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QUALITY ASSESSMENT SYSTEMS: A REVIEW

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Abstract

The effectiveness of quality assessment systems boils down to understanding the concept of quality. There are quite a number of studies that try to explain what quality is and the benefits it offers in project delivery. There has, however, been a dearth of literature that examines and reviews quality assessment systems. A critical review of the quality assessment system and its related concepts will provide a solid metric for assessing quality in the construction industry. The aim of this study is to carry out a review of the quality assessment system and its related concepts with a view to improving the performance of building construction projects in Lagos, Nigeria. This study is significant because the construction industry in Nigeria is undergoing an important growth phase. The research approach was a descriptive literature review. The study found that associated concepts include quality management, quality planning, quality control, quality assurance, quality improvement, and quality assessment. There are quite a number of studies that examine the systems used to assess quality in the construction industry, but none provide a critical understanding of the quality assessment system and its related concepts. The study concludes that for a quality assessment system to be accepted by contractors across the county, it should target improving customer satisfaction, enhancing safety, and increasing compliance with industry regulations. There is a need for continuous training of local contractors in the area of quality assessment.

Keywords: Construction Projects, Quality Assessment System, Quality Assurance, Quality Evaluation, Quality Planning

Introduction

Quality assurance in the industry should also include consideration for cost and time implications. Quality practices not only focus on producing quality buildings in terms of aesthetics, durability, and functionality; they also focus on reducing the cost and time implications of the completed project. Utilisation of new and improved technology can help contractors provide quality services at reduced costs and in shorter time spans (Zeng, Tam, and Tam, 2015).

To date, numerous buildings, including residential houses, have collapsed, killing many people and injuring scores of others. The damages caused by collapsing buildings differ from time to time. On September 12, 2014, a six-story guesthouse at the Synagogue Church of All Nations in Lagos State collapsed, killing 115 and injuring 131 and sparking a national dialogue on building safety (Babatunde, Perera, Zhou, and Udeaja, 2015). Incidents of collapsed buildings are common in Nigeria, with most cases being reported in Lagos. Between 2007 and 2012, national statistics indicate that there were 130 cases of collapsed buildings in Lagos alone.

Nationwide, more than 135 buildings were reported to have collapsed in 2013 alone. The high rate of collapsing buildings can be attributed to poor workmanship and the

utilisation of poor-quality materials. Ajayi and Thwal (2015) recognise that implementing a quality assessment system reduces the chances of experiencing poor workmanship, negative environmental impacts, and exceeding costs. Implementers of such systems may be met with financial challenges, a lack of collaboration and cooperation from other players, time constraints, and other challenges. For continued success, such challenges need to be addressed early so that they do not affect the progress. Wahab and Lawal (2011) note that although the construction industry in Nigeria is well developed and continues to mature, there is no reliable standard quality assessment system.

The aim of this study is to carry out a critical understanding of the quality assessment system and its related concepts in order to improve the performance of building construction projects in Lagos, Nigeria. The specific objectives of the study are to provide a better understanding of the quality assessment system and its related concepts. This study is significant because the construction industry in Nigeria is undergoing an important growth phase (Idiake, Shittu, Anunobi, and Akanmu, 2015).

This study covers all types of building construction in Lagos, including industrial, residential, and commercial. The study will, however, utilise the case study design, where data will be collected from building contractors operating in the Lagos Metropolitan Area. The research is to be conducted within the Lagos Metropolitan Area (LMA) in Nigeria. LMA refers to the city of Lagos. It is the largest urban centre in Africa, with a population estimated at 16 million people (Banjo and Mobereola, 2012).

Literature Review

Overview of quality

The effectiveness of quality evaluation systems boils down to the definition of quality. Quality is, however, quite an ambiguous concept. Wicks and Roethlein (2009) noted that quality is defined differently for goods and services, for different levels of dimensionality, and for different industries. They defined quality as the summation of the affective evaluation by each customer of each attitude object that creates customer satisfaction. Zeithaml (1988) noted that the concept of quality is often mistaken with adjectives such as luxury, goodness, weight, and shininess. He also noted a limited distinction between quality and other constructs such as value, utility, and worth. He defined quality as the overall superiority or excellence of a given product or service. Deming (2000) believed that quality is a multidimensional concept that cannot be defined using a single feature. He suggested that the most effective way to define quality is through the level of customer satisfaction.

According to Deming, quality is therefore the difference between the objective features of a product and the customers' subjective expectations. Juran defined quality as fitness for use, while Crosby defined it as conformance to requirements (Hellman and Liu, 2013). Zeithaml (1998) has highlighted two types of quality: objective and perceived quality. He defined objective quality as mechanistic in nature, involving tangible aspects of a product or service.

On the other hand, perceived quality is humanistic in nature and involves the subjective responses of people to products or services. Scholars have traditionally focused on defining quality from the perspective of goods. Modern definitions have, however, evolved from the product perspective to encompass fields such as services, projects, and the environment. Kang and James (2004) argued that service quality comprises technical and functional dimensions. Functional quality is associated with the process used to deliver services, while technical quality relates to the outcome of the service delivery process. Pace (2007) defined quality as ‘doing the right thing, the right way, the first time, and every time.’ This

definition goes beyond definitions that focus on product and service aspects such as product features, reliability, and serviceability.

Scholars in construction quality have associated quality with various aspects, including meeting the expectations of the customer, reducing defects and reworks, repeat business, conformance to ISO criteria, and completion within budget and on time (Willar, 2012). Dharani and Ramasamy (2015) defined quality as the "satisfaction of customers with the performance, appearance, and reliability of the project for the valuable cost range. Just like in other industries, it is difficult to find a precise definition of quality in the construction industry. Ali (2010) argues that managing quality in the construction industry is a daunting task because production processes are generally not standardized.

To develop an effective quality assessment system, a uniform and standard definition of quality is needed. It is impossible to develop a coherent and valid measure of quality without a precise definition of the term. To date, the most authoritative definition of quality is provided by the Organisation for Standardisation (ISO) (Elshaer, 2012). ISO is the largest developer of quality standards in the world and has developed thousands of standards for different industries, including agriculture, medical services, and engineering. ISO defines quality as the "degree to which a set of inherent characteristics of a product or service fulfils the requirements of customers and other stakeholders. According to Rapert, Smith, Velliquette, and Garretson (2010), the ISO definition of quality emphasises continual examinations of requirements not only of clients and users but also of other stakeholders such as regulators, financiers, and employees.

Understanding quality assessment

Quality assessment can generally be viewed as the process of measuring performance against predetermined quality standards. As Ahmad *et al*. (2014) explain, one cannot manage quality without first being able to measure it meaningfully and determining the causal link between the sources of quality change, types of quality problems, activities affected, and their implications. From the description above, it is clear that data collection is one of the main activities in the quality assessment process. In order to measure quality, the QA team must gather data regarding the subject of the assessment process (Harrison, 2005). For instance, if the goal is to assess the quality of workmanship in a construction project, the QA team must gather data regarding the work practices within the project.

Methodical ways of gathering data must be used so as to obtain a reliable and valid outlook on existing practices. The data gathering process must use well-designed instruments and logical procedures. Quality assessment in the building construction setting is a daunting activity for various reasons. First, construction activities do not take place in a closed workshop but rather in an open environment, making it difficult to observe and control all activities (Ahmad *et al*., 2014). Secondly, construction projects bring together multiple uncoordinated actors in a complex contractual relationship (Pala *et al*., 2012; Ali, 2014). Construction projects encompass different kinds of work, including architectural works, structural works, mechanical works, plumbing, electrical works, and interior design. In most cases, these works are performed by different actors in isolation, with each making decisions that affect the other (Herdandez and Aspinwall, 2008). Construction projects may also have multiple suppliers providing a wide range of inputs. Consequently, keeping tabs on all activities and actors becomes a challenging task.

Despite the challenges, implementing an effective quality assessment system presents numerous benefits to construction projects, including minimising mistakes, material waste, and rework; enhancing control over suppliers and subcontractors; increasing

productivity and profitability; and expanding market share (Leong *et al.*, 2014). The instrument used in quality assessment must satisfy the construct, content, and criterion validity requirements.

Construct validity is the extent to which a given instrument measures what it purports to measure (Carmines and Zeller, 1999). It is mainly determined by how the instrument developers have conceptualised the concept of quality and its variables. Realising construct validity is often a difficult task due to the ambiguity of the quality concept. On the other hand, content validity is the extent to which the instrument covers all the facets of quality (Ibid.). It is concerned with the comprehensiveness of the assessment tool. A comprehensive quality assessment system should have scoring criteria for all components of the construction value chain, including purchasing and procurement, human resources, design and engineering, construction and workmanship, customer service, and operations and maintenance.

Rad and Khosrowshahi (1998) also propose that to improve the comprehensiveness of the quality assessment processes, measurements should incorporate both objective and subjective quality attributes and apply triangulation by comparing the perspectives of different stakeholders, such as clients, employees, and suppliers. Criterion validity is the extent to which measures are connected to the intended outcomes (Carmines and Zeller, 1999). For instance, a scoring system for workers should accurately reflect their actual performance.

Hernandez and Aspinwall (2008) made a summary of the features of an effective QAS. According to them, a good QAS should be user-friendly, easy to understand, systematic, well-structured, comprehensive, practical, and applicable. This summary introduces an attribute that had not been captured in previous discussions: practicability. Practical means that not only should the system contain measures that are relevant to the construction industry, but it should also incorporate pragmatic considerations such as costs and the time needed to implement the system. Harrison (2005) also proposes that quality assessment should be left to third parties rather than being implemented internally by the contractor's employees. The rationale for using third parties is to introduce objectivity and independence in the quality assessment process. This position is also supported by Vaughan, Gardiner, and Eyre (2012), who argue that external verification systems enhance the credibility of the assessment process. They also proposed the development of an award or accrediting system to provide incentives for contracts to subscribe to the assessment program. Assessors must also be people with verifiable, sufficient, relevant, and current industry knowledge and experience.

Quality management systems

Despite the absence of a precise definition, the importance of quality has grown in all areas of society. Managing quality has become a major priority among organisations in all economic areas. Quality management refers to the process of planning and executing activities and tasks needed to maintain the desired quality level (Dale, Wiele, and Iwaarden, 2013). It may entail different activities, including developing quality policies, identifying quality requirements, and conducting inspections. The concept of quality management comprises four main components: quality planning, quality control, quality assurance, and quality improvement.

Quality Planning: Quality planning is the process of identifying and documenting quality requirements and standards (Lam, 1997). It is an essential component of quality management as it provides standards against which quality is measured. Bhonde and Shaikh (2015) described it as a systematic process for developing a structured sequence of activities aimed at delivering quality. The focus of quality planning is often to identify the customers' needs, use them to formulate quality standards, develop ways of measuring

performance, establish mechanisms for meeting quality goals, and build mechanisms for improving results (Lakshmi, 2015). Closely related to the concept of quality planning is strategic quality management.

Gulersoy *et al*. (2009) described strategic quality management as the process of integrating quality management initiatives with other initiatives of the organization. Senaratne and Jayarathna (2012) argue that, just like all other dimensions of business, quality must be strategically managed at the senior managerial level for it to have a meaningful impact on the organization. Quality management methods and tools must be aligned with the firm's strategy and coordinated with other functions of the business. Quality management efforts cannot lead to success if they are implemented in isolation from other organisational initiatives and the general strategy of the company.

Quality Control: Quality control refers to a set of processes that are used to assess the organisations or project's outputs so as to determine whether they meet pre-established standards (Hellman and Liu, 2013). The goal of quality control is to identify and correct defects before the product gets to the customer. Bhonde and Shaikh (2015) described quality control as the analysis of output to ensure that it meets required standards and taking corrective action whenever a gap in quality is found. It is a set of activities and techniques that an organisation uses to verify that products are meeting quality specifications. It incorporates the collection, analysis, and interpretation of data related to quality issues. In the construction industry, quality control entails monitoring specific project outcomes so as to determine whether they comply with building plans and implement actions to eliminate deviations from the plan (Lakshmi, 2015). This exercise may apply tools and techniques such as inspections, Pareto diagrams, control charts, flowcharting, statistical sampling, and trend analysis.

According to Phatak *et al*. (2014), the contractor is largely responsible for the quality control task because he or she controls the bulk of the work that takes place in a construction project. The contractor is expected to apply efficient methods and techniques to test products and structures at each stage of the project.

Quality Assurance: Quality assurance refers to processes and procedures that are applied so as to ensure the organisation or project outputs meet predefined requirements (Mane and Patil, 2015). It refers to evaluations done on a regular basis to generate confidence that the projects will meet the relevant quality standards (Ashokkumar, 2014).

Quality assurance is undertaken before outputs are generated, while quality control is done after outputs are generated. It consists of planned and systematic activities that aim to provide a satisfactory degree of confidence that outputs will meet quality specifications. It requires continuous evaluation of factors that impact the quality of output, such as the quality of designs, the condition of inputs, the quality of workmanship, and the effectiveness of processes. In the construction industry, quality assurance encompasses activities such as recruiting qualified people in the various roles, training employees, developing policies that govern work processes, selecting qualified suppliers, and developing suppliers' capacity (Bhonde and Shaikh, 2015). It may also entail evaluating the performance of the entire project on a regular basis so as to assure stakeholders that projects comply with requirements. The combination of quality assurance and quality control creates a rigorous process that is bound to ensure that the final product is bound to satisfy customer requirements.

Quality Improvement: Quality improvement is the process that seeks to improve the performance of organisational or project processes and functions on a continuous basis. This process is founded on the understanding that quality is a moving

target because customer preferences keep changing, technology is advancing, the political and economic environments are constantly evolving, and computers are also getting better (Hellman and Liu, 2013). Consequently, organisations should continuously strive to improve their systems and processes. Several quality improvement tools have been developed over the years, including the Six Sigma model, the PDCA cycle, and the 5-S model (Senaratne and Jayarathna, 2012). These tools have also found use in the construction industry.

Quality Assessment: Just like quality, quality assessment (QA) is quite an ambiguous term that has attracted varying descriptions from different scholars. Ahmad, Sabli, and Othma (2014) described QA as a systematic, data-guided activity that seeks to bring about immediate improvements to a given process or product. Szczerban (2002) defined it as the process of systematically monitoring and evaluating various aspects of a given project, service, or product with the aim of ensuring that quality standards are being met. It entails the examination of quality parameters vis-à-vis the set standards.

On the other hand, Ashokkumar (2014) defined quality assessment as the process of collecting evidence and making inferences on whether quality standards have been attained. He further defined a quality assessment system as a coordinated set of policies, procedures, materials, and tools designed to ensure that the assessment process is consistent, credible, and valid. Quality assessment is a vital component of quality management, as it provides organisations with data regarding the extent to which work processes and products conform to standards (Harrison, 2005). It gives the organisation crucial information that enables it to control key processes and reduce variation in quality.

An important component of quality assessment systems is performance measurement. Ali (2010) defined performance measurement as the process of evaluating the execution of tasks relative to predefined goals. Performance measurement enables a given organisation to determine its current status and what needs to be done in order to realise the desired state. Performance measurement plays a significant role in supporting the implementation of quality management initiatives (Sarhan and Fox, 2013). It seeks to pinpoint defects and their intensity, facilitate prompt corrective measures, enable organisations to take precautionary measures in future projects, and develop the capability and competencies of employees.

Literature gaps

The subject of quality assessment in the construction industry is widely covered in the existing body of literature. There are quite a number of studies that examine the systems used to assess quality in the construction industry, but none provide a critical understanding of the quality assessment system and its related concepts.

Research Methodology

This study is guided by a pragmatic research paradigm. The research believes that the main goal of research should be to solve problems; hence, all methodologies that contribute towards solving the problem should be considered appropriate. The problem being addressed in this study is the absence of a uniform quality assessment system that can easily be implemented by all contractors across the industry. This study used a literature review methodology to address this problem.

Conclusion

This study sought to develop a quality assessment system for building contractors that will improve the performance of building construction projects. The study employed a literature review approach. The study concludes that for a quality assessment system to be accepted by contractors across the county, it should target improving customer satisfaction, enhancing safety, and increasing compliance with industry regulations.

Recommendations

Based on the findings and conclusion of the study, the following recommendations are made for improving the quality assessment system in the construction industry: There is a need for continuous training of local contractors in the area of quality assessment. Findings suggest that a lack of skills and expertise in quality assessment is one of the factors hindering effective quality assessment in the Nigerian construction industry as a whole.

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