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EXPLORING THE IMPORTANCE OF QUALITY MANAGEMENT PRACTICES AND INFLUENCING FACTORS OF CONSTRUCTION PROJECTS' QUALITY IN NIGERIA

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ABSTRACT

Numerous building projects across the globe operate poorly to varying degrees of quality, costing money and failing to provide clients with value for their money. This study, therefore, investigates quality management practices (QMP) in construction organizations in Nigeria, with a view to enhancing project outcomes. The objectives of the study are to examine the important QMPs construction companies implement and examine the factors that influence the quality of construction projects. This study's population comprised key built environment professionals such as architects, builders, engineers, and quantity surveyors involved in project procurement in construction companies in Lagos State. A survey research strategy was adopted for this research and the respondents were conveniently selected. The total number of questionnaires administered was 150 out of which 114 were adequately filled and returned representing a 76% response rate. Appropriate statistical tools were used for the analysis including mean, percentage, frequency and t-test. Findings from the study revealed that the most important QMPs of construction companies are feedbacks and continuous improvement measures. The topmost factors that influence quality on construction projects are inconsistent quality control instruments and procedures, and insufficient management support. The study concludes that there are as many as 23 important QMPs engaged by construction practitioners, nonetheless, the most important of them all are feedback and continuous improvement techniques. Thus, concerted efforts by construction practitioners in ensuring the implementation of all these 23 QMPs could yield tremendous improvement of the quality of projects. It is recommended that quality control instruments and procedures should be standardized across construction firms. This can be accomplished through government procurement regulations and policies.

Keywords: Importance, Influencing Factors, Quality Management Practices, Quality Management System

INTRODUCTION

Construction projects are required to satisfy certain specifications, comply with rules, and produce high-quality outcomes. Quality management practices (QMP) in construction projects help to reduce errors and increase production while also improving safety. Harris and McCaffer (2001) opine that QMP encompasses all efforts that executives make to ensure the implementation of their quality procedures, including quality affirmation, quality control and quality enhancement. While, Orji et al. (2016) define quality management practices as quality planning, quality assurance, quality improvement, and quality control. Meanwhile, Flynn et al. (1994) noted that organisations that use a quality management strategy (QMS) strive to achieve and maintain high-quality outputs by utilizing management approaches as inputs and quality performance as outputs. Accordingly, Ofori et al. (2002) noted that QMPs could indeed greatly accelerate work progress, appease clients, lessen the number of deficiencies in projects, lessen reworks, finish projects within price limits, enhance construction firms' self-esteem and help companies get prolonged work from clients. It is however important to mention that the construction sector in developing countries has consistently struggled with quality problems, substandard work, and losses (Oludare & Olugboyega, 2016). Meanwhile, Adam, Kunya and Abdulmumin (2020) opine that although the capital requirements of the construction industry are equivalent to several years' worth of output from a typical manufacturing organization, the sector has been slow to adopt total quality management, which is standard for most manufacturing concerns. It is in this regard that Ashokkumar (2014) buttressed that poor construction has been a major problem for the construction industry for a number of years and firms have been bankrupted as a result. Meanwhile, Mhatre et al. (2017) opine that construction project is faced with myriad numbers of quality issues that results in schedule overrun, budget overrun, financial losses, environmental damages and sometimes loss of life. It is in this regard that Adenuga (2013) note that many projects are developed in violation of established quality standards and construction codes. This includes inadequate quality planning and control, incorrect material specifications, poor craftsmanship, improper building methods, and the employment of quacks and unscrupulous site operations. Annually, inadequate or non-existent QMS consumes a substantial amount of money, time, human and physical resources, especially in building projects (Othman, 2015). Mane and Patil (2015) conducted studies on QMS and discovered that the most important QMS on construction projects were client and customer satisfaction, management commitment, stakeholder satisfaction, and competitive markets. Thus, understanding the influencers of construction projects' quality and the importance of QMPs in the construction sector in Nigeria is crucial. This research aims to investigate the QMPs in construction organizations in Nigeria, with a view to enhancing project outcomes. The objectives are to examine the QMPs construction companies adopt during procurement operations and to appraise the factors that influence the quality of projects. The study hypothesizes that the factors influencing quality on construction projects is not similarly perceived between consulting and contracting organisations. This study is significant because it highlights the importance of QMPs and factors influencing the quality of construction projects, thereby enhancing quality implementation on construction projects.

RESEARCH METHODS

The research was conducted in Lagos State. The research region was chosen because Lagos is the most populated metropolis in Nigeria, with a population of over 24 million inhabitants, which makes it the second largest city in Africa after Cairo. Lagos is a significant African financial centre as well as the economic centre of Nigeria. A cross-sectional research strategy was employed for the study. Yin (2014) suggests that a research strategy be chosen based on three factors: the degree of control an investigator has over actual behavioral events, the type of research question and the degree of focus on current or historical events. A researcher can choose from a variety of research methodologies, each with its own set of features, based on the aforementioned requirements, hence, a survey research strategy was adopted for this research. The population of this study comprised key built environment professionals such as architects, builders, engineers and quantity surveyors involved in the procurement of construction projects in the research area. The opinions of the key built environment professionals were important because they are the ones who implement quality control measures on construction project sites. According to Umeh (2018), a research population comprises all conceivable subjects, elements or observations relating to a particular phenomenon of interest to the research, or totality of items, objects, persons, issues, or observations that share at least one common feature or characteristic on which the research is centered. Convenience sampling technique was used to select the sample for the study. For the intended respondents, a structured Self-administered Questionnaire (SSAQ) was developed. The structured questionnaire included closed-ended questions to obtain information from the respondents about the research objectives. The instrument was divided into three sections. The purpose of Section 'A' was to elicit information about the respondent's demographic profile. Section B of the study instrument sought to ask the respondents to examine the importance of QMPs construction companies adopt during procurement operations in Lagos State, using a 5-point Likert scale, with 1 denoting not important, 2 denoting slightly important, 3 denoting moderately important, 4 denoting more important, and 5 denoting most important. Section C appraised the factors that influence quality on construction projects in Lagos state using a 5-point Likert scale, with 1 denoting no influence, 2 denoting slight influence, 3 denoting moderate influence, 4 denoting high influence, and 5 denoting extreme influence. A sample size of 150 was used based on the rule of thumb principle. Roscoe (1975) revealed that a study's appropriate sample size ranges from 30 to 500. The total number of questionnaires administered was 150 out of which 114 were adequately filled and returned representing a 76% response rate. The data obtained were processed using the statistical package for social sciences (SPSS) version 23.0 software and Microsoft Excel Packages version 16. The descriptive statistical tools deployed were frequency counts, percentages, mean scores, and ranking. T-test was used to measure the inferential results. Meanwhile, the reliability of the research instrument was tested and the Cronbach's Alpha test was 0.76. This implies that the research instrument was consistent.

The respondents' demographic information is shown in Table 1. It can be seen that 16.7% of the respondents had a background in Architecture, 37.7% in Building, 39.5% in Civil Engineering and 6.1% in Quantity Surveying. Majority of the respondents are of Civil Engineering profession according to the results. Additionally, 16.7% were members of the Nigerian Institute of Architects (NIA), 37.7% were members of the Nigerian Institute of Building (NIOB), 39.5% were members of the Nigerian Society of Engineers (NSE), while 6.1% were members of the Nigerian Institute of Quantity Surveyors (NIQS).

RESULTS AND DISCUSSIONS

Demographic profile

Table 1 shows the demographic profiles of the respondents and respective organizations.

Characteristic	Frequency (N)	Percentage (%)
Professional Background		
Architecture	19	16.7
Building	43	37.7
Civil Engineering	45	39.5
Quantity Surveyor	7	6.1
Total	**114**	**100.0**
Professional Association		
NIA	19	16.7
NIOB	43	37.7
NSE	45	39.5
NIQS	7	6.1
Total	**114**	**100.0**
Academic Qualification		
National Diploma	**2**	1.8
Higher National Diploma	21	18.4
Bachelor of Science	74	64.9
Master of Science	17	14.9
Total	**114**	**100.0**
Organization Type		
Consulting	27	23.7
Contracting	87	76.3
Total	**114**	**100.0**
Years of Experience		
1-5 years	**7**	6.1
6-10 years	66	57.9
11-15 years	39	34.2
16-20 years	1	0.9
21 and above years	1	0.9
Total	**114**	**100.0**

Besides, 1.8% holds National Diploma (ND) educational qualification, 18.4% holds Higher National Diploma (HND), 64.9% holds Bachelor of Science (B.Sc.) degree, while 14.9% holds Masters degree. Furthermore, 23.7% of the respondents were from consulting organizations, while 76.3% were from contracting organizations. Furthermore, 6.1% had experience which ranged from 1 to 5 years, 57.9% had 6 to 10 years, 34.2% had 11 to 15 years, 0.9% had 16-20 years, while 0.9% had 21 and above years of experience.

Important Quality Management Practices on Building Projects

The mean of the elements mentioned as important QMP was used to rate the respondents' perception of the importance of QMPs in construction organizations in Lagos State. Table 2 shows the results of the analysis.

Table 2: Important Quality Management Practices on Building Projects.

Quality Management Practices	Frequency					TR	MS	Rank
	1	2	3	4	5			
Feedback	0	0	1	40	73	114	4.63	1
Continual improvement measurement	0	0	2	41	71	114	4.61	2
Top management engagement and commitment	0	0	4	55	55	114	4.45	3
The logic of collaboration and participation	0	0	4	56	54	114	4.44	4
Client participation and satisfaction	0	0	4	59	51	114	4.41	5
Record declarations of policy, quality, and goals	0	0	4	60	50	114	4.40	6
Improved organizational structure	0	0	11	58	45	114	4.30	7
Use of quality control	0	0	12	57	45	114	4.29	8
Well-developed planning	0	0	18	56	40	114	4.19	9
Process management	0	0	20	55	39	114	4.17	10
Client-supplier connection	0	0	15	68	31	114	4.14	11
Cooperation encouragement	0	0	18	63	33	114	4.13	12
Draft a quality manual	0	0	15	69	30	114	4.13	12
Incorporating workers in some decision-making	0	1	18	61	34	114	4.12	14
Effective (internal and external) communication	0	0	23	58	33	114	4.09	15
Quality Policy	3	5	26	31	49	114	4.04	16
Strategic quality planning	0	4	33	42	35	114	3.95	17
Document processes	1	9	14	72	18	114	3.85	18
Organization-supplier collaboration	0	0	47	47	20	114	3.76	18
Maintain customer focus	0	0	48	46	20	114	3.75	20
Participant education and training	0	7	30	66	11	114	3.71	21
Control of procedures	0	1	41	54	8	114	3.69	22
Standard requirement planning	0	19	66	29	0	114	3.09	23

1 means not important, 2 means slightly important, 3 means moderately important, 4 means more Important, 5 means most Important, TR means total respondents, and MS means mean score.

Table 2 displays the frequency counts and mean ratings for the 23 QMPs that were evaluated. The factors whose mean scores are 3.00 and above, which on the scale indicates "moderately important," are used as the criterion to decide which QMPs are important and the results indicate that all the 23 QMPs are important. Feedback is the topmost important QMP among the 23 identified QMPs (4.63). This is closely followed in a descending order by continual improvement measurement (4.61). This agrees with the findings of Barouch and Kleinhans (2015) that the logic of collaboration and participation, feedback and continuous improvement assessment is the dominant quality management practice used by construction firms in procurement operations. Besides, Kanji and Wong (1998) corroborate these findings that several of the foundations of QM are collaborative efforts, which is the rationale for involvement and support. Businesses must create personal and professional relationships in order to achieve their main goal. As a result, the importance of cooperation and resource planning as key components of quality management is stressed. In addition to coordinating and ensuring effective resource efficiency, supplier performance planning is seen as vital total quality management (TQM) activity. Also, top management engagement and commitment (4.45), the logic of collaboration and participation (4.44), and client participation and satisfaction (4.41) were ranked third, fourth and fifth respectively. This result is in agreement with the findings of Oni et al. (2019) which confirm that client satisfaction and obtaining more jobs as a result of prior excellent efforts done were the highest-ranked quality management practices. Record declarations of policy, quality and goals (4.40), improved organizational structure (4.30), use of quality control (4.29), well developed planning (4.19), and process management (4.17) were ranked sixth, seventh, eight, ninth, and tenth respectively. Kafetzopoulos (2015) agrees that an important field is process improvement, which centers on dealing with, supervising, overseeing and improving the process development outline in order to accomplish quality, profit, inventiveness and value. Arditi and Gunaydin (1997) corroborate the findings that in process management, innovation is key, therefore, construction firms that have embraced QM must be on the watch for innovative methods to enhance its process management. Creating client-supplier connection (4.14), cooperation encouragement (4.13), drafting a quality manual (4.13), incorporating workers in some decision-making (4.12) and effective internal and external communication (4.09) were ranked eleventh, twelfth, thirteenth, fourteenth and fifteenth respectively. These findings are consistent with those of Murphey (2009) who noted that both external and internal communication has also been cited as a critical aspect in improving QM adoption. Also, quality policy statement (4.04), strategic quality planning (3.95), document processes (3.85), organization-supplier collaboration (3.76) and maintaining customer focus (3.75) were ranked sixteenth, seventeenth, eighteenth, nineteenth and twentieth respectively. These results are in consistent with those of Greenwood and Howarth (2017) that if construction companies want to acquire a significant edge over their competitors, they must increase the efficiency of the business and provide a superior customer experience. Also, Yusr et al. (2014) supports the findings that a business could identify immediate and long-term consumer expectations and treat them as a precondition for the entire company. This would result in more committed customers and higher organizational effectiveness (Barouch & Kleinhans, 2015). Besides, Schlickman (2003) agrees that the practice of primary customer focus, a well-developed strategy and constant improvement evaluation are essential and the most important QMPs implemented on

construction projects. Employee relations have also been identified as a critical TQM problem, because it is believed that including employees in certain choices might aid process performance (Thamizhmanii & Hasan, 2010; Ramasamy, 2005). Additionally, participant education and training (3.71), control of procedures (3.69), and standard requirement planning (3.09) were ranked twenty first, twenty second, and twenty third respectively. This finding is in consonance with the finding of Hoonakker et al. (2010) that the training and education of both management and employees is considered the most important and effective for quality work performance.

Factors that influence quality on construction projects

Table 3 shows the Frequency counts, Mean score, and Ranking of factors that influence quality on construction projects.

Table 3: Factors that Influence Quality on Construction Projects

Variables	Frequency					TR	MS	Rank
	NI	SI	MI	HI	EI			
	1	2	3	4	5			
Inconsistent quality control instruments and procedures	1	2	16	40	55	114	4.28	1
Inadequate support from management	1	2	17	39	55	114	4.27	2
Paucity of scientific information	0	5	24	53	32	114	3.98	3
Failure to adapt to new work techniques	0	5	24	53	32	114	3.98	3
Nonchalant attitudes of site specialists	0	0	22	88	4	114	3.84	5
Rate of demand for housing	0	0	23	87	4	114	3.83	6
Lack of technical know-how of professionals	0	2	37	55	20	114	3.82	7
High cost of training skilled and unskilled labour	0	3	48	39	24	114	3.74	8
Paucity of personnel training on quality management	0	3	48	39	24	114	3.74	8
The complex nature of construction work	0	3	49	52	10	114	3.61	10
Lack of attention to quality assurances within the construction industry	0	14	46	31	23	114	3.55	11
Poor attention to quality issues	2	9	40	55	8	114	3.51	12
Incorrect firm structure	0	14	38	52	10	114	3.51	12
The lack of quality assurance committee to oversee construction activities	2	9	41	54	8	114	3.50	14
Poor customer satisfaction and service delivery	0	15	39	50	10	114	3.48	15

Variables	Frequency					TR	MS	Rank
	NI	SI	MI	HI	EI			
	1	2	3	4	5			
Lack of competent manufacturers	0	20	52	32	10	114	3.28	16
Poor participation and resource sharing among various gangs	2	25	42	40	5	114	3.18	17
Shortage or lack of technology	2	24	44	39	5	114	3.18	17
Lack of suitable resources	0	41	53	16	4	114	2.85	19
Lack of commitment to quality	0	41	54	15	4	114	2.84	20
Representative consciousness and accountability	18	42	40	11	3	114	2.46	21
Disregard for quality management implementation	18	42	40	11	3	114	2.46	21
Lack of worker participation	28	51	22	11	2	114	2.19	23

NI represents No influence, SI represents Slight influence, MI represents Moderate influence, HI represents High influence, EI represents Extreme influence, TR represents Total Respondents, MS represents Mean Score.

Twenty-three factors that influence quality were measured and the frequency counts and mean scores are presented in Table 3. The criterion used to determine the influencing factors of quality by the respondents are those variables whose mean scores were 3.00 and above, which represents 'moderate influence' on the scale. Eighteen out of the twenty-three factors meet this criterion, while lack of suitable resources, lack of commitment to quality, representative consciousness and accountability, disregard for quality management implementation, and the lack of worker participation fall below the criterion. It can be seen from Table 3 that the topmost factor influencing quality on construction projects is inconsistent quality control instruments and procedures (4.28), this is closely followed by inadequate support from management (4.27), paucity of scientific information (3.98) and failure to adapt to new work techniques (3.98) are jointly tied on third, while the nonchalant attitudes of site specialists (3.84) was ranked fifth. Achi, et al. (2007) corroborate these findings that inadequate quality control in the Nigerian building industry has led to low customer satisfaction performance. Also, the high rate of demand for housing (3.83) was ranked sixth. This is closely followed by the lack of technical know-how of professionals (3.82) which was ranked seventh, the high cost of training skilled and unskilled labour (3.74) and paucity of personnel training on quality management (3.74) were jointly ranked eight, while the complex nature of construction was ranked tenth. These findings are consistent with Tam et al. (2000) who concluded that the biggest barrier to quality implementation in the construction industry is the culture of the construction industry. Implementing TQM in the building and construction sector is not simple. The absence of standardization, the numerous parties (occupations, professions, and organizations) engaged, and "the transitory character" of building and construction are some of the causes. Besides, lack of attention to quality assurances (3.55) was ranked eleventh, poor attention to quality issues (3.51) and

incorrect firm structure (3.51) are jointly tied to the twelfth position in the rankings. Poor customer satisfaction, service delivery (3.48) was ranked fifteenth. In addition, lack of competent manufacturers (3.28) was ranked sixteenth, while poor participation and resource sharing among various gangs (3,18) and shortage or lack of technology (3.18) were jointly ranked seventeenth. These findings are supported by Love et al. (2000) who found that in the construction industry, quality has fallen below expectations in the construction industry, noting that the building sector's unattention to quality details has led to failures in quality which is element endemic to the business. Poor management is widespread in underdeveloped and developing countries. In addition, Achi, et al. (2007) noted that inadequate quality control in the Nigerian building industry has led to low customer satisfaction performance. Conversely, lack of suitable resources (2.85) and lack of commitment to quality (2.84) was ranked nineteenth and twentieth respectively. Also, representative consciousness and accountability (2.46) and disregard for quality management implementation (2.64) were jointly ranked twenty-one. While lack of workers' participation (2.19) was ranked twenty-third. These findings are in line with the findings of Said et al. (2009), which list a number of factors that influence quality management approach, including lack of commitment to excellence, inattention to quality details, insufficient managerial support and poor-quality planning. In addition, the findings are also in agreement with those of Sadikoglu and Olcay (2014) which indicated that construction firms were confronted with significant challenges such as representative consciousness and responsibility, lack of employee engagement, wrong corporate strategy and absence of appropriate resources.

Inferential Analysis Result

Test of Hypothesis

Hypothesis: The factors influencing quality on construction projects is not similarly perceived between consulting and contracting organisations.

The hypothesis was tested using the independent sample t-test. The t-test results are presented below in Table 4

The results in Table 4 shows 23 factors that influence quality on construction projects of which only 1 of hypothesized factors have $p \leq 0.05$, thus it is significant and the remaining 22 hypothesized factors have $p > 0.05$, thus it is not significant. The only one hypothesized significant factor influencing quality on construction projects is document processes.

CONCLUSIONS

This research work examined factors that engender quality on construction projects and important QMPs engaged by construction organizations. The study was carried out empirically and the following conclusions are made based on the findings:

1. There are as many as 23 important QMPs engaged by construction practitioners, nonetheless, the most important of them all are feedbacks and continuous improvement technique. Thus, concerted efforts by construction practitioners in ensuring the implementation of all these 23 QMPs could yield tremendous improvement of the quality of projects.
2. Quality control instrument and procedures is the most influential factor of quality on construction projects. The implication of this is that control measures, such as inspection and testing, are of great essence for any organization that seeks client satisfaction in terms of quality.

Table 4.6: Independent sample T-test on the factors influencing quality on construction projects is not similarly perceived between consulting and contracting organisations.

Influencing Factors	F	df	t	MD	p-value	Remark	Decision
Strategic quality planning	.226	112	-.681	-.131	.497	NS	Accept
Quality policy	.077	112	-.624	-.145	.534	NS	Accept
Use of quality control	2.697	112	-.524	-.076	.601	NS	Accept
Incorporating workers in some decisions	4.563	112	.580	.090	.563	NS	Accept
Logic of collaboration and participation	1.354	112	-.553	-.070	.582	NS	Accept
Organisation-supplier collaboration	.456	112	-.560	-.092	.577	NS	Accept
Process management	.285	112	.528	.083	.599	NS	Accept
Feedback	7.433	112	1.601	.178	.112	NS	Accept
Client's participation and satisfaction	.180	112	.507	.064	.613	NS	Accept
Client-supplier connection	.188	112	.483	.067	.630	NS	Accept
Participant education and training	2.306	112	-1.070	-.173	.287	NS	Accept
Effective internal and external communication	.007	112	.548	.086	.585	NS	Accept
Improved organizational structure	2.580	112	.086	.012	.932	NS	Accept
Cooperation encouragement	2.976	112	1.215	.178	.227	NS	Accept
Top management engagement and commitment	1.947	112	-.248	-.031	.805	NS	Accept
Maintaining customer focus	.617	112	-.488	-.080	.626	NS	Accept
Well-developed planning	.823	112	.640	.099	.524	NS	Accept
Continual improvement measurements	3.987	112	1.391	.163	.167	NS	Accept
Record declaration of policy, quality and goals	.260	112	.600	.075	.550	NS	Accept
Drafting a quality manual	.340	112	.569	.079	.570	NS	Accept
Document processes	.047	112	2.497	.442	.014	S	Reject
Standard requirement planning	.007	112	-1.845	-.263	.068	NS	Accept
Control of procedures	9.131	112	-.370	-.051	.712	NS	Accept

Note: p is significant at p≤0.05. df1 and df2 = degree of freedom, MD= Mean difference, NS=not significant.

RECOMMENDATIONS

The following recommendations are made in view of the findings:

Professionals should get more familiar with and use numerous underutilized QMPs. This may be accomplished by construction companies, governments and organizations supporting procurement system training for professionals.

Quality control instruments and procedures should be standardized across construction firms. This can be accomplished through government procurement regulations and policies.

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