Scope
Volume 16 Number 03 September 2026

Examination of the Metrics Used for Measuring Successful Building Construction Project Delivery in Delta State

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Abstract: Building construction project delivery in Nigeria, particularly within the ecologically sensitive and institutionally complex environment of Delta State, faces persistent challenges including time overruns, budget escalations, quality deficiencies, and safety concerns. This study examined the metrics for measuring successful building construction project delivery and evaluated the current performance state across both public and private sectors in Delta State. Utilizing a descriptive survey research design, quantitative data were collected via structured physical, online, and telephone questionnaires administered to built environment professionals across Asaba, Ogwashi-Uku, and Agbor. From a total population of 476 construction professionals, a sample of 217 respondents was purposively selected using the Taro Yamane formula for finite populations. Data were analyzed using quantitative descriptive statistical methods, including mean item scores and relative importance rankings. The findings established that several key metrics used to measure successful project delivery. Indicators with mean scores equal to or above the average mean score of 4.19 were considered the most reliable measures of project success. These findings imply that effective project delivery is commonly assessed through the aesthetic appearance and visual quality, Achievement of specified quality standards and workmanship, Minimization of environmental impact during and after construction, and Completion of the project within the agreed schedule .Based on the findings and conclusions of this study.To sustain this trajectory and mitigate chronic cost and schedule variances, the study recommends that professional bodies (such as CORBON, NIA, NSE, and NIQS) expand continuous professional development programs, and that contracting firms embed robust financial management practices, digital quality monitoring tools, and strict environmental compliance protocols into their project lifecycle strategies.

Keywords: Building Construction, Project Delivery Success, Performance Metrics, and Stakeholder Satisfaction

1.0 Introduction

The concept of successful building construction project delivery has undergone considerable evolution in contemporary construction management scholarship. Whereas earlier frameworks equated delivery success almost exclusively with adherence to the iron triangle of time, cost, and quality, contemporary definitions have expanded to encompass broader dimensions of performance. Mustapha, Boahene Akomah and Ansah (2023) propose a four-dimensional framework of construction project success that incorporates time, cost, quality, and safety as equally weighted performance dimensions, arguing that the exclusion of safety produces an incomplete assessment of delivery performance. Further extending this multidimensional perspective, Oke and Aigbavboa (2022) argue that a building construction project may appropriately be deemed unsuccessful even where it is physically completed, if it fails to satisfy
quality requirements, compromises safety, or generates adverse environmental consequences. Although standard project management principles and performance benchmarks exist for building construction projects, many projects in Delta State still struggle to meet these standards. Issues such as delayed completion, poor workmanship, safety lapses, environmental degradation, and lack of sustainability are frequently reported across both public and private sector projects in the state (Ogunmakinde and Maund, 2021). These challenges often result in increased costs, reduced service life of structures, and dissatisfaction among stakeholders. This situation can be traced to critical factors such as project management incompetence, ineffective communication, budget constraints, and challenging environmental conditions—all of which represent a knowledge gap requiring systematic investigation.

Despite several studies on project delivery in Nigeria, limited attention has been given to comprehensively examining the metrics for measuring successful building construction project delivery. As a result, there remains a gap in understanding how these metrics interact to influence project outcomes in the state. This study was therefore undertaken to address this gap and provide evidence-based insights to improve building construction project delivery performance in Delta State."

For the purpose of this study, successful building construction project delivery is operationally defined as the achievement of project objectives across the dimensions of time, cost, quality, safety, environmental impact, sustainability, and appearance, to the satisfaction of key stakeholders in Delta State. Construction professionals gain clearer insight into which factors most affect delivery outcomes, supporting better planning and execution decisions. The need for the study is hinged on the assumption that an examination of what makes for successful projects across public and private sectors, such as real estate developments, infrastructure works, and institutional buildings.

2.0 Literature Review/Related Works

2.1 Concept of successful project delivery

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2.2 Metrics for Measuring Successful Building Construction Project Delivery

The measurement of successful building construction project delivery requires the application of clearly defined, operationalisable performance metrics that capture the multiple dimensions of project outcome relevant to the expectations of different stakeholder groups. The construction management literature has evolved considerably in its approach, moving from exclusive reliance on time, cost, and quality indicators toward a more comprehensive framework that incorporates safety, sustainability, environmental responsibility, and aesthetic quality as legitimate dimensions of delivery performance (Mustapha, Boahene Akomah and Ansah, 2023). The key metrics relevant to this study are examined below.

1 Time performance: Time performance refers to the degree to which a building construction project is completed within the originally agreed project schedule. It is typically measured using schedule variance indicators that compare actual progress against planned milestones at regular intervals throughout the project lifecycle. Time overrun the failure to complete a project by the agreed completion date is one of the most frequently reported delivery failures in the construction management literature and has been documented extensively in the Nigerian context (Adeleke, Adeniyi and Muuka, 2021).

For clients and end users, time performance is often the most immediately visible dimension of delivery performance because delays directly affect the date on which the facility becomes available for use, with consequential financial impacts including lost

rental income, delayed business operations, and additional financing costs. Mustapha, Boahene Akomah and Ansah (2023) confirmed through empirical analysis that time performance is a statistically significant and independent dimension of building construction project success, with strong correlations to client satisfaction and contractor profitability.

2 Cost performance: Cost performance refers to the degree to which a building construction project is delivered within the approved project budget (Ajayi and Opawole, 2022). It is commonly measured using the Cost Performance Index (CPI), which expresses the ratio of the budgeted cost of work performed to the actual cost incurred. A CPI value greater than one indicates that the project is being delivered below budget, while a value less than one signals cost overrun. Cost overrun is a pervasive problem in Nigerian building construction and has been attributed to multiple causes including client scope changes, contractor financial mismanagement, material price escalation, and poor initial cost estimation (Isah and Sani2022).

Beyond the immediate financial impact on clients and contractors, cost overrun has systemic consequences for the building construction industry by eroding contractor profitability, discouraging investment in new projects, and creating incentives for quality reduction as contractors seek to recover financial losses. Oke and Aigbavboa (2022) demonstrated that clients who engage in structured value management processes consistently achieve better cost performance outcomes, reinforcing the importance of proactive cost management at the pre-construction stage.

3 Quality performance: Quality performance refers to the extent to which the completed building meets the technical specifications, workmanship standards, and functional requirements established in the project contract and design documents (Onyekachi and Okolie2023). It is typically assessed through inspection of completed works against specified standards, defect surveys, and rework frequency analysis. Poor quality in building construction is a significant problem in Nigeria, where the use of substandard materials, inadequate supervision, and poor workmanship frequently result in defective buildings that require expensive remediation shortly after completion (Mustapha, Boahene Akomah and Ansah, 2023).

Quality performance is particularly consequential for commercial building projects such as hotel developments because the quality of finish, fitting, and facility standard directly influences the commercial value of the property, its ability to attract guests, and its compliance with hospitality industry standards. Eze, Gento Municio, Ramabodu and Olatunde (2025) observed that quality performance in Nigerian building construction is significantly influenced by the adoption of digital monitoring tools, with contractors who utilise technology-assisted quality management reporting measurably better outcomes than those relying on manual inspection processes alone.

4 Safety performance: Safety performance refers to the degree to which a building construction project is executed without causing injury, illness, or death to workers, site visitors, or members of the public (Mustapha, Boahene Akomah and Ansah, 2023). It is

measured through safety indicators such as the Lost Time Injury Frequency Rate (LTIFR), the Total Recordable Injury Rate (TRIR), near-miss incident rates, and compliance with statutory safety requirements and site safety plans. Building construction is inherently one of the most hazardous industries, and the failure to maintain adequate safety standards on site constitutes not only a moral failure but also a significant source of project risk, as safety incidents cause work stoppages, attract regulatory penalties, and generate legal liabilities (Mustapha, Boahene Akomah and Ansah, 2023).

In the Nigerian building construction industry, safety performance is widely regarded as inadequate, with limited enforcement of safety regulations, low levels of personal protective equipment usage, and insufficient safety training among construction workers. Ofori(2021) found that safety performance was one of the dimensions of project success most sensitive to contractor-related factors, confirming that contractor commitment to safety protocols is a primary determinant of whether building construction projects are delivered without significant safety incidents.

5 Environmental impact and sustainability: Environmental impact and sustainability have emerged as increasingly important dimensions of building construction project performance measurement, reflecting the growing recognition that construction activities generate significant environmental consequences including land disturbance, water pollution, waste generation, energy consumption, and carbon emissions that extend far beyond the project boundary and persist long after project completion (Eze, Gento Municio, Ramabodu and Olatunde, 2025).

In Delta State, the measurement of environmental impact is particularly important given the ecological sensitivity of the Niger Delta environment and the stringent environmental regulations applicable in the region (Eze, Gento Municio, Ramabodu and Olatunde, 2025). Projects that generate significant environmental damage whether through improper waste disposal, contamination of water bodies, or destruction of vegetation risk regulatory sanctions, community opposition, and reputational damage. Zhang and Skibniewski (2020) demonstrated that sustainability performance is increasingly being adopted as a formal project success metric by progressive construction clients across Africa, and that buildings assessed against sustainability criteria achieve higher long-term value for both owners and users.

6 Appearance and aesthetics: Appearance and aesthetic quality, while sometimes regarded as subjective measures of project success, have been empirically demonstrated to constitute legitimate and commercially significant dimensions of building performance. For commercial properties in particular, the visual appeal of a completed building directly influences its market value, its ability to attract tenants or customers, and its contribution to the built environment quality of its surrounding area. Oke and Aigbavboa (2022) found that appearance was consistently identified by building construction clients as one of the dimensions of project success most closely associated with overall satisfaction.

Aesthetic quality is determined by the quality of architectural design, the standard of finishing trades, the selection of materials, and the care taken in the execution of visible elements of construction. In the context of this study, which examined a multi-storey commercial hotel development in Agbor, Delta State, appearance is a particularly salient performance dimension given the hospitality industry's dependence on physical environment quality as a driver of commercial success. Mustapha, Boahene Akomah and Ansah (2023) confirmed through their empirical analysis that aesthetic performance, while more difficult to quantify than time or cost, contributes independently and significantly to stakeholder perceptions of overall building construction project success.

2.3 Measures for Enhancing Building Construction Project Delivery Performance

Ebekozien, Samsurijan, Aigbavboa, Awe and Amadi (2022), Mustapha, Boahene Akomah and Ansah (2023), Ogundipe, Ogunbayo and Aigbavboa (2024), and Eze, Gento Municio, Ramabodu and Olatunde (2025) collectively identify a range of practical measures through which the performance of building construction project delivery in developing economies such as Nigeria can be meaningfully improved. These measures directly address the five categories of influencing factors identified, such as government and regulatory factors, client-related factors, contractor-related factors, environmental factors, and project nature and characteristics, and are drawn from empirical research and professional best practice. In the Delta State context, their effective implementation requires the coordinated engagement of government, clients, contractors, and professional bodies.

3.0 Methodology

This study adopts a descriptive survey research design considered appropriate because it enables the systematic collection of data from a defined population of building construction professionals in Delta State through the use of a structured questionnaire, thereby facilitating the description, analysis, and interpretation of professional perceptions regarding the factors influencing successful building construction project delivery in the study area (Afolayan and Olatunji, 2022). The study was conducted in Delta State, Nigeria, with specific fieldwork activities carried out in three locations: Asaba, Ogwashi-Uku, and Agbor. The population for this study comprised construction professionals involved in building construction projects in Delta State.

A total population of 476 construction professionals was adopted based on Field Survey and Professional Office Enquiries. 217 respondents were purposively sampled using the Taro Yamane formula for finite populations: this method was adopted as the sampling size for this study. The primary instrument for data collection in this study was a structured questionnaire developed by the researcher to elicit quantitative data from building construction professionals on the factors influencing successful project delivery in Delta State. The validity of the research instrument was established through face validity and content validity procedures. For this study, the reliability of the instrument

was assessed on a priori grounds through the adoption of a structured, closed-ended five-point Likert scale format.

Data for this study was collected through three modes of questionnaire administration, reflecting the practical circumstances encountered during the fieldwork phase. The first mode was physical, in-person administration, online administration and telephone administration. The data collected through the structured questionnaire was analysed using quantitative descriptive statistical methods.First, frequency distribution analysis and percentage analysis were employed as the primary analytical tools. Second, mean score analysis was employed to determine the average level of agreement among respondents for each questionnaire item rated on the five-point Likert scale. The results of the data analysis are presented in Chapter Four in the form of frequency, percentage, and mean score tables accompanied by descriptive narrative interpretation.

4.0 Results and Discussions

4.1 Metrics for Measuring Performance of Building Construction Project

This section addresses Research Objective Two and Research Question Two by examining the metrics that construction professionals consider appropriate for measuring successful project delivery. The results are presented in Table 8.

Table 1: Metrics for Measuring Successful Building Construction Project Delivery (N = 181)

Rank	Item	Statement	SA	A	N	D	SD	Mean	Rank
1	C7	The aesthetic appearance and visual quality of the completed project is a valid measure of success.	84	62	54	8	3	4.22	1st
2	C3	Achievement of specified quality standards and workmanship is a valid measure of success.	90	55	24	8	4	4.21	2nd
3	C5	Minimisation of environmental impact during and after	88	58	23	8	4	4.20	3rd

		construction is a valid measure of success.							
4	C1	Completion of the project within the agreed time schedule is a valid measure of success.	85	68	25	3	0	4.19	4th
5	C4	Absence of safety incidents and accidents on site is a valid measure of project success.	82	63	26	7	3	4.18	5th
6	C2	Delivery of the project within the approved budget (Cost Performance Index) is a valid measure of success.	78	65	28	10	0	4.15	6th
		Average Mean Score						**4.19**	

Source: Field Survey (2026)

Table 1 reveals that respondents agreed on several key metrics used to measure successful project delivery. Indicators with mean scores equal to or above the average mean score of 4.19 were considered the most reliable measures of project success. These findings imply that effective project delivery is commonly assessed through the aesthetic appearance and visual quality, Achievement of specified quality standards and workmanship, Minimization of environmental impact during and after construction, and Completion of the project within the agreed schedule

5.0 Conclusion

The study found that completion of the project within the agreed schedule, achievement of specified quality standards and workmanship, minimization of environmental impact, and aesthetic appearance and visual quality were identified as the most reliable indicators of delivery success, validating the study's seven-dimensional performance measurement framework.

6.0 Recommendations

Based on the findings and conclusions of this study, Professional bodies such as CORBON, NIA, NSE, and NIQS should organise regular training programmes, workshops, and continuing professional development activities aimed at improving the technical and managerial competence of construction professionals in Delta State.

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