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Quality Performance Indicators of Building Construction Projects in Nigeria

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Abstract

In the pursuit of quality in the construction industry, there are a number of gaps that need to be filled, according to previous surveys. These gaps include a lack of a common definition, the need for better asset life-cycle prediction, a lack of available measurement and monitoring techniques, poor data against which benchmarking can be done, risk management, and handling uncertainty. In this study, stakeholders' perceptions on suggested quality performance metrics for building construction projects in Nigeria were assessed. A descriptive survey methodology using a structured questionnaire was the instrument deployed to collect data. A total of one hundred sample of questionnaires were distributed to accessible construction professionals through a snowball sampling technique, and fifty-nine (59) of the questionnaires were retrieved and deemed suitable for analysis. SPSS, a social science statistical tool was then used to analyse the data. Findings revealed that the most important indicators for assessing the quality performances of building construction projects are: meeting the client's expectations; project durability; project satisfaction by end users', customers and stakeholders'; meeting requirement of regulatory agencies, environment, health and safety; project reliability and continuous service; aesthetic finishes of completed projects; delivering project in conformance to contract specifications, codes and standards; project ease of use and fitness for constructed purpose; cost or ease of maintenance and serviceability of completed project; conformance to international standard organization; and repeat business by awarding contractors with similar project after completion. In conclusion, the major gap this study filled, as well as its contribution to the literature, was that quality indicators that can be used to evaluate the performances of building construction projects throughout its life-cycle were established.

Keywords: Building, Construction Projects, Performance, Quality Management, Quality Indicators

Introduction

According to Nigeria National Bureau of Statistics (NBS, 2023), the construction sector contributed 9.38% of the country's nominal GDP in 2022, but by 2023, it had increased to N28.9 trillion, despite challenges like high interest rates, inflation, and the cost of construction materials. According to Shehu (2023), the sector as a whole grew by 4.54% in real terms in 2022. The

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majority of clients, project sponsors, and other stakeholders were said to be more concerned with timely delivery and the anticipated end cost of a project in the construction sector than with quality during the early stages of a project's life cycle.

The Charted Institute of Building (CIOB) conducted a research on issues related to poor quality management, they have identified five areas that require correction in order to achieve quality in the construction industry (CIOB, 2019). These areas are: a lack of an agreed-upon definition; a need for better asset life-cycle prediction; a lack of methods for measurement, monitoring, etc.; a lack of adequate data against which benchmarking can be carried out; and risk control and handling. Most quality management objectives contain qualitative quality variables, as opposed to time and cost, which may be quantified.

Previous studies in this field, for instance, Song, Lee, and Park (2006) and Ibrahim and Sodangi (2007), focused only on evaluating the client's and/or contractors' perspectives as well as the quality of performance at the project execution level. Before this study, there were no recognised, and tried-and-true indicators that could be used to assess the quality performances of building projects over the course of their life cycles. As such, numerous quality performance indicators must be created that include all phases of a building project's existence in order to overcome these deficiencies. This present study sorts the insight of construction professionals into three groups: client/end users, consultants, and contractors. As such, this paper evaluates stakeholders' perceptions of the quality performance indicators of building construction projects in Nigeria.

Literature Review

An Overview of Quality in the Construction Sector

Quality is one of the critical factors in determining the success or failure of a construction project. As such, different professionals have over the years attempted to define the word quality in their own understanding. However, according to Howarth and Greenwood (2018) in a search for a definition of 'quality', Reeves and Bednar (1994) point out that the definition of quality has continued to yield inconsistent results, regardless of the time period or context in which quality is examined. The concept has had multiple and often muddled definitions and has been used to describe a wide variety of phenomena. Table 1 presents a summary definition of quality by quality management's theorist like Deming, Juran, Crosby, Feigenbaum, Ishikawa, Garvin, Taguchi, etc.

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Table 1: Summary of Definition of Quality

Definition of quality	Sources
• Quality is anything said to have the positive attribute of conformance to specified standards	Shewhart (1931)
• Quality is a customer determination which is based on the customer's actual experience with the product or service, measured against his or her requirements – stated or unstated, conscious or merely sensed, technically operational or entirely subjective and always representing a moving target in a competitive market	Feigenbaum (1961)
• Conformance to requirements	Crosby (1979)
• Quality is product performance which results in customer satisfaction and freedom from product deficiencies, which avoids customer dissatisfaction	Juran (1988)
• Quality: the totality of features and characteristics of a product or service that bears on its ability to meet a stated or implied need	ISO 8402–1986,
• Quality is anything which can be improved	Masaaki (1986)
• Quality is the loss a product causes to society after being shipped	Taguchi (1986)
• Quality is the total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product in use will meet the expectations of the customer.	Feigenbaum (1951)
• Good quality means a predictable degree of uniformity and dependability at a low cost with a quality suited to the market	Deming (1986)
• Fitness for use	Juran (1988)
• Quality is the extent to which the customer or users believe the product or service surpasses their needs and expectations	Gitlow *et al.* (1989)

Source: Howarth & Greenwood (2018)

The Concepts of Quality Performance

When evaluating the performance of construction projects after they are completed and/or put into service, quality is the appropriate indicator and/or metric to employ. Quality encompasses not only exceeding the expectations of the client or other stakeholders but also adhering to regulations, meeting standards, and being fit for purpose. Idrus and Sodangi (2010) described quality performance as the degree of satisfaction that owners and end-users of completed facilities experienced as a result of the consulting and contracting companies' performance. Unlike cost and time, quality was reported to be mostly neglected when construction initiatives were started. Quality is the best benchmark to utilize when assessing the accomplishment of building construction projects throughout their life cycles, especially after they are completed (Shehu & Shehu, 2023). However, in the context of this study, the quality performance of a building construction project is defined as meeting the contractually agreed-upon quality criteria by the client, stakeholders, and compliance with regulatory agency standards and requirements throughout the project lifecycle.

Building Construction Quality Indicators

According to CIOB (2019), a collaboration between several construction institutions in the UK, including the Royal Institute of British Architects (RIBA), the Charted Institute of Building (CIOB), and the Royal Institute of Charted Surveyors (RICS), has established three dimensions of quality as follows: build quality, which measures how well an asset performs once it is finished; functionality, which measures how well an asset serves its purpose and impact which measures

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how much the asset contributes to society's social, economic, cultural, and environmental well-being. Table 2 lists a few metrics for good quality work that academics have employed across the literature.

Table 2: Quality Performance Measures across Literature

Source	Quality Measures
Song et al. (2006)	• Failure cost • Cost of rework • Prevention cost • Non-conformance records • Work rejection • Client satisfaction • Number of claims by client • Number of claims by contractors ▪ Rework
Idrrus and Sodangi (2010)	• Performance • Features • Reliability • Conformance • Durability • Serviceability • Aestheticism • Conveniences
CIOB (2019)	• Accuracy • Robustness • Reliability • Resilience • Consistency • Conformance to specification • Defect free
Shehu and Shehu (2023)	• Minimal or absence of defect as observed after project completion • Cost of rectifying defective components and services after project completion • Time taking in rectifying defective components and services • Feedback/ or satisfaction by end users', customers and stakeholders with completed project • Cost of maintenance and serviceability of completed project

Source: Compiled by Authors (2023)

According to Shehu and Shehu (2023), construction quality is based on the subjective perceptions of several stakeholders, including the client, consultants, and contractors in general. In addition, quality, though firstly disregarded at the project initiation stage, is in favour of the project timeline and budget. However, quality is the best standard for evaluating the success of construction projects over the course of their life cycles, particularly after commissioning (Shehu & Shehu, 2023). Table 3 shows a list of proposed building construction project quality performance indicators, as used in this survey.

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Table 3: List of Proposed Building Quality Performance Indicators

	Quality Indicators
1)	Little or no reports of claims, litigations and disputes after project completion
2)	Minimal or absence of defect as observed after project completion
3)	Minimal or absence of rework of faulty components during construction
4)	Cost of rectifying defective components and services after project completion
5)	Cost of reworking faulty components during construction operation
6)	Time taking in rectifying defective services
7)	Time taking in doing rework of faulty components
8)	Meeting the client's expectations
9)	Project satisfaction by end users', customers and stakeholders'
10)	Conformance to international standard organization
11)	Aesthetic finishes of completed projects
12)	Project durability
13)	Project ease of use
14)	Fitness for constructed purpose
15)	Project reliability and continuous service
16)	Meeting requirement of regulatory agencies, environment, health and safety
17)	Delivering project in conformance to contract specifications, codes and standards
18)	Cost of maintenance and serviceability of completed project
19)	Number of complaints recorded on completed project
20)	Number of recommendations recorded on completed project
21)	Repeat business by awarding contractors with similar project after completion

Source: Compiled by Authors (2023)

Methodology

Prior to choosing a research design, a researcher should consider the purpose, objectives, hypotheses, and questions of the study (Shehu & Shehu, 2023; Shehu, 2021; Oso & Onen, 2011). As such, this paper evaluates stakeholders' perceptions of the quality performance indicators of building construction projects in Nigeria. A descriptive survey methodology using a structured questionnaire was the instrument deployed to collect data. A 5-point Likert scale of 'importance' in a range of 1 to 5 (1= not important to 5= very important) was employed to rate eighteen quality performance indicators that were proposed in this study.

The study was conducted in the state of Yobe, located in Nigeria. The state is located in the northeastern part of the country. The state has a population of approximately 2.67 million people, with a geographic area of 46,609 square kilometers (NBS, 2011). The survey was specifically undertaken in Damaturu, the state capital, as well as other major towns, including Potiskum, Gashua, and Nguru respectively.

Respondents of the study include building contractors, clients, and consultants, all represented by experienced and academically qualified construction professionals and personnel in areas such as architecture, building, engineering, quantity surveying, and planning and estate management. A total of one hundred samples of questionnaires were distributed to the accessible construction professionals in the study area through a snowball sampling technique, and fifty-nine (59) of the questionnaires were retrieved and deemed suitable for analysis. Figure 1 indicates the research methodological flow chart adapted for this study.

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The data analysis was conducted with the aid of the statistical package for social science (SPSS). According to Shehu and Shehu (2023), the SPSS is being the most widely used tool because it is easy to operate and present data in various forms. The analysis conducted was in the form of descriptive statistics through the use of tables, percentages, frequencies, mean item score, and standard deviation. Table 4 shows the ratings of the quality performance indicators as developed for this study.

Table 4: The Ratings of Quality Indicators

Grading	Remark
0.0-1.49	Not important
1.50-2.49	Slightly important
2.50-3.49	Moderately 'M' important
3.50-4.49	Important
4.50-5.00	Very important

Source: Proposed by Author's

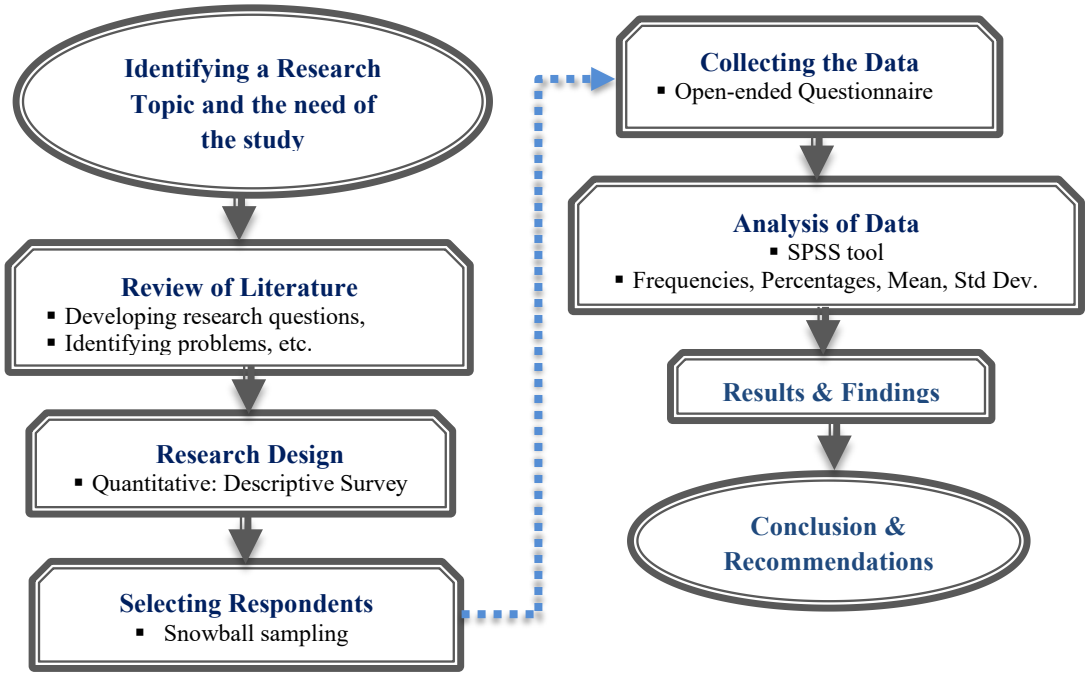

Figure 1: Research Methodology Flow Chat
Adapted: Shehu and Shehu (2023)

Findings

The characteristics of the respondents as presented in Table 5 show that nearly all the relevant construction professions participated in the survey, with engineering (37.3%) and planning/estate surveying (25.4%), while other professionals like the architecture, quantity surveying and the building professionals were represented by 37.4% of the respondents. Findings show that the majority of the respondents (45.8%) possessed a first degree or higher diploma, and 30.5% of the

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respondents claimed to have possessed a master's degree or post-graduate diploma, meaning that almost all of the respondents have the necessary academic credentials. Almost all of the respondents had the necessary years of working experience in the construction sector, with 30.5% each having 6-10 years and more than 15 years of working experience, respectively. As such, the respondents were qualified to take the survey, which increased the reliability of the findings of the study. The clients/end users were represented by 50.8% of the respondents, 25.4% represented the contractors, and 23.7% of the professionals represented the consultants. Therefore, all the important parties are respectfully represented.

Table 5: The Respondents Characteristics

Categories	Features	Frequency (No)	Percentage (%)
Area of Professionalism	Architecture	9	15.3
	Engineering	22	37.3
	Quantity surveying	6	10.2
	Building	7	11.9
	Planning, Estate Surveying	15	25.4
	Total	**59**	**100.0**
Highest Academic Qualifications	Certificate/ Diploma	6	10.2
	Degree/Higher National Diploma	27	45.8
	Masters/Post Graduate Diploma	18	30.5
	PhD	8	13.6
	Total	**59**	**100.0**
Years of working experience	1-5 years	11	18.6
	6-10 years	18	30.5
	11-15 years	12	20.3
	More than 15 years	18	30.5
	Total	**59**	**100.0**
Working Organization	Contractors	15	25.4
	Clients/End user's	30	50.8
	Consultants	14	23.7
	Total	**59**	**100.0**

Source: Authors (2023)

Table 6 shows the reliability test results of the proposed eighteen '18' building quality performance indicators using internal consistency. Findings revealed that an Alpha (α) value of 0.919 obtained for this study was greater than the recommended acceptable minimum value of 0.70 which agreed with similar studies, such as (Shehu, Shehu, & Aliyu, 2023).

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Table 6: Reliability Test of Building Quality Performance Indicators

Factors	No. of items	Cronbach's alpha (α)	Remark
Quality Indicators	18	0.919	Accepted

Source: Authors (2023)

Table 7 presents the results of the perceptions of the 'Architecture Professionals' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in the order of importance are: meeting requirement of regulatory agencies, environment, health and safety (M.S./4.33), meeting the client's expectations (M.S./4.33), project durability (M.S./4.22), project satisfaction by end users', customers and stakeholders' (M.S./4.00), delivering project in conformance to contract specifications, codes and standards (M.S./3.89), minimal or absence of rework of faulty components during construction (M.S./3.89), project ease of use and fitness for constructed purpose (M.S./3.78), and cost/ or ease of maintenance and serviceability of completed project (M.S./3.67) respectively.

Table 7: Construction Projects Quality Performance Indicators 'Architecture Professionals' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Meeting requirement of regulatory agencies, environment, health and safety	4.33	0.500	Important	1
• Meeting the client's expectations	4.33	0.707	Important	1
• Project durability	4.22	0.972	Important	3
• Project satisfaction by end users', customers and stakeholders'	4.00	1.118	Important	4
• Delivering project in conformance to contract specifications, codes and standards	3.89	1.054	Important	5
• Minimal or absence of rework of faulty components during construction	3.89	1.054	Important	5
• Project ease of use and fitness for constructed purpose	3.78	1.202	Important	7
• Conformance to international standard organization	3.67	0.866	Important	8
• Project reliability and continuous service	3.67	1.000	Important	8
• Cost/ or ease of maintenance and serviceability of completed project	3.67	1.118	Important	8
• Minimal or absence of defect as observed after project completion	3.56	0.882	Important	11
• Repeat business by awarding contractors with similar project after completion	3.56	1.014	Important	11
• Cost of reworking faulty components during construction operation	3.56	1.236	Important	11
• Cost of rectifying defective components and services after project completion	3.56	1.236	Important	11
• Aesthetic finishes of completed projects	3.44	1.014	M. Important	15

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• Number of complaints or recommendations recorded on completed project	3.33	1.225	M. Important	16
• Little or no reports of claims, litigations and disputes after project completion	3.00	1.118	M. Important	17
• Time taking in rectifying defective components and doing rework	2.56	1.236	M. Important	18

M = Moderately
Source: Authors (2023)

Table 8 presents the results of the perceptions of the 'Building Professionals' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: project satisfaction by end users', customers and stakeholders' (M.S. 4.43), project reliability and continuous service (M.S. 4.29), project ease of use and fitness for constructed purpose (M.S. 4.00), project durability (M.S. 4.00), aesthetic finishes of completed projects (M.S. 4.00), meeting the client's expectations (M.S. 4.00), repeat business by awarding contractors with similar project after completion (M.S. 3.86), and delivering project in conformance to contract specifications, codes and standards (M.S. 3.86) respectively.

Table 8: Construction Projects Quality Performance Indicators 'Building Professionals' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Project satisfaction by end users', customers and stakeholders'	4.43	0.787	Important	1
• Project reliability and continuous service	4.29	0.488	Important	2
• Project ease of use and fitness for constructed purpose	4.00	0.817	Important	3
• Project durability	4.00	0.817	Important	3
• Aesthetic finishes of completed projects	4.00	1.000	Important	3
• Meeting the client's expectations	4.00	1.155	Important	3
• Delivering project in conformance to contract specifications, codes and standards	3.86	0.900	Important	7
• Time taking in rectifying defective components and doing rework	3.86	0.900	Important	7
• Repeat business by awarding contractors with similar project after completion	3.86	1.464	Important	7
• Number of complaints or recommendations recorded on completed project	3.57	0.976	Important	10
• Cost/ or ease of maintenance and serviceability of completed project	3.43	1.272	M. Important	11
• Meeting requirement of regulatory agencies, environment, health and safety	3.29	1.113	M. Important	12
• Conformance to international standard organization	3.29	1.113	M. Important	12
• Cost of reworking faulty components during construction operation	3.14	1.069	M. Important	14

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• Minimal or absence of rework of faulty components during construction	3.14	1.069	M. Important	14
• Minimal or absence of defect as observed after project completion	3.14	1.215	M. Important	14
• Little or no reports of claims, litigations and disputes after project completion	3.14	1.464	M. Important	14
• Cost of rectifying defective components and services after project completion	3.00	1.528	M. Important	18

Source: Authors (2023)

Table 9 presents the results of the perceptions of the 'Engineering Professionals' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: meeting the client's expectations (M.S. 4.32), project durability (M.S. 4.23), project satisfaction by end users, customers, and stakeholders (M.S. 4.23), meeting requirement of regulatory agencies, environment, health, and safety (M.S. 4.14), project reliability and continuous service (M.S. 3.86), delivering project in conformance to contract specifications, codes, and standards (M.S. 3.82), conformance to international standard organization (M.S. 3.82), and aesthetic finishes of completed projects (M.S 3.77) respectively.

Table 9: Construction Projects Quality Performance Indicators 'Engineering Professionals' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Meeting the client's expectations	4.32	0.839	Important	1
• Project satisfaction by end users', customers and stakeholders'	4.23	0.922	Important	2
• Project durability	4.23	1.066	Important	2
• Meeting requirement of regulatory agencies, environment, health and safety	4.14	0.990	Important	4
• Project reliability and continuous service	3.86	1.167	Important	5
• Delivering project in conformance to contract specifications, codes and standards	3.82	1.140	Important	6
• Conformance to international standard organization	3.82	1.181	Important	6
• Aesthetic finishes of completed projects	3.77	1.110	Important	8
• Project ease of use and fitness for constructed purpose	3.68	0.995	Important	9
• Cost/ or ease of maintenance and serviceability of completed project	3.64	1.177	Important	10
• Repeat business by awarding contractors with similar project after completion	3.64	1.255	Important	10
• Minimal or absence of defect as observed after project completion	3.55	1.057	Important	12
• Cost of rectifying defective components and services after project completion	3.50	1.102	Important	13
• Little or no reports of claims, litigations and disputes after project completion	3.41	0.908	M. Important	14

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• Minimal or absence of rework of faulty components during construction	3.41	1.221	M. Important	14
• Cost of reworking faulty components during construction operation	3.36	1.177	M. Important	16
• Time taking in rectifying defective components and doing rework	3.27	1.202	M. Important	17
• Number of complaints or recommendations recorded on completed project	3.27	1.241	M. Important	18

Source: Authors (2023)

Table 10 presents the results of the perceptions of the 'Quantity Surveying Professionals' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in the order of importance are: project durability (M.S. 4.33), delivering project in conformance to contract specifications, codes, and standards (M.S. 3.83), aesthetic finishes of completed projects (M.S. 3.67), meeting the client's expectations (M.S 3.67), repeat business by awarding contractors with similar project after completion (M.S. 3.50), number of complaints or recommendations recorded on completed project (M.S. 3.50), project reliability and continuous service (M.S. 3.50), and time taking in rectifying defective components and doing rework (M.S. 3.50) respectively.

Table 10: Construction Projects Quality Performance Indicators 'Quantity Surveying Professionals' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Project durability	4.33	0.817	Important	1
• Delivering project in conformance to contract specifications, codes and standards	3.83	1.169	Important	2
• Meeting the client's expectations	3.67	1.033	Important	3
• Aesthetic finishes of completed projects	3.67	1.506	Important	3
• Number of complaints or recommendations recorded on completed project	3.50	1.049	Important	5
• Project reliability and continuous service	3.50	1.049	Important	5
• Time taking in rectifying defective components and doing rework	3.50	1.049	Important	5
• Repeat business by awarding contractors with similar project after completion	3.50	1.378	Important	5
• Meeting requirement of regulatory agencies, environment, health and safety	3.33	0.817	M. Important	9
• Project ease of use and fitness for constructed purpose	3.33	1.033	M. Important	9
• Cost/ or ease of maintenance and serviceability of completed project	3.33	1.366	M. Important	9
• Cost of reworking faulty components during construction operation	3.17	1.169	M. Important	12
• Conformance to international standard organization	3.17	1.329	M. Important	12

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• Cost of rectifying defective components and services after project completion	3.17	1.472	M. Important	12
• Project satisfaction by end users', customers and stakeholders'	3.00	1.414	M. Important	15
• Minimal or absence of rework of faulty components during construction	2.83	1.472	M. Important	16
• Minimal or absence of defect as observed after project completion	2.67	1.633	M. Important	17
• Little or no reports of claims, litigations and disputes after project completion	2.33	1.211	M. Important	18

Source: Authors (2023)

Table 11 presents the results of the perceptions of the 'Planning/ Estate Surveying Professionals' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: meeting the client's expectations (M.S. 4.00), project durability (M.S. 3.80), aesthetic finishes of completed projects (M.S. 3.80), cost of reworking faulty components during construction operation (M.S. 3.73), cost or ease of maintenance and serviceability of completed project (M.S. 3.67), project satisfaction by end users, customers, and stakeholders (M.S. 3.67), project reliability and continuous service (M.S 3.60), and meeting requirement of regulatory agencies, environment, health, and safety (M.S 3.53) respectively.

Table 11: Construction Project Quality Performance Indicators 'Planning/Estate Surveying Professionals' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Meeting the client's expectations	4.00	1.195	Important	1
• Project durability	3.80	1.265	Important	2
• Aesthetic finishes of completed projects	3.80	1.265	Important	2
• Cost of reworking faulty components during construction operation	3.73	1.033	Important	4
• Cost/ or ease of maintenance and serviceability of completed project	3.67	1.113	Important	5
• Project satisfaction by end users', customers and stakeholders'	3.67	1.175	Important	5
• Project reliability and continuous service	3.60	0.910	Important	7
• Minimal or absence of rework of faulty components during construction	3.53	1.187	Important	8
• Meeting requirement of regulatory agencies, environment, health and safety	3.53	1.407	Important	8
• Number of complaints or recommendations recorded on completed project	3.47	0.915	M. Important	10
• Delivering project in conformance to contract specifications, codes and standards	3.47	1.060	M. Important	10
• Project ease of use and fitness for constructed purpose	3.47	0.990	M. Important	12

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• Conformance to international standard organization	3.40	1.242	M. Important	13
• Little or no reports of claims, litigations and disputes after project completion	3.33	1.175	M. Important	14
• Minimal or absence of defect as observed after project completion	3.27	1.163	M. Important	15
• Time taking in rectifying defective components and doing rework	3.20	1.207	M. Important	16
• Cost of rectifying defective components and services after project completion	3.13	1.125	M. Important	17
• Repeat business by awarding contractors with similar project after completion	3.07	0.961	M. Important	18

Source: Authors (2023)

Table 12 presents the results of the perceptions of the 'Consultants' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: meeting the client's expectations (M.S. 4.21), project durability (M.S. 4.07), project satisfaction by end users, customers, and stakeholders (M.S. 4.00), aesthetic finishes of completed projects (M.S. 3.93), repeat business by awarding contractors with similar project after completion (M.S. 3.86), conformance to international standard organization (M.S. 3.86), meeting requirement of regulatory agencies, environment, health, and safety (M.S. 3.79), and cost of rectifying defective components and services after project completion (M.S. 3.79) respectively.

Table 12: Construction Projects Quality Performance Indicators 'The Consultants' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Meeting the client's expectations	4.21	0.975	Important	1
• Project durability	4.07	1.141	Important	2
• Project satisfaction by end users', customers and stakeholders'	4.00	1.038	Important	3
• Aesthetic finishes of completed projects	3.93	0.917	Important	4
• Conformance to international standard organization	3.86	0.864	Important	5
• Repeat business by awarding contractors with similar project after completion	3.86	0.949	Important	5
• Meeting requirement of regulatory agencies, environment, health and safety	3.79	0.802	Important	7
• Cost of rectifying defective components and services after project completion	3.79	0.893	Important	7
• Project ease of use and fitness for constructed purpose	3.71	0.726	Important	9
• Delivering project in conformance to contract specifications, codes and standards	3.64	1.151	Important	10
• Minimal or absence of rework of faulty components during construction	3.64	1.277	Important	10
• Project reliability and continuous service	3.57	1.016	Important	12

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• Time taking in rectifying defective components and doing rework	3.43	1.089	M. Important	13
• Minimal or absence of defect as observed after project completion	3.43	1.089	M. Important	13
• Cost/ or ease of maintenance and serviceability of completed project	3.43	1.089	M. Important	13
• Cost of reworking faulty components during construction operation	3.36	1.151	M. Important	16
• Number of complaints or recommendations recorded on completed project	3.21	1.051	M. Important	17
• Little or no reports of claims, litigations and disputes after project completion	3.14	1.099	M. Important	18

Source: Authors (2023)

Table 13 presents the results of the perceptions of the 'Clients/End users on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: project durability (M.S. 4.30), project reliability and continuous service (M.S. 4.03), meeting the client's expectations (M.S. 3.97), meeting requirement of regulatory agencies, environment, health, and safety (M.S. 3.90), project satisfaction by end users, customers and stakeholders (M.S. 3.87), delivering project in conformance to contract specifications, codes, and standards (M.S. 3.83), Cost or ease of maintenance and serviceability of completed project (M.S. 3.80), and aesthetic finishes of completed projects (M.S. 3.73) respectively.

Table 13: Construction Projects Quality Performance Indicators 'The Clients/End Users' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Project durability	4.30	1.022	Important	1
• Project reliability and continuous service	4.03	0.964	Important	2
• Meeting the client's expectations	3.97	0.999	Important	3
• Meeting requirement of regulatory agencies, environment, health and safety	3.90	1.269	Important	4
• Project satisfaction by end users', customers and stakeholders'	3.87	1.196	Important	5
• Delivering project in conformance to contract specifications, codes and standards	3.83	1.053	Important	6
• Cost/ or ease of maintenance and serviceability of completed project	3.80	1.215	Important	7
• Aesthetic finishes of completed projects	3.73	1.230	Important	8
• Project ease of use and fitness for constructed purpose	3.67	1.093	Important	9
• Conformance to international standard organization	3.67	1.295	Important	9
• Number of complaints or recommendations recorded on completed project	3.63	0.964	Important	11
• Cost of reworking faulty components during construction operation	3.53	0.937	Important	12

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• Minimal or absence of rework of faulty components during construction	3.50	1.106	Important	13
• Minimal or absence of defect as observed after project completion	3.33	1.155	M. Important	14
• Cost of rectifying defective components and services after project completion	3.33	1.184	M. Important	14
• Repeat business by awarding contractors with similar project after completion	3.33	1.269	M. Important	14
• Little or no reports of claims, litigations and disputes after project completion	3.30	0.988	M. Important	17
• Time taking in rectifying defective components and doing rework	3.17	1.147	M. Important	18

Source: Authors (2023)

Table 14 presents the results of the perceptions of the 'Contractors' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: meeting the client's expectations (M.S. 4.40), project satisfaction by end users, customers and stakeholders (M.S. 4.07), project durability (M.S. 3.73), meeting requirement of regulatory agencies, environment, health, and safety (M.S. 3.73), delivering project in conformance to contract specifications, codes, and standards (M.S. 3.67), aesthetic finishes of completed projects (M.S. 3.60), project ease of use and fitness for constructed purpose (M.S. 3.53), and repeat business by awarding contractors with similar project after completion (M.S. 3.47) respectively.

Table 14: Construction Projects Quality Performance Indicators 'The Contractors' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Meeting the client's expectations	4.40	0.910	Important	1
• Project satisfaction by end users', customers and stakeholders'	4.07	1.033	Important	2
• Project durability	3.73	0.961	Important	3
• Meeting requirement of regulatory agencies, environment, health and safety	3.73	1.033	Important	3
• Delivering project in conformance to contract specifications, codes and standards	3.67	1.047	Important	5
• Aesthetic finishes of completed projects	3.60	1.183	Important	6
• Project ease of use and fitness for constructed purpose	3.53	1.060	Important	7
• Project reliability and continuous service	3.47	0.990	M. Important	8
• Repeat business by awarding contractors with similar project after completion	3.47	1.187	M. Important	8
• Cost/ or ease of maintenance and serviceability of completed project	3.33	1.047	M. Important	10
• Cost of reworking faulty components during construction operation	3.33	1.447	M. Important	10

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• Minimal or absence of defect as observed after project completion	3.27	1.223	M. Important	12
• Time taking in rectifying defective components and doing rework	3.20	1.373	M. Important	13
• Conformance to international standard organization	3.07	0.961	M. Important	14
• Number of complaints or recommendations recorded on completed project	3.07	1.280	M. Important	14
• Minimal or absence of rework of faulty components during construction	3.07	1.280	M. Important	16
• Little or no reports of claims, litigations and disputes after project completion	3.00	1.414	M. Important	17
• Cost of rectifying defective components and services after project completion	2.87	1.356	M. Important	18

Source: Authors (2023)

Table 15 presents the results of the perceptions of the 'Overall Stakeholders' on the quality performance indicators of building construction projects. Findings revealed that the quality indicators with the high mean scores 'M.S.' and ranked in order of importance are: meeting the client's expectations (M.S. 4.14), project durability (M.S. 4.10), project satisfaction by end users, customers, and stakeholders (M.S. 3.95), meeting requirement of regulatory agencies, environment, health, and safety (M.S. 3.83), project reliability and continuous service (M.S. 3.78), aesthetic finishes of completed projects (M.S. 3.75), delivering project in conformance to contract specifications, codes, and standards (M.S. 3.75), and project ease of use and fitness for constructed purpose (M.S. 3.64) respectively.

Table 15: Construction Projects Quality Performance Indicators 'Overall Stakeholders' Perceptions

Indicators	Mean	Std. Dev.	Remark	Rank
• Meeting the client's expectations	4.14	0.973	Important	1
• Project durability	4.10	1.045	Important	2
• Project satisfaction by end users', customers and stakeholders'	3.95	1.105	Important	3
• Meeting requirement of regulatory agencies, environment, health and safety	3.83	1.101	Important	4
• Project reliability and continuous service	3.78	1.001	Important	5
• Delivering project in conformance to contract specifications, codes and standards	3.75	1.060	Important	6
• Aesthetic finishes of completed projects	3.75	1.139	Important	6
• Project ease of use and fitness for constructed purpose	3.64	0.996	Important	8
• Cost/ or ease of maintenance and serviceability of completed project	3.59	1.146	Important	9
• Conformance to international standard organization	3.56	1.149	Important	10
• Repeat business by awarding contractors with similar project after completion	3.49	1.180	M. Important	11

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• Cost of reworking faulty components during construction operation	3.44	1.118	M. Important	12
• Minimal or absence of rework of faulty components during construction	3.42	1.192	M. Important	13
• Number of complaints or recommendations recorded on completed project	3.39	1.083	M. Important	14
• Minimal or absence of defect as observed after project completion	3.34	1.139	M. Important	15
• Cost of rectifying defective components and services after project completion	3.32	1.195	M. Important	16
• Time taking in rectifying defective components and doing rework	3.24	1.179	M. Important	17
• Little or no reports of claims, litigations and disputes after project completion	3.19	1.121	M. Important	18

Source: Authors (2023)

Table 16 shows the result of the hypothesis that 'there was no agreement amongst the respondents in their ratings of the quality performance indicators'. Kendall's Coefficient of Concordance, a nonparametric statistical test, was used to rate the level of agreement. At the 0.05 level of minimum significance and 95% confidence interval, findings revealed that, individually, except for the building, quantity surveying, and planning and Estate surveying professionals, all the other respondents, including the consultants, clients and contractors were in concordance in their responses. Further findings revealed that, at overall, all the respondents were in concordance in their responses at the $0.000 < 0.05$ level of significance. Therefore, the hypothesis that 'there was no agreement amongst the respondents in their ratings of the quality performance indicators' is hereby rejected.

Table 16: Respondents' Level of Concordance with Quality Performance Indicators

Respondents/Professionals	Kendall's Coefficient	Chi-Square	Asymptotic Sig.	Hypothesis decision
• The Architecture	0.222	34.037	0.008	Rejected
• The Building	0.229	27.227	0.550	Accepted
• The Engineering	0.144	53.754	0.000	Rejected
• The Quantity surveying	0.224	22.876	0.153	Accepted
• The Planning and Estate surveying	0.097	24.685	0.102	Accepted
• The Consultants	0.124	29.515	0.030	Rejected
• The Clients/End user's	0.130	66.113	0.000	Rejected
• The Contractors	0.164	41.851	0.001	Rejected
Overall	**0.099**	**99.337**	**0.000**	**Rejected**

Source: Authors (2023)

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Discussion

The survey shows that the most important indicators for assessing the quality performances of building construction projects based on the perceptions of professionals and stakeholders are: meeting the client's expectations; project durability; project satisfaction by end users', customers, and stakeholders'; meeting requirement of regulatory agencies, environment, health, and safety; project reliability and continuous service; aesthetic finishes of completed projects; delivering project in conformance to contract specifications, codes, and standards; project ease of use and fitness for constructed purpose; cost or ease of maintenance and serviceability of completed project; conformance to international standard organization; and repeat business by awarding contractors with similar project after completion respectively. The major findings of this study agree with previous studies. For instance, in the UK, CIOB (2019) reports that estimates suggest that between 2% to 5% of construction costs are spent on remedying defects and getting them right. In the US, quality failures resulted in rework, which incurred an extra cost of approximately 2% to 12% of the project cost (Dorcas, Elkanah, & John, 2019) and quality rectification problems contributed approximately 3.4% to 6.2% of the project cost. In Nigeria, Shehu and Shehu (2023) report that the most significantly impacted quality measures include: absence of rework; time taking in rectifying defective components and services; satisfaction by stakeholders; absence of observable defects; cost of rectification and reworking defective components and services. Also, all the respondents, including the consultants, the clients/end users and the contractors were in absolute agreement in their ratings of the quality performance indicators of building construction projects.

Limitation/Implications/Conclusion

This paper has identified the indicators for assessing the quality performance of building construction projects in Nigeria. The respondents rated all eighteen indicators proposed in this survey as either 'important or moderately important'. This paper is a survey that encompasses the perceptions of all the relevant professionals and stakeholders in the built environment.

Some of the most important indicators for assessing the quality performance of building construction projects are: meeting the client's expectations; project durability; project satisfaction by end users, customers, and stakeholders'; meeting requirement of regulatory agencies, environment, health, and safety; project reliability and continuous service; aesthetic finishes of completed projects; delivering project in conformance to contract specifications, codes and standards; project ease of use and fitness for constructed purpose; and cost or ease of maintenance and serviceability of completed project, etc.

The major constraint to the application of the findings of this study stems from the fact that it was limited to respondents from Nigeria's state of Yobe. The state is situated in the north-eastern region of the country, and for decades it has peculiar issues related to insecurity and climate change, which have devastated its built environment. The high concentration of participation of some respondents over the others was due to the peculiarities of the study area; snowballed sampling was the ideal technique used in reaching out to wider respondents in the study area.

This survey was necessitated due to gaps observed in previous studies on the indicators for measuring the quality performance of building construction projects. The major gap this study

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filled, as well as its implications and contribution to the literature was that quality indicators that can be used to evaluate the performances of building construction projects throughout its life cycle were established.

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