

Framework for Evaluating Quality Performance of Contractors in Nigeria.

Arazi Bin Idrus and Mahmoud Sodangi

Abstract— The Nigerian construction industry produces nearly 70% of the nation's fixed capital formation yet its performance within the economy has been, and continues to be, very poor. For example, the Nigerian construction industry's contribution to employment has remained consistently at 1.0% over the last decade against the World Bank's average observation of about 3.2% in developing countries. The last decade however exposed the declining level of clients' satisfaction from the built facilities as a result of poor quality performance in addition to the perennial problems of time and cost overruns in the Nigerian construction industry. This has necessitated a radical change in industry practice in order to improve the quality of construction processes and the level of clients' satisfaction arising there from by devising methodology for evaluating the quality performance of the contractors in order to assist construction clients in selecting quality-oriented organizations that will provide higher quality services and products within budget and on schedule. Therefore, the principal aim of this paper is to provide a methodology that will improve the quality of the design and construction processes and the level of customer satisfaction derived there from. This paper identified quality attributes relevant to the construction process and proposed a quality performance evaluation model that covers both the corporate and operational levels of a construction project. The paper also implemented the framework in the form of an investigative survey into the quality performance of building contractors in Nigeria as perceived by client organizations. The assessment was based on clients' perception of the contractor quality practices based on the identified quality attributes.

Index Terms— *Client satisfaction, Construction industry, Quality attributes, Quality Performance,*

I. INTRODUCTION

The Nigerian construction industry produces nearly 70% of the nation's fixed capital formation [1]. Yet its performance within the economy has been, and continues to be, very poor. For example, the Nigerian construction industry's contribution to employment has remained consistently at 1.0% over the last decade against the World Bank's average observation of about 3.2% in developing countries. The construction industry tends to define quality as the ability of products and processes to conform to the established requirements. These requirements are established characteristics of a product, process or service as specified in the contractual agreement.

Quality is a persuasive concern throughout the entire project process, as the performance of each phase in the process will affect the performance of subsequent phases [2]. Both [3] and [4] have suggested the consideration of quality as a major criterion in construction procurement systems in order to enhance the level of competitiveness and facilitate the production of higher quality construction. Yet, quality remains an elusive attribute that has been defined in many different ways. [6] consider quality as a subset of performance, in conjunction with productivity, safety and timeliness, while others seem to think of it in terms of "conformity to established requirements" or "fitness for purpose" [7] and [8]. ISO 8402 defined quality as the degree of excellence in a competitive sense, such as reliability, serviceability, maintainability or even individual characteristics. Similarly, the term 'performance' can also take on different meanings depending on the context in which it is being used. Traditionally, it has been used to measure the effectiveness (doing the right thing) and efficiency (doing the right thing right). Various researchers have attributed numerous dimensions to performance, such as quality, productivity, profitability, safety, timeliness, growth, satisfaction, etc [9].

Therefore, in order for construction clients and end-users of completed facilities to realize best value, the concept of quality culture must be stressed in the industry to improve the quality of services (design and construction processes) and products (facilities constructed) offered by various organizations. Accordingly, there is a need for a framework for evaluating quality performance to assist construction clients in selecting quality-oriented organizations that will provide higher quality services and products within budget and on schedule. Therefore, the principal aim of this paper is to provide a methodology that will improve the quality of the design and construction processes and the level of customer satisfaction derived there from. The main objectives include investigating project quality attributes in the design and construction process; developing a quality performance evaluation model that will encompass both the corporate and project levels of a construction; and demonstrate the application of the framework by investigating the client's perspectives of the quality performance of their contractors at operational level.

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2.0 Construction Quality Performance

In a paper on assessing contractor quality performance, [10] stated that quality performance in construction is results oriented, and seeks evidence of quality awareness within the operations and output of a project organization. For example, cost overruns and time delays of construction activities are often used to measure the impact of rework occurring during the process. They added also that quality performance is defined over a long term for the effects to be permanent, and its improvement are expected to increase the productivity and profitability of contractors as well as increasing client and end-user satisfaction.

Quality performance in the context of this paper is defined in terms level of satisfaction derived by owners and end-users of completed facilities as a result of the performance of the consulting and contracting organizations. The proposed methodology for evaluating quality performance, shown in Figure 1, diagnoses construction from both corporate level (where corporate strategies concerning how to perform the construction operations are formulated) and project level (where the design and construction systems produce a physical facility and provide contracting and consulting services). Although prescriptive in nature, this dissection would facilitate the development of strategies to define, operationalize, measure and improve construction quality at both corporate- and site- levels.

2.1 Quality Performance at Project-level

The quality performance of a construction project at the site-level includes the quality of the constructed facility as well as the quality of services. A mix of product and service quality dimensions would therefore be very instrumental to the achievement of site-level quality performance. Table 1 contains some of the product and service quality dimensions (attributes) from literature, and their interpretations.

Table 1: Product and Service Quality dimensions at Project- Level

Dimension	Definitions
Product Quality	
Performance ^a	Basic function of the facility meets the end-user’s needs and intents
Features ^a	Characteristics that supplement basic functions of the facility
Reliability ^{a, c}	The level of confidence with which the end-user may use the facility, to the end of its design life, without failure.
Conformance ^a	The degree to which construction operations meet the design standards and specifications
Durability ^a	The amount of use end-users get from the facility before replacement is preferred to continued repair
Serviceability ^a	Speed, courtesy, competence with which maintenance on facility can be carried out
Aesthetics ^a	The level of satisfaction the end-user experiences with the facility’s look, feel, sound, taste, or smell.
Perceived quality ^a	The level of satisfaction the end-user experiences with the facility’s image and publicity
Service Quality	
Time ^b	The duration of the contract, including the wait for mobilization on site
Timeliness ^b	Completion of the contract on the scheduled date
Completeness ^b	The amount of items on the punch list upon completion of the project
Courtesy ^{b, c}	The degree of respect, politeness, friendliness and kindness of the site and other personnel
Consistency ^b	The ability to repetitively provide the same level of service to all clients
Accessibility & convenience ^{b, c}	The ease with which the contracting service is obtained
Accuracy ^b	The ability to provide the right service the first time with minimum amount of rework
Responsiveness ^{b, c, d}	The ability to react to the unexpected problems encountered during the contract. Willingness and readiness to provide prompt service
Reliability ^{c, d}	Ability to perform the promised service dependably and accurately
Communication ^c	Keeping customers informed in a language they can understand and listening to the customer when necessary
Credibility ^c	Honesty; trustworthiness
Security ^c	Physical, financial and confidentiality
Competence ^c	Possession of required skills and knowledge of all employees
Tangibles ^{c, d}	The physical facilities and equipment, and appearance of employees
Understanding ^c	The ability to comprehend the client’s needs and requirements
Assurance ^d	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy ^d	The degree of caring, individualized attention the firm provides its customers
Recovery ^e	The ability to regain momentum and improve after each project completion

^a[11]; ^b[12]; ^c[13]; ^d[14]; ^e[15]

To sum it up, the project level is where the project process is carried out in order to produce a physical facility and provide a contracting service. This level may be part of the corporate organization [16].

2.2 Quality Performance at Corporate-level

The foundations of the quality orientation of a company are defined at the corporate level. Quality orientation is recognized by an organizational commitment to developing and maintaining core competence based upon a quality focus [17]. Core competence is what a company does better than anyone else. It should be noted that core competence should be enhanced in line with the business environment, to provide more value to the customer, otherwise it risks becoming obsolete [18] Other factors contributing to quality orientation include the business performance and social responsiveness of the organizations. [19] assert that quality-conscious companies adopt quality management systems that focus on creating and/or sustaining performance improvement in the areas of management involvement and leadership, product and process design, product control, customer and supplier communications, quality improvement programmes, employee participation, education and training, and quality information.

The corporate-level quality of a contractor can be experienced through the corporate quality culture, which comprise of the organizational value system that encourages a quality-conscious work environment. It establishes and promotes quality and continuous improvement through values, traditions and procedures [20]. [21] provides reliable and tested critical success factors for Total Quality management. Table 2 shows the quality performance indicators at corporate level of an organization.

Table 2: Corporate Quality Performance Indicators (Adopted from [22])

Factor 1	People and customer management ♦ Human resource management in line with company performance plans ♦ Employee recognition/ movement to support quality performance plans ♦ Management of customer relations.
Factor 2	Supplier partnership ♦ Assurance of supplier quality ♦ Action to assist and improve the quality and expensiveness of suppliers
Factor 3	Communication of improvement information ♦ Determination of quality costs ♦ Assessment of needs for quality trailing and subsequent delivery and review ♦ Benchmarking of processes in non-competing organizations ♦ Promotion of quality improvement with outside groups.
Factor 4	Customer satisfaction orientation ♦ Commitments to customers through strengthening of warranties/policies, etc. ♦ Comparisons of customers' satisfaction with competitors and internal indicators. ♦ Determination of improvements in customer satisfaction. ♦ Benchmarking of direct competitors' products and policies
Factor 5	External Interface Management ♦ Recognition of responsibilities for public health and safety, and the environment. ♦ Determination of customers' requirements. ♦ Integration of the design process with customer and operational requirements.
Factor 6	Strategic Quality Management ♦ Process control and improvement of core process in accordance with design ♦ Active leadership by managers in quality issues. ♦ Inclusion of employee well-being considerations in improvement activities. ♦ Senior executive commitment to quality through involvement and communications. ♦ Development/implementation of short-term plans/strategies focused on quality. ♦ Analysis of performance and cost data to support improvement priorities.
Factor 7	Team work structures form improvement ♦ Use of specific organizational structures to support quality improvement. ♦ Use of techniques to identify key process, customers and suppliers.
Factor 8	Operational Quality Planning ♦ Development/implementation of short-term plans/strategies focused on quality. ♦ Consideration of performance requirements in developing short terms goals.
Factor 9	Quality improvement measurement system. ♦ Assessment and improvement of processes, practices and products/services. ♦ Management of data/information to support quality improvement efforts. ♦ Procedures to ensure reliability and improvement of data gathering.
Factor 10	Corporate quality culture. ♦ Consideration of performance requirements in developing long-terms goals. ♦ Encouragement of a company wide culture committed to quality improvement.

The evaluation of project quality performance are based on the availability and implementation of certain quality improvement tools and techniques that will help in the assessment of the quality attributes identified at both corporate and project levels.

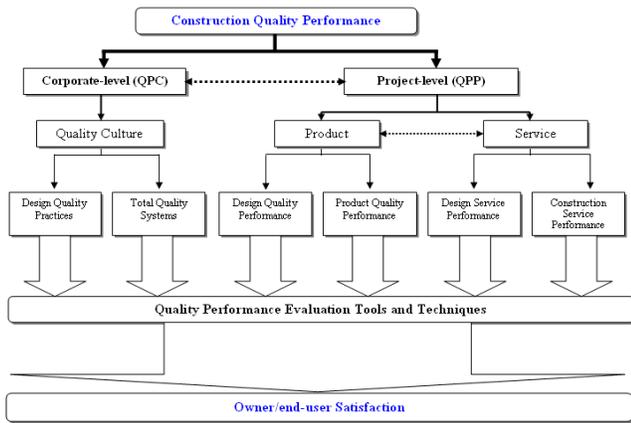


Figure1: Framework for evaluating construction Quality Performance

(Adopted from [23]).

The following definitions constitute the key quality dimensions of the above proposed framework.

- Design Quality Practices – consist of a framework for guiding quality-related actions by all employees of the consulting organisations and a means of assessing how well these actions are carried out. These are reflected in the quality practices of the consulting organisations.
- Total Quality Systems - consist of a framework for guiding quality-related actions by all employees and a means of assessing how well these actions are carried out. These are reflected in the quality management systems of the organisations.
- Product design performance – the degree to which the features of the facility conform to the client’s needs as expressed in the client’s brief.
- Product quality performance - the degree of conformance of built facility to the drawings and specifications.
- Design service performance - the competence, integrity and promptness with which the design and construction planning activities are carried out by consultants.
- Construction service performance - the technical/managerial competence, integrity and

promptness demonstrated by contractors during the construction process.

3.0 Clients’ perspectives of Project-level Quality Performance of Contractors

The proposed framework was partially implemented in the context of clients’ perceptions of the quality performance of contractors at the project level. The evaluation was restricted to the project level because construction is a project-oriented industry and many construction researchers have emphasized closer focus on the project level more than the organizational level [24] and [25].

Eighteen (18) out of thirty (30) randomly selected medium sized contractors responded to the request to identify one each from the following client groups that they worked with recently; Government, Semi-government and Private clients. Each of the client organizations were requested to assess the quality performance of the specific contractor that identified them. The assessment was along the product and service dimensions identified in Table 2 using a scale of 1 to 5 where 1 is poor performance and 5 is best performance. The average means of the scores for each contractor and their rankings are given in Table 3. The contractors were labeled A to R to maintain the confidentiality of their identities assured during the survey.

Table 3: Evaluation Results of Assessment of Contractors by Client organizations

Contractors	Client Organizations			Average Score	Rank
	Government	Semi-Government	Private		
A	4.18	4.33	4.55	4.35	2
B	4.18	4.42	4.35	4.31	4
C	4.14	4.42	4.30	4.29	5
D	4.14	4.08	4.30	4.17	10
E	3.78	3.83	4.05	3.89	12
F	4.36	4.17	4.45	4.33	3
G	3.82	4.08	3.75	3.88	14
H	4.18	4.17	4.35	4.23	7
I	3.96	4.25	4.45	4.22	8
J	3.96	4.25	4.35	4.19	9
K	3.75	4.17	3.75	3.89	12
L	4.32	4.50	4.30	4.37	1
M	4.00	4.50	4.30	4.27	6
N	4.32	4.67	4.30	4.10	11
O	2.00	2.33	2.00	2.11	17
P	0.00	0.33	0.00	0.11	18
Q	3.00	3.00	3.00	3.00	15
R	3.00	3.00	3.00	3.00	15

4.0 ANALYSIS OF VARIANCE (ANOVA)

An analysis of variances (ANOVA) test was carried out at 95% confidence level to determine whether the three groups of clients have different perceptions on the quality performance of the contractors. The null hypothesis, H_0 , was that the three groups of clients have the same perception about the quality performance of the contractors. The decision was to accept H_1 if the critical value of F is less than F-table, otherwise H_0 will be accepted. In other words, to accept H_1 is to say that the three groups have different perceptions of the quality performance of the contractors.

Since the F-ratio calculated from the ANOVA table has a value of 0.52, which is less than the critical value of F at 5% significant level of 3.19, it can be concluded that H_0 is accepted and implying that the mean quality performance of the three categories of clients is the same. Thus, by way of inference, a contractor can be selected based on the assessment of any of the three groups of client organizations as far as quality performance of construction product and service is concerned at the project level.

5.0 Conclusion

A quality performance evaluation model that covers both the company and site levels of a construction project was proposed in this paper. The paper also identified quality attributes relevant to the construction process and implemented the framework in the form of an investigative survey into the quality performance of building contractors in Nigeria as perceived by client organisations. The measurement was based on clients' perception of the quality performance of contractors based on identified quality practices at both organisational and operational levels. The results revealed that the three categories of clients generally agree on their assessment, indicating a general consistency in the quality performances amongst the contractors. The paper, while acknowledging the dynamics and continuous change in the construction sector especially the shortcomings of the lowest cost competitive bidding, further stressed that quality be considered as a major criterion in contractor evaluation and selection systems. It is also recommended that Government, being the major client of the building industry, should establish specialist Construction Quality Council that will serve as regulatory body to ensure conformance to quality standards required in various areas (materials, labour skills, equipment, methods, etc) of the construction industry.

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