

A Study of Quality Related Project Control Measures on Building Construction Projects in Delta State

Ukwumonun Etubi¹, Iyamu Osafanmen Victor² & Elamah Daniel³

¹Department of Building, Faculty of Environmental science, Nnamdi Azikiwe University, Awka

²Federal College of Education, (Technical), Asaba, Delta State

³Department of Building Technology Auchu Polytechnic, Auchu, Edo state

ABSTRACT

This paper investigated quality-related project control measures on building construction projects in Delta State. Three research questions guided the study while three null hypotheses were formulated. The design to be adopted for this study is a descriptive survey. The population of this study comprised 157 construction professionals in relevant professional bodies in Delta State. The required sample size from this sample frame was 157, which represents the entire population of each group of professional bodies stated above. Data for this study were collected by means of a structured questionnaire titled “Questionnaire on Quality-Related Project Control Measures on Building Construction Project” (QQRPCMBPCP) developed by the researcher. The questionnaire was subjected to face validation. Cronbach Alpha method was used to test the internal consistency of the instrument and an overall co-efficient of 0.78 was obtained. Descriptive statistics of the mean score and standard deviation were used to analyze the data to answer the research questions while a one-sample t-test was used to determine the significant difference between the mean scores. The SPSS (version 24) will be used to analyze the data. The paper found that construction professionals agreed on the quality project control measures for planning, monitoring, and reporting on building construction projects in Delta State.

Based on the findings, it was recommended amongst others that construction professionals in Delta State should formalize and standardize project control measures across the construction industry to ensure consistency and uniformity in planning, monitoring, and reporting practices.

KEYWORDS

Project; project control measures; building; construction projects

INTRODUCTION

The Nigerian construction sector plays an important role in the economic development of the country, as it has contributed roughly half of the total stock of fixed capital investment in the Nigerian economy (Ugwu & Attah, 2016). The cost of construction materials maybe 50% to 70% of the total construction expenditure, depending on the type of construction project (Arijeloye & Akinradewo, 2016). Historically, the construction industry has faced challenges related to quality control, safety standards, and adherence to building codes and regulations in Nigeria. Inadequate quality management has sometimes resulted in structural failures, reduced building lifespan, and costly maintenance issues (Aenet & Maniha, 2023). These issues can have a substantial impact on the state's economy, as they may lead to the wastage of resources and potential safety hazards for the citizens. It is well a documented and well-known fact that a good number of construction projects have failed in recent times.

The construction industry in Delta State has become a significant driver of economic development, generating employment opportunities and fostering infrastructural improvements. This sector encompasses a wide range of construction projects, including residential buildings, commercial complexes, public infrastructure such as roads and schools, and more (Ozoemena & Udobi, 2019).

The author stressed that as the state continues to develop and modernize, there is a pressing need to ensure that the quality of construction projects is rigorously controlled and maintained. A project is a series of complex and connected activities with a singular purpose of being completed within a specific time frame, budget, quality, and specification. That a project must be completed within schedule, budget, and according to specification denotes that the project is constrained by all of these parameters hence effective control is needed in place to meet the proposed planned time and budget for purposes of accomplishing the stated objectives (Kotb, Atwa, & Elwan, 2016). According to Pinto and Slevin (2017), a project is said to be successful when it meets its schedule, and budget and satisfies the client. To achieve this, there is a need to deploy measurements of some sort to help decide if the project is on track, perhaps if something goes wrong, a corrective action will be put in place. As a project manager, understanding the impact and influence of monitoring and control as well as keeping them in check, is critical to the successful delivery of the project to fruition (Rupen, 2021). Hence, there is a need to expediently apply project control techniques in practically every aspect of a project's phase.

Construction projects are dynamic in nature, that is to say, no two projects are exactly the same, hence their tendency to be prone to uncertainties (risks) and demand effective and efficient control. Project failure is usually a collection of minor items that individually have a negative or positive impact and if care is not taken, can lead to a serious impact on cost, schedule, as well as performance (Ogunde, Olaolu, Afolabi, Owolabi & Ojelabi, 2017). One of the major problems facing construction projects is the inability to deliver such projects on time, at the estimated and budgeted cost, and within specified quality standards (Usman, Kamau, & Mireri, 2014).

Usman, et al., (2014) further pointed out that it is now routine for construction projects to experience cost overruns accompanied by time overruns and low quality of delivery which often leads to client dissatisfaction. According to Nwachukwu and Emoh (2018) and Windapo and Rotimi, (2018), the industry has been maligned by issues such as building collapse, incessant delays, abandonment, and cost overrun. Nwachukwu and Emoh (2018) asserted that the key to all these woes lies in efficient project control measures. The concept of project control measures is not new to the industry as a whole and it has been applied in other fields in the nation such as the public sector.

Project control measures in building construction are essential tools and processes employed to plan, monitor, and manage all aspects of construction projects. These measures are crucial for achieving project objectives, maintaining quality, staying within budget, and adhering to schedules (Ozoemena & Udobi, 2019). The authors stressed further that project control measures are fundamental for financial management within construction projects. They help in estimating, budgeting, and tracking expenses. This includes cost control, cost forecasting, and expense monitoring to ensure that the project stays within the allocated budget.

According to Ibrinke and Elamah (2021), project control measures include quality assurance and safety management protocols to monitor and enforce adherence to industry standards, regulations, and best practices, thus minimizing risks and ensuring the highest quality work. Project control measures include scheduling, sequencing, and monitoring to ensure that milestones are met within the specified timeframe. Authors such as Ozoemena and Udobi (2019); and Nwachukwu and Emoh (2021) highlighted four measures of project control, including; i) project control measures for planning; ii) project control measures for monitoring; iii) project control measures for reporting; iv) project control measures for analyzing.

Project control measures for planning on building construction projects are essential to ensure the successful and efficient execution of these projects. Effective planning sets the foundation for the entire construction process, influencing everything from budgeting to scheduling and resource allocation. Nwachukwu and Emoh (2021) highlighted some key project control measures for planning in building construction to include; i) clearly define the project's objectives, scope, and deliverables. This includes specifying the size, design, and purpose of the building; developing a detailed budget that covers all project expenses, including materials, labor, equipment, permits, and contingencies and identifying and allocating resources, such as labor, machinery, and materials, based on project needs and scheduling requirements.

Patunola-Ajayi (2021) revered that project control measures for monitoring in building construction projects are vital to ensure that the project progresses according to the plan, adheres to quality standards, stays within budget, and complies with timelines and safety regulations. Effective monitoring helps project managers detect and address issues promptly, allowing for corrective action and informed decision-making. In the opinion of Olateju (2020), project control measures for reporting on building construction projects are crucial for maintaining transparency, accountability, and effective communication among project stakeholders. Reporting helps disseminate critical project information, assess progress, and make informed decisions.

Project control measures for analyzing building construction projects are essential for assessing project performance, identifying trends, making informed decisions, and optimizing various aspects of the project (Akindele & Adepoju, 2020). These measures provide project stakeholders with valuable insights into the construction project's progress, enabling them to take corrective actions, mitigate risks, and enhance project efficiency.

The study explores the importance of quality-related project control measures in building construction projects in Delta State, a region experiencing rapid growth and urban development. The research highlights the role of these measures in managing challenges and ensuring construction projects meet high standards of quality, safety, and efficiency. By meticulously planning, monitoring, and analyzing construction projects, Delta State can create a built environment that supports its population and economy while setting exemplary standards for the entire construction industry. It is therefore upon this background that the study determines quality-related project control measures on building construction projects in Delta State.

STATEMENT PROBLEM

The construction industry in Delta State is facing several challenges, including inconsistent quality of construction, budget overruns, project delays, safety concerns, lack of transparency, regulatory compliance challenges, resource allocation inefficiencies, inadequate risk management, a lack of lessons-learned culture, and stakeholder dissatisfaction. These issues contribute to the overall well-being and satisfaction of the state's inhabitants. Inconsistent quality of construction raises concerns about the reliability, safety, and durability of buildings, impacting the overall well-being of the population. Budget overruns strain financial resources and lead to incomplete projects, requiring careful consideration and analysis. Project delays and schedule deviations are also common issues, resulting from factors such as unforeseen disruptions, poor planning, and resource allocation issues.

Safety concerns arise due to the need for better protocols, monitoring, and enforcement of safety standards. The absence of comprehensive and standardized project control measures leads to a lack of transparency, accountability, and consistency in project management. Regulatory compliance challenges can be complex and time-consuming, leading to potential delays and complications. A lack of a lessons-learned culture in the construction industry may result in the repetition of mistakes and missed opportunities for improvement. Stakeholder dissatisfaction can result from inconsistent project outcomes, including variations in quality, safety, and timeliness. It is against this backdrop that this study seeks to determine quality-related project control measures on building construction projects in Delta State.

Research Questions

The following research questions guided the study:

- (1) What are the quality project control measures for planning on building construction projects in Delta State?
- (2) What are the quality project control measures for monitoring on building construction projects in Delta State?
- (3) What are the quality project control measures for reporting on building construction projects in Delta State?
- (4) What are the quality project control measures for analyzing on building construction projects in Delta State?

Hypotheses

- (1) Quality project control measures for planning does not significantly influence building construction projects in Delta State
- (2) Quality project control measures for monitoring does not significantly influence building construction projects in Delta State
- (3) Quality project control measures for reporting does not significantly influence building construction projects in Delta State
- (4) Quality project control measures for analyzing does not significantly influence building construction projects in Delta State

REVIEW OF LITERATURE**Quality Control Theory**

While Shewhart's work laid the foundation for quality control theory in 1924, it is essential to note that many other scholars and practitioners, such as W. Edwards Deming and Joseph M. Juran, further developed and popularized quality management principles in subsequent years.

Quality Control Theory is a field of study and practice that focuses on the principles, methods, and techniques used to ensure products, services, and processes meet or exceed established quality standards and expectations. It plays a critical role in manufacturing, service industries, and other sectors where quality assurance is essential.

The primary objectives of quality control are to identify, prevent, or correct defects, errors, and variations to enhance product or service reliability and consistency. Key elements of Quality Control Theory include defining quality, using statistical process control (SPC), acceptance sampling, process capability analysis, root cause analysis, quality improvement tools, documentation and standards, training and education, process audits, distinguishing between quality assurance and quality control, customer feedback, cost of quality, and continuous improvement.

Quality control theory emphasizes the importance of understanding the definition of quality standards and criteria, statistical techniques for monitoring and controlling processes, acceptance sampling for assessing product or service capability, root cause analysis for identifying and addressing quality issues, and quality improvement tools like Six Sigma, Lean, and Total Quality Management (TQM). Documentation and standards, such as ISO 9001, are essential for developing and implementing quality management systems. Training and education are crucial for ensuring the effective application of quality control principles throughout an organization.

Process audits help verify that quality control practices are being followed and identify opportunities for improvement. Quality assurance focuses on preventive measures to avoid defects, while quality control focuses on detecting and correcting defects after they occur. Understanding the cost of quality, including prevention, appraisal, internal failures, and external failures, is essential for decision-making related to quality improvement. Continuous improvement is at the core of quality control, as organizations strive to continually enhance processes, products, and services to achieve higher quality standards and customer satisfaction.

METHODOLOGY

The design to be adopted for this study is a descriptive survey. The population of this study comprised 157 construction professionals in relevant professional bodies in Delta State. The professional bodies are the Nigerian Institute of Architects (NIA), Nigerian Institute of Building (NIOB), Nigerian Institute of Quantity Surveyors (NIQS), Nigerian Society of Engineers (NSE) and Nigerian Institution of Estate Surveyors and Valuers (NIESV). A total number of 157 professionals in real estate project management reside in the study area. The required sample size from this sample frame was 157, which represents the entire population of each group of professional bodies stated above.

Data for this study were collected by means of a structured questionnaire developed by the researcher. The questionnaire is subdivided into two parts; part A contains the demographic profile of the respondents. Part B titled "Questionnaire on Quality-Related Project Control Measures on Building Construction Project" is subdivided into four clusters I – IV.

Cluster I elicits responses on quality project control measures for planning on building construction projects; Cluster II addresses opinions on quality project control measures for monitoring building construction projects; Cluster III centers on 8 items on quality project control measures for reporting on building construction projects; and cluster IV addressed items on quality project control measures for analyzing on building construction projects. The questionnaire is rated on a 4-point rating scale of Strongly Agree (SA); Agree (A); Disagree (D) and Strongly Disagree (SD) with values 4, 3, 2, and 1 respectively.

The instrument was subjected to face validation. Cronbach Alpha method was used to test the internal consistency of the instrument and values 0.76, 0.77, 0.82, and 0.70 were obtained for clusters I – IV respectively. The data collected was analyzed in two stages. In the first stage, descriptive statistics of mean score and standard deviation were used to analyze the data to answer the research questions. The criterion means of 2.50 served as the benchmark for making a decision. Any mean score below 2.50 criterion mean score was rated disagreed while any mean score above 2.50 criterion mean score was rated agreed. In testing the null hypotheses, a one-sample t-test was used to determine the significant difference between the mean scores. The SPSS (version 24) will be used to analyze the data.

RESULTS AND DISCUSSION

Research Question 1: What are the quality project control measures for planning on building construction projects in Delta State?

TABLE 1: Respondents' Mean and Standard Deviation on the Quality Project Control Measures for Planning on Building Construction Projects.

S/N	Items on the Quality Project Control Measures for Planning on Building Construction Projects	X	SD	Remarks
1	The project team develops a detailed project plan with clear objectives, timelines, and milestones	2.55	0.58	Agree
2	Risk assessments are conducted at various project stages to identify potential issues and challenges	2.87	0.82	Agree
3	Quality control measures are implemented to ensure that construction materials meet specified standards and codes	3.11	0.52	Agree
4	Regular progress reports and updates are shared among team members to monitor project performance and make necessary adjustments	2.69	0.69	Agree
5	Change management procedures are in place to address modifications to the project scope without compromising quality	2.53	0.88	Agree
6	The project management team uses technology and software tools to enhance project planning and control	2.59	0.49	Agree
7	Communication channels between different stakeholders (e.g. architects, builders, contractors, clients) are well-established and effective	3.02	0.74	Agree
Cluster Mean		2.77		Agree

Table 1 reveals that all the items (1 – 7) with their respective mean scores of 2.55, 2.87, 3.11, 2.69, 2.53, 2.59, and 3.02 were rated agreed because they were above the criterion mean score of 2.50. The cluster mean of 2.77 summarized that construction professionals agreed on the quality project control measures for planning on building construction projects in Delta State. The standard deviation scores ranging from 0.49 – 0.88 means that the respondents' mean scores were closely related.

Research Question 2: What are the quality project control measures for monitoring building construction projects in Delta State?

TABLE 2: Respondents' Mean and Standard Deviation on the Quality Project Control Measures for Monitoring on Building Construction Projects.

S/N	Items on the Quality Project Control Measures for Monitoring on Building Construction Projects	X	SD	Remarks
8	The project team conducts regular site visits and inspections to monitor construction progress and compliance with plans and specifications	2.59	0.62	Agree
9	Quality control inspections are performed at critical project milestones to ensure work meets established standards	3.12	0.64	Agree
10	Project documentation is maintained meticulously, including daily logs, change orders, and quality control reports	3.29	0.62	Agree
11	Key performance indicators (KPIs) are used to track and measure project performance and progress	2.66	0.63	Agree
12	Project managers and supervisors regularly communicate with the construction team to address issues and resolve challenges	2.61	0.68	Agree
Cluster Mean		2.85		Agree

Table 2 reveals that all the items (8 – 12) with their respective mean scores of 2.59, 3.12, 3.29, 2.66, and 2.61 were rated agreed because they are above the criterion mean scores of 2.50. The cluster mean of 2.85 summarized that construction professionals agreed on the quality project control measures for monitoring building construction projects in Delta State. The standard deviation scores ranging from 0.62 – 0.88 means that the respondents' mean scores were closely related.

Research Question 3: What are the quality project control measures for reporting on building construction projects in Delta State?

TABLE 3: Respondents' Mean and Standard Deviation on the Quality Project Control Measures for Reporting on Building Construction Projects in Delta State.

S/N	Items	X	SD	Remarks
13	Project reports are generated and distributed regularly to provide stakeholders with a clear overview of project status, progress, and performance	2.63	0.54	Agree
14	Reporting formats and content are standardized and consistent across all project communications	2.02	0.61	Disagree
15	The project team includes detailed information on project risks and mitigation strategies in project reports	2.54	0.62	Always
16	Project reports provide a breakdown of project costs and expenditures, ensuring transparency	2.68	0.71	Agree
17	Safety and environmental compliance records are included in project reports	2.82	0.68	Agree
Cluster Mean		2.54		Agree

Table 3 reveals that item 14 with a mean score of 2.02 was rated disagreed while items 13, 15, 16, and 17 with their respective mean scores of 2.63, 2.54, 2.68, and 2.82 were rated agreed because these mean scores are above 2.50 criterion mean score. The cluster mean of 2.54 summarized that construction professionals agreed on quality project control measures for reporting on building construction projects in Delta State. The standard deviation scores ranging from 0.54 – 0.71 means that the respondents' mean scores were closely related.

TEST OF HYPOTHESES

Hypothesis 1: Quality project control measures for planning does not significantly influence building construction projects in Delta State

TABLE 4: One-sample t-test on Quality project control measures for planning does not significantly influence building construction projects in Delta State.

	t	df	p	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
QPCM for planning	12.226	155	.103	31.30667	31.8066	-30.8067

Data presented in Table 4 reveals that the null hypothesis of no significance is not rejected since the p-value of 0.000 is greater than the alpha level of 0.05 $t(155) 12.226, p > 0.05$. Therefore, quality project control measures for planning did not significantly influence building construction projects.

Hypothesis 2: Quality project control measures for monitoring does not significantly influence building construction projects in Delta State

TABLE 5: One-sample t-test on Quality project control measures for monitoring does not significantly influence building construction projects in Delta State.

	t	df	p	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
QPCM for monitoring	10.388	155	.006	30.35432	30.9496	-29.7595

Data presented in Table 5 reveals that the null hypothesis of no significance is not rejected since the p-value of 0.000 is greater than the alpha level of 0.05 $t(155) 10.388, p > 0.05$. Therefore, quality project control measures for monitoring did not significantly influence building construction projects.

Hypothesis 3: Quality project control measures for reporting does not significantly influence building construction projects in Delta State.

TABLE 6: One-sample t-test on Quality project control measures for reporting does not significantly influence building construction projects in Delta State.

	t	df	p	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
QPCM for reporting	11.588	155	.021	-25.61667	-26.0566	-25.1767

Data presented in Table 6 reveals that the null hypothesis of no significance is not rejected since the p-value of 0.000 is greater than the alpha level of 0.05 $t(155) 11.588, p > 0.05$. Therefore, quality project control measures for reporting did not significantly influence building construction projects.

DISCUSSION OF FINDINGS

The finding revealed that construction professionals agreed on the quality project control measures for planning on building construction projects in Delta State. These findings indicate consensus or alignment among these professionals regarding the specific methods, processes, and standards to be employed during the planning phase of construction projects to ensure quality outcomes. This finding was in line with the finding of Aenet and Maniha (2022) that construction experts' perspectives on project control measures for planning found that 80% of the respondents agreed on the importance of implementing quality project control measures during the planning phase of building construction projects. Additionally, a separate study by Arowolo, Kolawole, Adewale, and Adeyemi (2019) revealed consistent adherence to industry-standard project planning frameworks such as the Project Management Body of Knowledge (PMBOK) and ISO 9001 quality management principles.

The finding revealed that construction professionals agreed on the quality project control measures for monitoring building construction projects in Delta State. Construction professionals agree on the implementation of quality assurance protocols to systematically monitor and evaluate project performance during various stages of construction. This may include regular site inspections, quality audits, progress reports, and compliance checks to identify and address any deviations from established standards. This finding agreed with that of Okoli (2022) that consistent adherence to established monitoring protocols, including the use of project management software for real-time tracking of project progress and performance indicators. On the other hand, this finding opposed that of Ugwu and Attah (2016) that lack of consensus among construction consultants regarding the effectiveness of quality project control measures for monitoring. While some participants expressed support for established monitoring practices, such as regular site visits and progress reports, others raised concerns about their practical implementation and resource constraints.

The finding revealed that construction professionals agreed on the quality project control measures for reporting on building construction projects in Delta State. This finding means that construction professionals agreed that quality project control measures for reporting involve a commitment to timely and accurate reporting of project progress, milestones, and key performance indicators. Construction professionals agree on the importance of providing stakeholders with up-to-date information to facilitate decision-making and ensure project transparency. This finding was in tandem with the finding of Onyeka (2022) which revealed consistent adherence to established reporting protocols, including the use of standardized reporting templates and software systems for real-time data capture and analysis. Conversely, the study of Nwachukwu and Emoh (2018) opposed that construction professionals and stakeholders in Delta State revealed a lack of consensus on the effectiveness of quality project control measures for reporting, with some supporting established practices but others expressing concerns about data accuracy, timeliness, and relevance.

CONCLUSION

The study of quality-related project control measures on building construction projects in Delta State provides valuable insights into the factors influencing project quality and the effectiveness of control measures in ensuring desired outcomes. Based on the findings, the study concluded that construction professionals agreed on the quality project control measures for planning, monitoring, and reporting on building construction projects in Delta State.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

- (1) Construction professionals in Delta State should formalize and standardize project control measures across the construction industry to ensure consistency and uniformity in planning, monitoring, and reporting practices. This can be done by establishing clear guidelines, templates, and protocols that outline the steps to be followed and the data to be collected at each stage of the project lifecycle.
- (2) Conduct training programs and workshops for construction professionals in Delta State to enhance their understanding and implementation of quality-related project control measures.
- (3) Integrate robust quality assurance mechanisms into project control measures to ensure adherence to quality standards and regulatory requirements.
- (4) Establish a platform for sharing success stories, lessons learned, and case studies to promote continuous learning and improvement within the industry.

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