IMPACT OF QUALITY MANAGEMENT ON CONSTRUCTION PROJECT DELIVERY IN NIGERIA

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ABSTRACT

The adoption and application of Quality Management System (QMS) on construction projects are very crucial to meeting the various project success criteria. It can be said that the construction industry impacts the Nigerian economy and QMS can help it maintain a steady ground in that position. This paper delves into the application of QMS on construction projects in Nigeria, how often they are applied and factors that affect its application. A questionnaire survey was carried out in this study involving 50 participants obtained by stratified random sampling technique. The data collated was evaluated with Mean Item Score (MIS), standard deviation and Ranks, for clarity. One-sample T-test was utilized to ascertain the respective benefits of the outlined items for the application of QMS on construction projects. Multiple regression analysis was also employed to prove the relationship between variables of the study and to draw conclusions. The findings reveal that, little or no effort from the top management, discord between project stakeholders, insufficient/lack of quality planning or tools, coaching and mentoring, documentation and records, costs involved in creating and supporting QMS, insufficient comprehension of the QMS, poor communication of quality criteria and lastly, diverse understanding amongst staff due to different backgrounds, affect the application of QMS on construction projects within the selected area. The study also identified seven critical success factors of significant impact to the adoption of QMS on construction projects were identified: customer focus and satisfaction, continuous improvement, team work, education and training, leadership and commitment, vendor development, and lastly, organization structure. The study therefore recommends that commitment and support from top management, implementation of a viable framework that prioritizes customer focus and satisfaction, continuous improvement, etc. be properly instituted for better implementation of an effective QMS in the construction industry.

Keywords: Quality Management System (QMS), Construction, projects, Quality Management, Implementation.

INTRODUCTION

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The construction industry is widely regarded as a fundamental industry upon which a country's development is predicated (Lawal et al., 2020). Notwithstanding the industry's importance to man and the nation's economy as a whole, it nevertheless falls behind in delivering products that fulfill the constantly changing client expectations (Osegbo, et al., 2021). Being frequently chastised for the poor standard of projects delivered in the industry has caused a hike in the level of uncertainty dissatisfaction which revolve around the industry in Nigeria, and this needs to cleared up as a good number of the masses do not have faith in the built and yet-to-be-built infrastructures. Construction projects have a huge impact on most economies throughout the world, therefore ensuring that they are delivered on time is critical (Njang'iru et al., 2020). In construction projects, quality refers to the materials and equipment employed, as well as the overall management strategy used to finish the project (Rumane, 2017). The projects' return on investment is measured using measures such as deliverability of the project, approval of stakeholders, how limited resources are optimized, and capacity to fulfill the preliminary requirements (Kibowen, 2018). Client satisfaction and quality attainment in a project are paramount in every project.

When it comes to the importance of construction, there are three meanings: getting the project completed on time, guaranteeing that the essential qualities of the finished product correspond with the specifications, and getting the task done within budget (Naveen Kumar & Naveen, 2019). One of the biggest problems faced in the construction sector is the collapse of infrastructures. Building collapses are occurring at an alarming rate in Nigeria, as they are in many other countries, causing enormous anxiety among stakeholders in the industry (Paul & Otieno, 2018). The reasons for these building collapse accidents are issues relating to quality such as poor workmanship, subpar building materials, inadequate sites, and bad design (Oyedele, 2018). As a result of inadequate or nonexistent quality management techniques, a significant amount of time, money, and assets are wasted on building projects (Lekan et al., 2018). Proper and adequate application of quality management would drastically impede the occurrence of recorded collapses (Kumar, 2011).

Quality management is not a one-time operation; it encompasses all management duties aimed at ensuring satisfaction of customers, notably the utmost management role in setting the firm's standard management system, targets, as well as responsibilities, which involves all staff members (Osegbo et al., 2021). Quality management in construction comprises concepts such as control of quality, assurance of quality, advancement of quality, and performance indicators, among others (Amusan, 2017). Construction firms are increasingly using Total Quality Management (TQM) as a strategy for resolving quality issues and meeting the requirements of end customer (Muhammad, 2021). Total Quality Management (TQM) has been regarded as a technique for management in the service industries for years, where it has been widely applied. However, it is only recently that it has been recognized as a useful tool in the building sector (Patyal et al., 2019). TQM has been used in industrialized countries, most notably the United Kingdom, the United States, and Japan. On the other hand, it is still very much in early stages in several nations (Khalfan et al., 2020). In developing countries like Nigeria, TQM is new to some construction firms. For TQM to be effectively utilized, the adoption of a quality management system (QMS) should be affected. Quality management is described as "the application of QMS in controlling a process to achieve the highest level of customer satisfaction at the minimum available total cost and with a continuous improvement process",

In (American Society for Quality, 2018). The TQM strategy aims to improve the efficiency of operations and receptiveness in meeting requirements of customers (Ramlawati, 2018).

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According to, Quality Management System is expounded in terms of quality assurance, quality control, and quality planning. As such, QMS is an organized system that records processes, and obligations for accomplishing policies and goals for attaining quality (Niranjan & Nisha, 2018). Its fundamental goal in construction is to avoid mistakes and complete tasks correctly on the first try. It's a method for eliminating work-related errors (Osegbo et al., 2021). With its implementation to plan, supervise, and regulate production processes, it is feasible to reduce discrepancies during the delivery of the project (Abdullahi et al., 2018). Some construction firms have regarded the widespread adoption of a quality management system (QMS) that will function as the organization's quality prospectus absolutely pointless, and this absent management policy in these firms has resulted in inconstancy in the quality of output, thereby affecting their quality delivery on various projects (Bankole, 2019). With this effect, these firm lose clients and reputation in the competitive world of construction and clients who have contracted construction projects to these firms tend to have little or no satisfaction. The QMS mechanism is simple and effective for improving project performance; it incorporates ISO 9001 criteria as well as its framework, which is founded on quality management principles (Neyestani, 2016). In Nigeria, the QMS used is the ISO 9001.

Quite a number of factors impede the adoption of a quality management system. Top management support, comprehension of the QMS, assessment from project stakeholders, discord between project stakeholders, time constraints, financial implications, frequent design changes, quality of materials from distributors and suppliers, documentation and records, and coaching and mentoring are all factors influencing QMS and its application, (Ilango & Shankar, 2017). Insufficient/lack of standard planning, poor communication, and a lack of clear understanding of advantages of quality management are also some of the factors (Abdullahi et al, 2018), that is when looked at from the perspective of quality management practices. Hurdles to effective application of QMS in the building of projects were identified and removed, whether they were formed before or after the systems were implemented, and these impediments were classified into seven categories: "managerial, organizational, communicational, financial, cultural, educational, and auditing" (Ahmed et al., 2017).

QMS motives are in all ramifications positive and its application has quite a number of benefits. Some of the benefits are methodologies, design, and advancement; minimizing wastes, correcting errors, Sepreasing costs, attracting personnel, developing and recognizing training opportunities, and charting a course through organizations (Patel & Pitroda, 2021). More so, to to achieve the benefits of establishing a quality management system as a strategic technique for management in a construction firm, it is necessary to have a thorough understanding of quality concepts (Oyebisi et al., 2019). In the construction sector, quality refers to a high level of perfection and rigorous compliance to standards. It's also known as achieving appropriate performance levels from construction projects. This level of performance is obtained when the activities satisfy or surpass the client's or owner's expectations (Arowolo et al., 2019). Construction firms must have good knowledge of what quality really entails in order for them to incorporate an effective quality management system.

For more efficient deployment of quality management systems (QMS), critical success factors ought to be created, particularly, the influence of external factors. Using the ultimate catalogue of all existing and identified factors would develop a foundation for the successful implementation of QMS in construction (Ahmed et al., 2017). This paper aims to assess the adoption of QMS in construction projects specifically on buildings; to assess how wide QMS is adopted and applied in Nigerian construction, the compliance with adopted

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QMS, factors affecting its adoption, benefits of QMS application on construction projects, and lastly, to ascertain the critical success factors for its adoption in the construction industry. In (Patel & Solanki, 2020) highlighted critical factors for the implementation of TQM in the building industry. They are: customer focus, vendor development, education and training, Quality Management System, Organisation structure, Team work, leadership and commitment and continuous improvement.

Moreso, evaluation of the impact of QMS adoption during project construction was solely based on client's satisfaction, as suggested by (Landy et al., 2020), who stressed that the assessment of consumer's satisfaction based on the evaluation of the gap that exists between expectations and image in a period of time after getting a service, indicates the proficiency and attitude of employees and the related service.

The conceptual framework for the study evolved from an existing literature that evinced hurdles to the effective application of QMS in construction. The conceptual framework institutes the link between the influence of the identified factors and the Sepision to adopt and implement quality management systems for construction projects. The framework is outlined in a diagram that establishes the variables and their posited relationship. This study adopted the conceptual framework suggested by (Ahmed et al., 2017) who classified the impediments to QMS adoption and implementation for construction firms into seven categories. The seven outlined critical factors formed the independent variables $(X1, X2, X3, X4, X5, X6, X7)$ while the adoption and application of QMS formed the dependent variable (Y) (Figure 1).

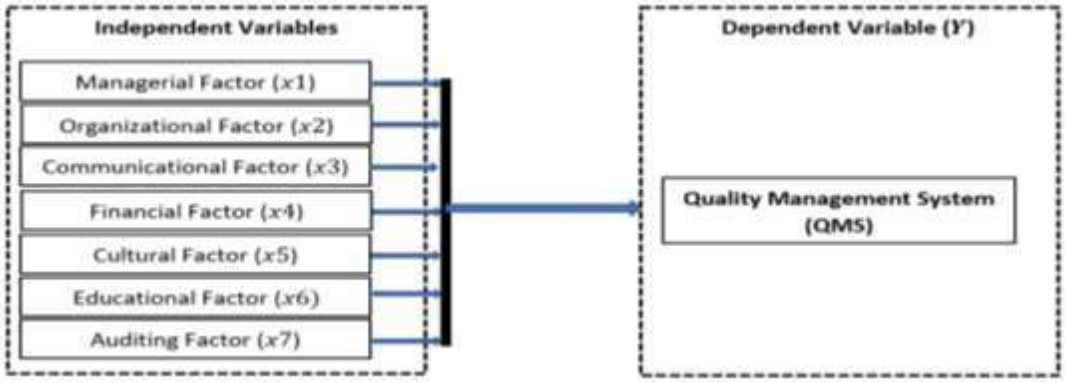

FIGURE 1
THE HYPOTHESIZED RELATIONSHIP BETWEEN FACTORS THAT IMPEDE QMS AND ADOPTION FOR CONSTRUCTION PROJECTS

MATERIALS AND METHODS

This study adopted a quantitative research technique which utilizes a survey design to examine the application of quality management system on construction projects in Nigeria.

Instrument

Questionnaires were utilized as a survey tool to increase contribution, because they are appropriate for survey methodologies. The two portions of this instrument are Section A and Section B. Section A deals with the personal information of the respondents, while Section B consists of research questions that will aid in the achievement of the paper's goals.

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Each respondent is given a list of options to choose from. The survey was split to duo sections: a demographic section comprising 4 items and an evaluation section consisting of 15 items.

Setting

The data was collated from construction professionals at two construction firms on the Lagos Island; Skynet Building Systems Ltd. and Makash Technical Company Ltd., Lagos State, Nigeria.

Population and Sample

The target population refers to the set of individuals, instances or entities with some common characteristics. The target population for the study was the professionals in the construction industry on the island region of Lagos (Victoria Island). Participants comprised of personnel in a variety of supervisory and operational positions from the various construction industries on the island, namely, project manager, QA/QC engineer, architect, project engineer and safety supervisor.

Sampling techniques present a range of methods that help to Seprease the amount of data required. This means that only data from a sub group was considered rather than all possible cases or entities. In this study, a purposive technique was used to select two construction firms on Lagos Island; Skynet Building Systems Ltd and Makash Technical Company Ltd. This was due to the nature, size and cumbersome burden of getting at the entire population. The proportionate stratified random sampling technique was adopted to obtain the strata sample size since it gives us the opportunity to choose our desired sample size (50) with equal probability. The formula for proportionate stratified random sampling technique is given as (Table 1):

$$n_j = \frac{n}{j} \times N_j \qquad (1)$$

Where: n_j = *Strata sample size,* N_j = *Stratum size,* n = *sample size, and* N = *population size*

$$n_1 + n_2 + n_3 + n_4 ..... + n_{j=n} \qquad (2)$$

$$N_1 + N_2 + N_3 + N_4 ..... + N_{j=N} \qquad (3)$$

Table 1
STRATA, STRATUM SIZE AND SAMPLE SIZE

Strata	Stratum size (N_j)	Sample size (n_j)
Project Managers	12	22
QA/QC Engr.	76	14
Architecture	44	8
Project Engr.	16	3
Safety Engr.	16	3
Total	274	50

Study Location

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Skynet Building Systems (6.4220°N, 3.4106°E) and Makash Technical Company (6.5714°N, 3.2823°E) (Figure 2- 4) & (Table 2).

FIGURE 2
MAP LOCATION OF SKYNET BUILDING SYSTEMS

FIGURE 3
MAP LOCATION OF MAKASH TECHNICAL COMPANY

Table 2
LATITUDINAL AND LONGITUDINAL LOCATIONS OF STUDY LOCATIONS

Location	Skynet Building Systems	Makash Technical Company
Latitude	6.2519°N	6.3417°N
Longitude	3.2438°E	3.1656°E

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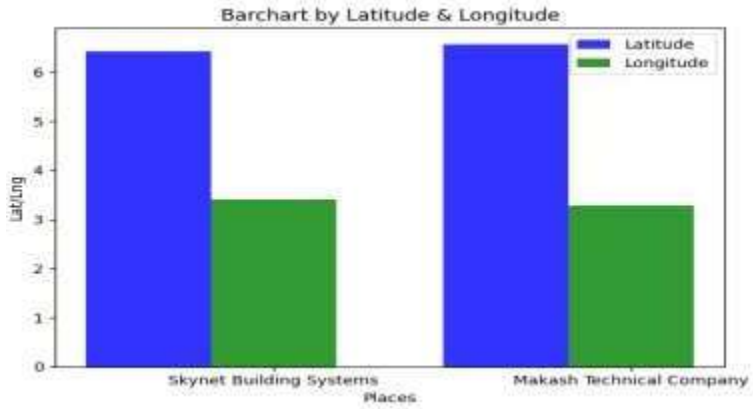

FIGURE 4
BAR CHART REPRESENTATION OF STUDY LOCATIONS WITH LATITUDE AND LONGITUDE.

Data Collection Procedures

The primary data was gathered using a prepared questionnaire. The questionnaires were distributed to the various construction professionals in the selected firms on island of Lagos state, Nigeria, via mail. A brief description of the questionnaire and its purposes were written to enable the respondent have a good idea of what they are participating in, and also a time duration of when the questionnaires are expected to be returned, which is one week. After a week, the filled questionnaires were received from the respondents via mail (Table 2).

Data Analysis

The data was examined by the use of descriptive and inferential statistical tools. The descriptive approach utilized the frequency, Mean-Item-Score (MIS), standard deviation, Rank and tables for a better interpretation. The inferential tool adopted the One-sample t-test to ascertain the respective benefits of the outlined items for the application of QMS on construction projects. Multiple regression analysis was also employed to prove the relationship that exists between the variables of the study and to draw conclusions and recommendations thereof. The regression model equation is highlighted below.

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + e_i$$

Where:

$Y = QMS\ adoption\ and\ implementation$, $x_1 = managerial\ \ factor$, $x_2 = organisational\ \ factor$,
$x_3 = communicational\ \ factor$, $x_4 = \ financial\ \ factor$, $x_5 = cultural\ \ factor$,
$x_6 = educational\ \ factor$, $x_7 = auditing\ \ factor$, $\beta_0 = constant$, $e_i = random\ error$.

Ethics

The field of study, the research aim, those that can access the information, the purposive use of the data, and repercussions of involvement in this research were all well explained to the respondents, who voluntarily provided informed permission in an explicit way. They were informed that they could withdraw from participation at any point they choose. The respondents' personal data were de-identified as their identities were not disclosed to anyone at any time. The data gotten was utilized for the purpose of research only,

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making use of them in a confidential manner.

RESULTS

This section makes a comparison and contrast between all the data received from the respondents. The outcomes of the study were based on the responses of 50 construction workers from various firms.

Demographics

Out of the twenty (50) questionnaires distributed, thirty (30) were responded to, that, thirty respondents participated in the survey (n = 30), of which 58.33% and 41.67% were males and females respectively, in all having a total response rate of 60%. The questions asked were all answered. The ages of all the respondents fell within the range of 20 – 29 and 30 – 39. Only 25% of the respondents fell within the ages of 20 – 29 and the other 75% fell within the range 30 – 39. Only 25% of the respondents were architects, about 8% were safety supervisors, another 8% were project managers, about 17% were project engineers and about 42% were QA/QC engineers. All the respondents, 100%, had very good knowledge of QMS. Experience of QMS ranged from 1 – 5 years to above 15 years. About 33% of the respondents had experience of QMS for 1 – 5 years, while the other 67% had experience and had been practicing QMS within the range of 6 – 10 years.

Adoption and Implementation of QMS in the Construction Firms

This section reveals whether or not QMS is adopted by contractors or construction firms in construction projects. Table 1 is a summary of the responses on the adoption of QMS in construction projects (Table 3).

Table 3
QMS ADOPTION AMONGST CONSTRUCTION PROFESSIONALS IN THEIR DAY-TO-DAY ACTIVITIES OF PROJECTS DELIVERY

QMS adopted and applied	Frequency	Percent (%)	Rank
Yes	25	83.33	1
No	3	10	2
Not sure	2	6.67	3

This result shows that QMS is adopted and applied widely amongst the professionals in the construction industry for project delivery. This is validated with the 83.33% of the respondents affirming it is adopted and applied, 10.00% negating, and 6.67% not sure.

Compliance to the Adoption of QMS

This section reveals the compliance level of construction firms to the adopted QMS. Table 3 summarizes the replies of the respondents as well as the probabilities of the compliance levels to the requirements given in standard QMS (Table 4).

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Table 4 COMPLIANCE TO QUALITY MANAGEMENT SYSTEM			
Compliance level to QMS	**Frequency**	**Percent**	**Rank**
High-level of compliance	18	72	1
Moderate-level of compliance	4	16	2
Low-level of compliance	3	12	3

The above result indicates that among the 25 respondents who affirmed the adoption and application of QMS in construction projects, 72% indicated that there is a high level of compliance, 16% opines that there is a moderate level of compliance and the remaining 12% claims that there is low-level compliance.

Factors Affecting the Adoption and Implementation of QMS on Construction Projects

This section indicates the various factors that affect QMS and its application on construction projects. Table 4 is a summary of the replies of the respondents on the factors that affect QMS and its application in construction projects (Table 5).

Table 5 THE MEAN VALUES OF FACTORS AFFECTING THE APPLICATION OF QUALITY MANAGEMENT SYSTEM (QMS) ON CONSTRUCTION PROJECTS IN NIGERIA				
Factor		**MIS**	**Rank**	**S.D.**
Managerial	Top management offers little or no support	2.73	1	0.583
	Insufficient/lack of quality planning or tools	2.60	3	0.724
Organizational	Discord between project stakeholders	2.63	2	0.556
Financial	Costs involved in creating and supporting QMS	2.45	6	0.776
Communicational	Poor communication of quality criteria	2.23	8	0.858
Cultural	Diverse understanding amongst staff due to different backgrounds	2.17	9	0.874
Educational	Insufficient comprehension of the QMS	2.37	7	0.669
	Coaching and mentoring	2.57	4	0.679
Auditing	Documentation and records	2.47	5	0.629

The factors acting as impedance to the application of QMS on construction projects in Nigeria was ranked from 1st to 9th as presented in Table 4; little or no effort from the top management was ranked 1st (MS=2.73 and SD=0.58), discord between project stakeholders was ranked 2nd (MS=2.63, SD=0.56), insufficient/lack of quality planning or tools was ranked 3rd (MS=2.60, SD=0.72), coaching and mentoring was ranked 4th (MS=2.57, SD=0.67), documentation and records was ranked 5th (MS=2.47, SD=0.62), costs involved in creating and supporting QMS was ranked 6th (MS=2.45, SD=0.77), insufficient comprehension of the QMS was ranked 7th (MS=2.37, SD=0.67), poor communication of quality criteria was ranked 8th (MS=2.23, SD=0.86), and lastly, diverse understanding amongst staff due to different backgrounds was ranked 9th (MS=2.17, SD=0.87). From the result, it is apparent that all these factors affect the application of QMS on construction projects within the selected area (Table 6).

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Table 6 MULTIPLE REGRESSION OF QMS ADOPTION AND FACTORS OF IMPEDANCE			
Factor	**Item**	**andard Beta**	**ificance (p)**
Managerial	Top management offers little or no support	-.290	.016
	Insufficient/lack of quality planning or tools		
Organizational	Discord between project stakeholders	.248	.027
Financial	Costs involved in creating and supporting QMS	-.095	.568
Communicational	Poor communication of quality criteria	-.286	.078
Cultural	Diverse understanding amongst staff due to different backgrounds	.219	.193
Educational	Insufficient comprehension of the QMS	.300	.086
	Coaching and mentoring		
Auditing	Documentation and records	-.513	.010

$r = 0.175, r^2 = 0.511, Significance = p < 0.05$

From table 4, it was glaring that the identified factors mitigated the implementation of QMS in projects construction. Table 5 is a multivariate analysis result showing that managerial factor (p=0.016), organizational factor (p=0.027), and auditing (p=0.010), all have a significant relationship with QMS adoption and implementation. The result further showed financial factor (p=0.568), communicational factor (p=0.078), cultural factor (p=0.193) and educational factor (p=0.086) as having insignificant relationship with the adoption of QMS in the construction firms.

Benefits of QMS Application on Construction Projects

This section reveals the benefits that can attained by applying an effective QMS in project construction in Nigeria. Table 6 summarizes the replies of respondents on the benefits of applying an effective QMS in construction projects (Table 7).

Table 7 BENEFITS OF APPLYING QMS IN CONSTRUCTION PROJECTS				
Benefits of QMS	**MIS**	**Standard Deviation**	**Rank**	**Significance (p)**
Stakeholders' Satisfaction	2.900	0.403	1	0.000
Increased competitive advantage in the construction world	2.600	0.770	2	0.000
Waste minimization	2.467	0.899	3	0.008
Prevention of project cost overrun	2.400	0.894	4	0.021
Improved quality of construction projects	2.300	0.915	5	0.083

$r = 0.175, r^2 = 0.511, Significance = p < 0.05$

The benefits of applying QMS on construction projects in Nigeria were ascertained and ranked from 1st to 5th as presented in Table 5; stakeholders' satisfaction was ranked 1st (MS=2.9, SD=0.4), increased competitive advantage in the construction world was ranked 2nd (MS=2.6, SD=0.7), waste minimization was ranked 3rd (MS=2.5, SD=0.9), prevention of project cost overrun was ranked 4th (MS=2.4, SD=0.8), and lastly, improved quality of construction projects was ranked 5th (MS=2.3, SD=0.9). The result further showed that, stakeholders' satisfaction (p=0.00), increased competitive advantage in the construction world (p=0.00), waste minimization (p=0.008), prevention of project cost overrun (p=0.02),

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and improved quality of construction projects (p=0.08), will all attain significant heights of benefits if QMS is applied on construction projects (Table, 8).

Critical Success Factors to the Adoption and Implementation of QMS on Construction Projects

Table 8
CRITICAL SUCCESS FACTORS FOR ADOPTION AND IMPLEMENTATION.

Factors	MIS	Standard Deviation	Rank	Significance (p)
Customer focus and satisfaction	2.6410	.75719	3	.000
Continuous improvement	2.5600	.82057	6	.002
Team work	2.8000	.50000	1	.000
Total Employees Involvement and empowerment	1.7600	.83066	9	.161
Education and Training	2.6000	.76376	5	.001
Recognition and rewards	1.7200	.84261	10	.110
Leadership and commitment	2.6800	.55678	2	.000
Vendor Development	2.6400	.56862	4	.000
Organization structure	2.3600	.86023	7	.047
Inventory minimization	1.8000	.91287	8	.284

$Significance = p < 0.05$

Table 7 identified the factors that could wane the current challenges posed by the difficulty in adopting QMS on construction projects. These critical success factors were ranked from 1st to 10th as presented in Table 7; team work was ranked 1st (MS=2.80, SD=0.50 Leadership and commitment was ranked 2nd (MS=2.68, SD=0.56), Customer focus and satisfaction was ranked 3rd (MS=2.64, SD=0.76), Vendor Development was ranked 4th (MS=2.64, SD=0.57), Education and Training was ranked 5th (MS=2.60, SD=0.76), Continuous improvement was ranked 6th (MS=2.56, SD=0.82), Organization structure was ranked 7th (MS=2.36, SD=0.86), Inventory minimization was ranked 8th (MS=1.8, Sd=0.91), Total Employees Involvement and empowerment was ranked 9th (MS=1.76, SD=0.83) and lastly, Recognition and rewards was ranked 10th (MS=1.72, SD=0.84). The study also revealed that, of all the critical factors identified, only seven proved to be effectively significant in combating the challenge posed by the factors that impede QMS adoption and implementation in the Nigerian construction industry. These are: customer focus and satisfaction (p=0.000), Continuous improvement (0.002), team work (p=0.000), Education and Training (p=0.001), leadership and commitment (p=0.000), vendor development (p=0.000), and lastly, organization structure (p=0.047) (Table 8).

Adherence and Non-Adherence to QMS

The Engineers and Managers from Skynet Building Systems (SBS) and Makash Technical Company (MTC) were asked how often the following feedbacks were returned from a client after completion of projects (Table 9).

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Table 9
ADHERENCE TO QMS AND CUSTOMER FEEDBACK AFTER PROJECT COMPLETION

S/N	Adherence and feedbacks		SBS		MTC	Correlation
		Yes (%)	No (%)	Yes (%)	No (%)	p
1	Adherence to ISO 9001:2015 guides during project execution	8 (61.5)	5 (38.5)	8 (47.1)	9 (52.9)	**1.00**
2	Getting more jobs as a result of previous work done	7 (53.8)	6 (46.2)	8 (47.1)	9(52.9)	0.68
3	Recommendations from clients	8 (61.5)	5 (38.5)	8 (47.1)	9(52.9)	0.94
4	Building quality according to technical specifications	7 (53.8)	6 (46.2)	8 (47.1)	9(52.9)	0.61
5	Adherence to schedule in accordance with common agreements	9 (69.2)	4 (30.8)	10 (58.8)	7 (41.2)	0.31
6	Quality of overall service level	8 (61.5)	5 (38.5)	10 (58.8)	7 (41.2)	0.66
7	Ontime delivery of project	7 (53.8)	6 (46.2)	10 (58.8)	7 (41.2)	0.73
8	Project was completed within budget	8 (61.5)	5 (38.5)	10 (58.8)	7 (41.2)	0.66
9	All project specifications were met	9 (69.2)	4 (30.8)	9 (52.9)	8 (47.1)	0.78

$Significance = p < 0.05$

Table 8 indicates SBS having a greater percentage (61.5%) against MTC (47.1%) in adherence to ISO 9001:2015 guides during project execution, which in turn has increased more jobs (53.8%), recommendations from clients (61.5%), adherence to schedule with common agreements (53.2%), building quality in line with specifications (53.8%), adherence to schedule (69.2%), quality of overall service level (61.5%), ontime delivery (53.8%), project completion within budget (61.5%), and satisfying all project specifications (69.2%).

Result from table depicts SBS as receiving more positive feedbacks from clients than MTC in handling more jobs, recommendations, quality of overall service, ontime delivery, and meeting all project specifications. This is as a result of SBS' adherence to QMS guides when executing a construction project.

The table further shows a strong positive correlation exists between adherence to QMS guides and getting more jobs (0.68), recommendations from clients (0.94), building quality according to technical specifications (0.61), compliance with schedules (0.31), quality of overall service level (0.66), ontime delivery of project (0.73), completion of project within budget (0.66), and satisfying project specifications (0.78) (Table 10).

Table 10
NON-ADHERENCE TO QMS AND CUSTOMER FEEDBACKS AFTER PROJECT COMPLETION

S/N	Non-adherence and feedbacks		SBS		MTC	Correlation
		Yes (%)	No (%)	Yes (%)	No (%)	ρ
1	Non-adherence to ISO 9001:2015 guides	5 (38.5)	8 (61.5)	9 (52.9)	8 (47.1)	**1.00**
2	Ponding of water taking place in a slab	6 (46.2)	7 (53.8)	9(52.9)	8(47.1)	0.80
3	Cracks appearing in concrete structural members in a structure	5 (38.5)	8 (61.5)	9(52.9)	8(47.1)	0.73
4	Peeling off of plaster, crumbling of concrete of structural members	3 (23.1)	10(76.9)	10(58.8)	7(41.2)	0.67

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5	Efflorescence in walls, peeling of plaster, corrosion of cement plaster of the walls	3(23.1)	10(76.9)	9(52.9)	8(47.1)	0.45
6	Walls of great thickness showing rupture, along the length of wall, in the middle portion	6(46.2)	7(53.8)	9(52.9)	8(47.1)	0.74
7	Walls having less strengths in certain portions, such as near corners, walls of large slenderness ratio	5(38.5)	8(61.5)	9(52.9)	8(47.1)	0.59
8	Leakage due to water tank, seepage at the top of mumty slab especially in rainy season	5 (38.5)	8 (61.5)	10(58.8)	7(41.2)	0.66
9	Falling hazards due to parapet walls and water tanks at the top	5 (38.5)	8 (61.5)	11(64.7)	6(35.3)	0.45
10	Seepage from water tank walls	4(30.8)	9(69.2)	10(58.8)	7(41.2)	0.67

From table 9, it is evident that MTC has a greater percentage in non-adherence to ISO 9001:2015, which apparently has resulted more of negative feedbacks from clients after project completion; ponding of water taking place in slab (52.9%), cracks (52.9%), peeling off of plaster (58.8%), efflorescence in walls (52.9%), rupture in walls (52.9%), less strength in certain portions of walls (52.9%), leakage due to water tank (58.8%), falling hazards due to parapet in walls (64.7%), and seepage from water tanks (58.8%).

The above results evince that, the non-adherence of MTC to QMS guides during project execution has resulted the high negative feedbacks from clients than their SBS counterpart.

Table 9 further reiterates that a strong positive correlation exists between MTC non-adherence to QMS guides and ponding of water in slabs (0.80), cracks (0.73), peeling off of plaster (0.67), efflorescence (0.45), rupture in walls (0.74), less strengths in walls of certain portions (0.59), leakage due to water tank (0.66), falling hazards (0.45), and seepage from water tanks (0.67).

From the above results, adoption of QMS in construction projects results in a better service quality of a firm and a functional rapport with clients, which in a large extent attracts contracts and an increase in their operations, as demonstrated by SBS.

DISCUSSION

This study was conducted within a small area in Lagos state, Victoria Island, through questionnaires. It was revealed that QMS is always applied on construction projects. It is best to always apply QMS in order to monitor methods and processes thoroughly.

The construction sector, particularly in institutions where it is meant to be practiced, has a lot of room for quality improvement (Ashiru et al., 2020). Despite the knowledge of QMS being new to some developing countries (Khalfan et al., 2020), like Nigeria, it is still adopted and applied in construction projects. This has tremendous advantages to the construction sector and to the economy at large. Many construction companies across Nigeria have successfully implemented Quality Management, resulting in increased revenues and Sepreased rework time and expense (Ashiru et al., 2020).

The quest to ascertain how wide QMS is adopted and practiced amongst the construction professionals led to the observation that QMS is adopted and applied widely amongst the professionals in the construction industry for project delivery.

Sequel to the level of adoption by the professionals followed an enquiry as to their

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level of compliance in the construction industry. It was indicated that there is a high level of compliance to the application of QMS on construction projects generally. Due to the fact that construction projects typically require a significant number of resources and a variety of dynamic processes, obtaining good quality is reliant on managing interconnected organizational processes (Masuin et al., 2020).

As regards the factors affecting QMS implementation, a company's top management should be involved in establishing the QMS vision, mission, and long-term goals. They should clearly describe the corporate mission and vision, taking into account the input of their employees in developing the stated purpose and vision, (Trigunarsyah et al., 2021). Significant opportunities for improvement in construction quality development include management commitment, organizational culture, and employee incentive to adopt and apply a QMS (Panuwatwanich & Nguyen, 2017). Therefore, the issue commitment and support from top management should be properly tackled for better implementation of an effective QMS, as this is the factor standing out as the most influencing.

More so, implementation of QMS and compliance to it would help the all stakeholders involved in a construction project to reap the benefits of applying QMS in the project. Therefore, in order to produce high-quality projects and services in the sector of construction, it is required to effectively execute a Quality Management System (QMS) (Trigunarsyah et al., 2021). The attitude of workers seems to be another endearing factor that should be resolved. People are the most important components of construction projects. As a result, human factors play a significant role in the formation and application of QMS (Gutierrez-Gutierrez et al., 2018). Even when top management Sepides to adopt and apply QMS, the workers may not comply with this Sepision and the work would likely go awry.

Furthermore, seven critical success factors of significant impact to the adoption of QMS on construction projects were identified: customer focus and satisfaction, continuous improvement, team work, education and training, leadership and commitment, vendor development, and lastly, organization structure, which connotes with the findings of (Patel & Solanki, 2020). This further reiterates that, using and modeling the ultimate catalogue of all existing and identified factors should develop a foundation for successful implementation of QMS in construction (Ahmed et al., 2017).

LIMITATIONS

Despite the fact that our findings were mainly noteworthy, the study's breadth of data collection was limited. Only a few numbers of people took part in the study, hence the data is limited. This limits the chances of achieving a trustworthy deduction or generating results that can be used to make appropriate projections. It is very much possible that some invalid responses were gotten as a result of the participants not understanding the whole context of this research and the meaning of some terms used in the questionnaire. Also, as result of the short time frame given for this research, some distributed questionnaires were not being able to be retrieved.

CONCLUSION

This paper has revealed that quality management systems are applied always in construction projects in Nigeria. It also shows that there are quite a number of factors that affect QMS and its application on construction projects in Nigeria, with insufficiency of support from leading management as the most common or rampant factor. With the various

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benefits of QMS, it is considered wise for construction companies to adopt and apply QMS in every project they carry out.

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Received: 02-Sep-2024 Manuscript No. JMIDS-24-15502; **Editor assigned:** 04-Sep-2024 Pre QC No. JMIDS-24-15502(PQ); **Reviewed:** 16-Sep-2024 QC No. JMIDS-24-15502; **Revised:** 23-Sep-2024 Manuscript No. JMIDS-24-15502(R); **Published:** 30-Sep-2024

Citation Information: Enyinna, G.C., Oguzie J.O.C., Moneke U.U., Nwokolo, N.C., Nmesoma, O.B., Okangba, S., Anyanwu C.I., Onwuka U.S., Okonkwo, C.B., Okwara, I.D., (2024). Effects of emerging technologies on computer-based project management. *Journal of Management Information and Decision Sciences, 27*(6), 1-17.