. The idea of developing a quality assessment model is founded on the fact that there model that appeal to the unique situation of Lagos contractors. Most of the available model are either too complex, or too expensive, or both making it difficult for local contractors to implement.This model titled Quality Assessment Model for Lagos Building Contractors (QAMNB) is based on the data obtained from the sampled builders in the Lagos Metropolitan Area. QAMLBC incorporates principles of continuous quality assessment. It views quality assessment as an ongoing process with the final step (reporting) returning the QA team to the first step where QA goals are assessed. The model is flexible; hence, can be applied by a wide variety of builders. It comprises of four main components: (1) quality assessment goals, (2) quality indicators, (3) data collection, and (4) reporting:
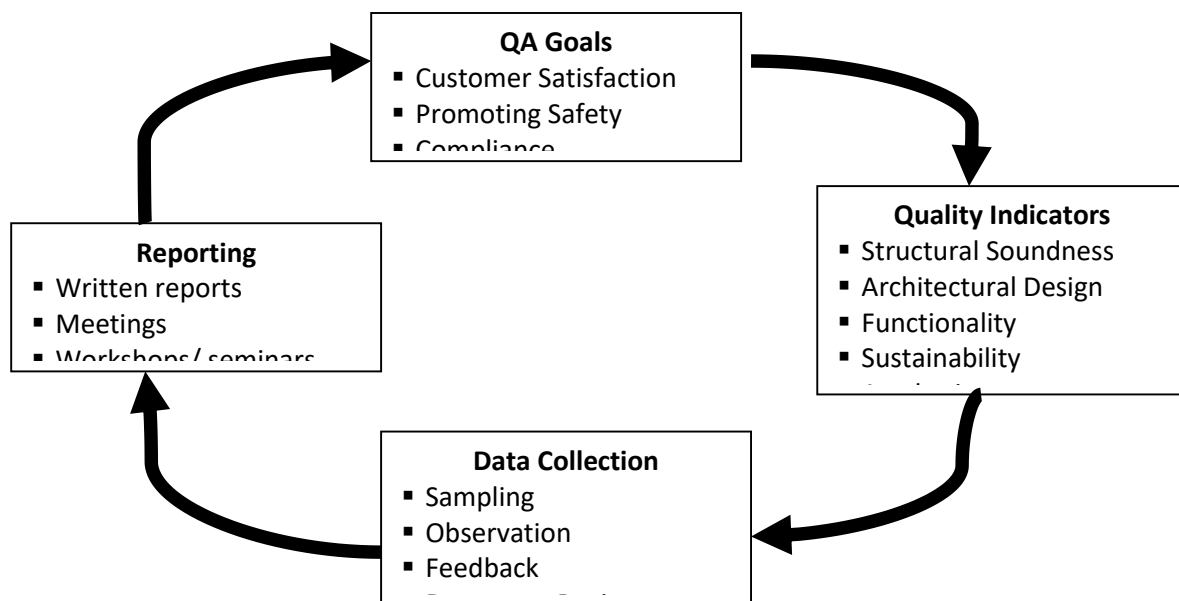

Figure 5.1: Quality Assessment System Model for Lagos Building contractors

Source: Field Survey. 2017

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Components of the QAMNB

Goals: According to the QAMNB, the first step in the quality assessment process should be to define the quality assessment goals. The most important goal should be to increase customer satisfaction. This implies that contractors should assess customers' needs and make these needs a basis for quality assessment process. Based on their interaction with customers, contractors need to develop specific quality goals. This implies that the quality assessment process may vary from one project to another depending on the priorities of the customer. It should go beyond compliance and focus on delivering maximum satisfaction to the customers. The assessment process should also focus on improving safety for all stakeholders including workers, occupiers, and members of adjacent communities. The quality assessment process should also incorporate all elementary demands by existing industry regulations. Reducing emphasis on compliance does not imply that the contractor should ignore industry regulation. Failure to comply with legal and regulatory requirements is a major risk to the project as it can lead to hefty penalties, halting of the project, or even jail term for the management team. The quality goals must be realistic taking into consideration existing resources such as manpower, equipment, capital, and expertise. The quality assessment goal must also capture the values and objectives of the construction company; hence, the involvement of the senior management team is crucial in this step.

Quality Indicators : The second step in the quality assessment process entails defining the quality indicators. Indicators refer to any item that signals the quality of given process or product (Gowda *et al*., 2015). To standardize the quality assessment process, the contractors should apply evidence-based measures that can be objectively assessed. The model recommends that the indicators be classified into the following five categories

a. Structural Soundness: This category should comprise of measure that signifies the structural stability of the buildings. It should focus on three main dimensions: quality of materials, quality of workmanship, and quality of the structural design.

b. Quality of the Architectural Design: This category should comprise of measures that signifies the overall quality of the formation. It should focus on issue such as use of space, physical layout, and accessibility of the building.

c. Functionality Indicators: This category should incorporate measures that indicate how well the building meets the functional needs of the client. It should incorporate indicators such as quality air conditioning, interior and exterior lighting, security features, parking space, and stairways.

d. Sustainability Indicators: This category should incorporate measures that indicate how well the building meets sustainability goals. It should incorporate indicators such as energy efficiency, water efficiency, and waste disposal system.

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e. Aesthetic Indicators: This category should incorporate measures that indicate the aesthetic value of the buildings. This category should incorporate indicators such as quality of internal and external wall, internal and external doors, floors, interior design and decorations,

Data Collection: Quality assessment is a measurement process; hence, data collection is one of the vital activities. The assessment process must deploy valid and reliable tools and procedures for data collection. The data collection instruments and procedures must demonstrate scientific rigor. At the time, findings of this study highlight the need to ensure that the data collection processes are simple enough for Lagos builders to be able to implement them. The methods and procedures must also be cost-effective to encourage use by small contractors. The QAMNB proposes four methods of data collection: (1) observation, (2) feedback, (3) sampling, and (4) document reviews. Observation method especially inspection should be used to assess process indicators such as quality of workmanship and quality of materials. Small contractors should train their supervisors to perform observations to avoid the cost of recruiter extra personnel. Observation checklists should be used to make the process more systematic and objective. Checklist will also facilitate the storage of observation data over a long period. The feedback method should be used to assess outcome indicators such as quality of air condition, lighting, and interior decoration. Feedback can be obtained through tools such as surveys and interviews. Customer complaints are also essential source of feedback. Feedback is an essential data collection method as it integrates the voices of customers and other external stakeholders into the quality assessment process. Feedback should be obtained from all stakeholders including customers, workers, regulators, and suppliers. Information technology such as social media and email should be integrated to reduce the cost of obtaining feedback and enhance efficiency. Sampling is essential as it introduces objectivity in the quality assessment process. This approach is particularly instrumental in assessing the quality of materials and soundness of the end product. Sampling should mainly be done prior to commencement of work where the quality of materials are tested as well as during construction rather than after the completion of works. This will ensure that defects are detected early minimizing the cost of rework. Sampling should also be done on work completed by subcontractor before it is accepted. However, small contractors may find it difficult to implement this approach as it requires technical skills and specialized equipment to analyze the samples. This bottleneck can be overcome by establishing public workshops or laboratory where contractors can take their sample to be analyzed at a small fee.Document review can also add value to the data collection process. Documentation is part and parcel of the building construction process. Work teams produce a wide range of documents including architectural and structural drawings, tender documents, material inventory, daily construction reports, and daily activity logs (Hojat and Sina, 2014). These documents provide readily available data that can be used to assess the quality of the construction process. Integrating information technology in the project documentation process would make it easy for contractors to use these data for quality assessment.

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Reporting: A major goal of quality assessment is to provide stakeholders with timely information that will help them improve their practices (Sarhan & Fox, 2013). Consequently, a good quality assessment system should be able to disseminate results of the quality assessment proves to all key stakeholders within the shortest time possible. Contractors can use various strategies to disseminate findings to their staff including the use of informal and formal meetings, workshops and seminars, and written reports. Results should also be communicated to external stakeholders such as customers so as to improve the face validity to the assessment process. For instance, if a customer had expressed reservation regarding the quality of a given aspects of the project, it would not be adequate for the company to address the issue and remain quite. The contractor should communicate the step taken to address the problem to this client. It is also essential to communicate outcomes of the assessment process to suppliers, partners, and regulators.

METHODOLOGY

This study will employ descriptive cross-sectional case study design, this cross-sectional design is selected to understand the current situation in the Lagos construction industry with regard to quality assessment rather than test the effect or a program. The target population comprises of senior managers, project managers, technical managers, architects, quantity surveyors, and engineers working with building contractors operating the Lagos Metropolitan Area, these are selected because they are actively involved in the planning and management of construction projects; hence, they are likely to provide the information needed to answer the research questions. Survey revealed that 1771 construction companies was registered in Lagos (Public Procurement Agency, Alausa Ikeja, 2018) . 1000 construction companies are from LMA which comprises 13 local government area. The population of his study is 1000 construction companies. This study made use of the Taro Yamane sample size formulae to determine the appropriate sample size for collection of quantitative data:

$$n= \frac{N}{1+N*(e)^2}$$

Where N= Population, n= Sample size and e= Margin of error

Since the unit of analysis is the building construction company, the number of registered building construction companies in Lagos Metropolitan Area will serve as population size. The population size is 1000. The margin of error is set at 5%. Using the formulae, the desired sample size would be:

n= 1000/ [1+ {1000* $(0.05)^2$}]

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n= 285.7 ≈ 286 companies.

The purposive sampling technique is adopted as it entails selecting participants based on the researcher's judgment regarding his or her ability to provide the require information. The audio-recorded Interview is the main method of data collection which took between 30 and 45 minutes depending on the level of details provided on the quality assessment methods that are currently used in their organizations, how these methods impact performance, challenges involved in implementing quality systems, and factors critical to the successful implementation of a QAS. questionnaires to 100 building construction companies operating in the Lagos Metropolitan Area. The first instrument of data collection is a semi-structured interview guide selected because of its ability to facilitate the collection of rich and contextual information, which is in line with the goal of the study while the structured questionnaires comprises of multiple choice questions to collect quantitative data via clustered random sampling method. The transcript for each interview will be analysed using t-tests to measures the impact of quality assessment system on project delivery in Lagos while the Principal Component Analysis (PCA) is used to reduce the number of variables while retaining the original variance as possible. Th method is to determine the method and approaches that the Lagos contractors are currently using to assess quality in their organizations as well as the major problem facing building contractors in applying quality assessment systems in Lagos, Nigeria. For internal validity, the researcher discussed the questions contained in the research instruments, design and method used in data collection and analysis with the experts to ensure that they capture what the study intends to measure. For external validity to enhance the generalizability of findings, the researcher documented the study methods and procedures in a clear and elaborate fashion. The reliability of the study was enhanced by conducting a pilot study before the main data collection exercise. The pilot involved a total of 10 builders and utilized the test retest approach. The responses for the first and second round were compared using the Pearson Product Moment Correlation Coefficient at a threshold of 0.7. The test yielded a correlation coefficient of 0.87 leading to the conclusion that the instrument is highly reliable.

RESULTS AND FINDINGS

The study also examined areas that the respondents' felts should be improved with regard to how their organization does quality assessment. Participants were presented with a list of seven suggestions and asked to rate them on scale of 1-10 with 1 indicating that issue was less important and 10 indicating very important. Results are presented in Table 4.12:

Table 4.1: Ranking of Improvement Issue using Friedman Method

Rank	Improvement Issues	N	Mean Rank
1	Staff education and training	261	6.21
2	Information technology	261	5.88
3	Involvement of senior leaders	261	5.13
4	Customization of existing quality assessment tools	261	4.85
5	Partnering with contractors, suppliers and other stakeholders	261	4.54
6	Change management	261	4.39
7	Involving other stakeholders	261	3.96

Source: Field Survey, 2017

As shown in the Table, staff education and training emerged as the highest ranked issue. In subsequent interviews, one of the participants explained that the quality assessment process can be improved significantly by training staff on modern assessment methods and tools. The importance of education and training is also captured in the study by Iruob *etal*. (2012) where it was noted that in order to secure full benefits of TAM, staff training must be systematic with clearly defined objectives, as well as, well-developed content that are tailored towards addressing the skill gap of employee. Juhari etal. (2011) also found that training increases employees' awareness of quality management principles, change their attitude regarding quality and their role in quality management, and impart quality management skills resulting in greater motivation and commitment to QAS implementation. Integrating information technology into the quality assessment process was ranked second among the improvement issue. This view is supported by Khaham *et al*. (2013) who argue that IT can act as enabler of the quality assessment process by facilitating collection and analysis of data, as well as, dissemination of findings. Russel (2005) also found that IT had the potential for facilitating tasks such documentation of quality requirements, analysis of quality data, diagnosis of quality problem, coordination of quality activities, managing the flow of quality information, and managing quality knowledge. In their study, Liu *et al*. (2016) examined various technology-based approaches that have been developed to aid the quality assessment process. These approaches include the use of sensors, SD laser can measurement, thermal imaging analysis, mobile robots, and infrared thermography. The study found that these technologies have added value to the QA process by enhancing objectivity, accuracy, cost effectiveness, and speed of data collection processes.

Increasing the involvement senior leaders in the QA process also emerged as key area for improvement. This position is supported by Deming who asserted that 85% of quality issues within organization originate from errors within system and processes, which can only be corrected by

senior managers (Maguad, 2011). Consequently, the involvement of senior leaders in QA process is essential. Feigenbaum philosophy also emphasizes total commitment from senior managers and emphasized a management approach that integrates quality throughout the entire organization. The importance of senior management involvement was reinforced in the study by Aziz and Hafez (2013) where it was found that leadership commitment was an essential factor in the implementation of the Last Planner System in the Egyptian construction sector. Customization of existing quality management tool ranked fourth suggesting that the majority of respondents felt that the issue was of moderate importance. The issue of customizing existing tool is best explained by Clegg *etal*. (2012), who noted that since each organization has unique mission, goals, objectives, and priorities, they should not view existing tools as one-size-fit-all solutions. They should instead try to adapt this tool to fit their unique circumstances.

CONCLUSION

Developing a model for guiding the process of assessing quality among Lagos and Nigerian contractors. Prior to this study, there was no framework for guiding the process of assessing quality in the construction industry. This study has led to the development of a framework that prescribes steps, methods, tools, and procedures that local contractors should use in the assessment of quality. This model will help to standardize the processes of assessing quality within the Lagos construction industry.

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