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Projects Integrating Sustainability Management and Project Delivery Performance in Nigeria

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Abstract

The implementation of Traditional project management methodology (TPMM) in Nigeria has resulted in ongoing inadequate evaluation and monitoring of construction project performance, which has caused a significant number of project failures in the Nigerian construction industry. Nonetheless, construction project managers in Nigeria are hesitant to embrace new and enhanced methodologies like PRiSM that can lead to better decision-making and project success. This study examines how the implementation of PRiSM (Projects integrating Sustainability Management), a novel project management practice, can enhance the performance of construction projects. Specifically, it focuses on how PRiSM, a sustainability methodology, contributed to the improvement in project delivery performance in the South-South region of Nigeria. Because of the challenges in acquiring a complete list of construction stakeholders, Cochran's formula was applied, resulting in a sample size of 384.The research used a descriptive design and gathered information from stakeholders through a questionnaire survey. One hypothesis was formulated and tested using regression analyses. The results shows a p-value less than 0.05 indicating a relationship between the use of the PRiSM methodology and project delivery performance. The findings also raises numerous factors affecting its development. These findings suggest that professionals in the field need to acquire new skills and training in sustainable techniques and technologies. This information could be valuable for project management experts seeking to understand sustainability challenges and exploit opportunities to increase project success rates while reducing the carbon footprint.

Keywords: Construction projects, TPMM, PRiSM, Project delivery performance

Introduction

The act of carrying out projects leads to change by producing new goods, services, results, and advantages for people, businesses, and institutions (Mergela, Edelmannb, & Hauga, 2019). Therefore, their effectiveness is vital for the economic and social progress of any country. Project performance is defined by PMI (2017) as the degree to which a project meets the specified requirements using particular approaches. Throughout the

duration of the project, these methods and principles are employed to develop and improve the product, service, or outcome (PMI, 2017). As stated by Ungureanu and Ungureanu (2024), a project management methodology refers to any principle that delivers successful project results.

Efforts to improve project performance have not prevented project under-performance from becoming a widespread issue in the construction industry, both in Nigeria and globally, as evidenced by its persistent nature (Love et al., 2011; Zhang and Fan, 2013). Lavanchy (2022) has highlighted several prominent projects in Europe, such as the Berlin Brandenburg Airport in Germany, the Scottish Parliament Building in the United Kingdom, and the Flamanville Nuclear Power Station EPR in France, which have all experienced delays and significant cost overruns, amounting to billions of pounds. He mentions that some of the most excessively costly metro projects in the United States include the New York MTA East Side Access and the Boston Central Antenna/Tunnel initiatives. Furthermore, Vartabedian (2022) stated that 92% of large-scale infrastructure projects in the United States went beyond their original cost and time estimates.

The issue of the 'construction pandemic' is prevalent in Nigeria as well. According to Vanguard (2022), there were approximately 56,000 abandoned public funded projects with a total value of over 12 trillion naira spread across Nigeria as of August 2021. As a result, a large number of infrastructure projects throughout the country are either left incomplete or progressing at a slow pace. Examples of such projects include the Ajaokuta Iron & Steel Company, Central Bank of Nigeria (CBN) Centre of Excellence (COE) Project in Maiduguri, Itakpe Iron-Ore Mining Company, Abuja-Kogi-Benin Federal Highway, and the Lagos-Ibadan motorway (Muhammed & Muhammed, 2021). These issues are hindering the country's developmental progress. Improving project management practices and methodology has been recognized as the potential solution to counteract the trend of poor project performance or underperformance.

The company developed its own GPM Global P5 Standard for Sustainable Project Management, utilizing the Projects Integrating Sustainable Methods (PRiSM) approach to ensure that construction practices and outcomes are environmentally sustainable. As expressed by (Carboni et al., 2013), "PRiSM is a method of delivering sustainable projects that integrates practical tools and techniques to manage the equilibrium between limited resources, social responsibility, and the achievement of environmentally friendly project outcomes. It was created for organizations to merge project processes with sustainability efforts to attain business goals while minimizing environmental impact." They believe that it's a method for managing projects in a structured way, emphasizing sustainability and incorporating it into the usual project stages. Understanding and effectively dealing with these areas can minimize adverse environmental effects in any project and maximize the potential to handle sustainability and limited resources.

Throughout the project lifecycle, PRiSM stands out due to its adaptability (Cabeças, 2022). PRiSM is characterized as a sustainable PMM that integrates five elements to offer a comprehensive perspective on project management (Gutierrez, 2014). Carboni et al. (2018) state that PRiSM's concepts and principles were created to address concerns about the implementation of project processes.

Furthermore, PRiSM's significance lies in its ability to enhance project goal and scope management, expedite time-to-market, mitigate risks, streamline processes such as decision-making and quality management, improve customer satisfaction, facilitate knowledge sharing across projects, and allocate more time to value-added tasks (Charvat, 2003; Chin and Spowage, 2010).

The current project management methodologies lack adequate development in terms of sustainability, and there are limited scientific publications that connect project management with sustainability. This article seeks to address this deficiency by expanding the discussion on sustainability in project management with regard to their impact on project delivery performance.

However, the paper main aim is to examine the relationship between projects integrating sustainability management and project delivery performance in Nigeria. The specific objectives include: (i). to examine the impact of PRiSM methodology on project delivery performance in Nigeria, and (ii). to identify factors affecting PRiSM methodology development in Nigeria

Literature Review

Project Management Practices in Nigerian Construction Industry

According to PMI (2017), project management involves systematically applying skills, knowledge, tools, and techniques to project tasks to achieve project objectives, which include delivering the project within budget, on time, and meeting quality standards while considering stakeholders' interests. Project management encompasses nine knowledge areas: cost, scope, schedule, quality, resources, communication, procurement, risk, and stakeholder interests (PMI, 2017), and begins with creating the project charter and project management plan (Olaniyan, 2019).

The project charter defines the project's scope, objectives, key stakeholders, and project participants, as well as detailing the authority of the project manager (Olaniyan, 2019). The project management plan is a finalized working document that delineates the approach and steps to be followed for planning, executing, coordinating, monitoring, and closing the project (Kerzner, 2017). Best practices are widely-accepted methods that have proven to effectively achieve desired outcomes. Incorporating best practices in project management enhances project performance. Identified areas for improvement in Nigeria include public procurement strategy, risk assessment, institutional frameworks, stakeholder engagement, monitoring and evaluation, and executive project management philosophy (Salawu and Abdullahi, 2015). According to Kerzner (2017), project management maturity refers to the existing state of an organization's project management processes, which helps to identify the processes that the organization needs to develop to achieve its future goals.

PRiSM (Projects integrating Sustainable Methods)

The acronym PRiSM stands for PRoject Integrating Sustainability Measures. This methodology is based on principles and utilizes a value-maximisation approach to project management, incorporating sustainability throughout the entire project lifespan. By

leveraging current organizational systems and emphasizing both process and the end product, it ensures the realization of sustainable benefits (PM365, 2021).

Furthermore, the management methodology of a project incorporates sustainable practices. GPM Global, an organization promoting sustainable project management, developed PRiSM. PRiSM includes principles and guidelines to aid project managers in integrating sustainability into all project stages. These principles involve incorporating sustainability goals into the project's scope, addressing sustainability risks, involving stakeholders in sustainable practices, developing a sustainable project management plan, and evaluating project sustainability performance. PRISM aims to assist project managers in creating sustainable projects with a positive impact on the environment, society, and the economy. This methodology is one of many that prioritize sustainability as a vital aspect of project success (PMO Global Institute, 2021).

Padickakudy in his work from 2019 introduces the concept of PRiSM, which signifies projects integrating sustainable methods. This methodology targets to incorporate sustainability factors into project management processes by taking into account social, economic, technical, governance, and environmental aspects. By combining the best practices from various standards, such as ISO 14000 Environment, ISO 21500 Project management, ISO 26000 Social responsibility, ISO 9000 Quality, and ISO 50001 Energy standards, PRiSM provides a comprehensive framework. Figure 1 illustrates the PRiSM methodology framework.

Figure 1: PRiSM Methodology Framework
Source: Miller, (2022).

The PRiSM framework was developed by the Green Project Management Organisation (GPMO) to tackle the issue of project management sustainability (Miller, 2022). This framework integrates various ISO sustainability standards and types of sustainability. According to Alvarez-Dionisi et al. (2016), the scope encompasses the potential long-term benefits. Additionally, he mentioned that PRiSM operates with the 5 Ps, which include Product, People, Process, Profit, and Planet, and these are embedded within the

connections between feasibility study, plan evaluation, planning & organization, and implementation.

The PRiSM framework consists of six guiding principles that collectively involve incorporating sustainability and sustainable development within a company. As stated by Green Project Management (GPM) (2019), these six principles are based on the PRME (Principles for Responsible Management Education), UN Global Compact's Ten Principles, Earth Charter, and ISO: 26000 Guidance on Corporate Social Responsibility.

Empirical Review

To execute a PRiSM methodology, which promotes sustainable practices that improve project delivery efficiency, reduce risks, stay within budget, and meet timelines in the construction sector, Fagarasan et al. (2023) performed a study aimed at addressing a gap by introducing a data-driven scoring model tailored for software companies to incorporate sustainability metrics into their project and portfolio evaluations. A comprehensive literature review was conducted to identify shortcomings in current practices, leading to the creation of a scoring model that integrates delivery and sustainability metrics seamlessly. Validation through a case study indicated that the model positively impacts the performance and sustainability aspects within software development organizations.

In a separate investigation, Zoufa and Ochieng (2016) presented the outcomes of an exploratory study involving interviews with 25 senior project managers in the construction sector who have some involvement with sustainability. The primary conclusions indicate that comprehensive sustainability strategies and initiatives throughout project life cycles in the construction industry have not been entirely adopted. Although all interviews took place in Nigeria, the findings may have relevance or interest for other countries as well.

Soares et al. (2024) conducted a study focusing on Sustainability in Project Management Practices. An online survey was created based on an extensive review of the literature, yielding a total of 107 valid responses for analysis. The findings highlight the most beneficial sustainable project management practices recognized by seasoned project professionals, including 'Sustainability team management,' 'Lessons learned towards sustainability,' and 'Sustainability risk register,' among others. Nonetheless, data analysis reveals a prevailing trend characterized by the limited perceived effectiveness of sustainability practices within the realm of project management.

Additionally, the connection between PRiSM methodology and project delivery performance must be highlighted. This link was confirmed by Moshood et al. (2024), who investigated the criteria for project sustainability success for future performance in construction projects. Information obtained from the Scopus database was analyzed using ATLAS.ti 9 software to establish criteria for achieving project sustainability success. The study's results indicate that both organizational and individual factors are strong predictors of sustainable construction and are essential antecedents for greater sustainability implementation. Lastly, the research emphasizes the importance of

construction project managers' understanding of how to establish sustainability-related criteria and its potential impact on their project outcomes.

Isang (2023) likewise performed a study on the historical assessment of sustainable construction (SC) progress in Nigeria spanning a decade. The assessment also offers a thoughtful viewpoint on the advantages of SC and the current status of green building enforcement in Nigeria. A historical analysis approach was utilized in the research. Employing secondary data sources, 47 key journals from the emerald, scopus, and science direct databases pertaining to "SC," "sustainability," and "green building" in Nigeria from 2012 to 2022 were utilized for the analysis. The examination concluded that the growth of SC in Nigeria has experienced three distinct phases: the initial phase (2012–2016), the transitional phase (2016–2020), and the growth phase (2020–present). The review compares the three timelines to highlight the swift increase in SC awareness, yet it disclosed moderate implementation levels in several key cities in Nigeria.

Nonetheless, the research carried out by Kyriakogkonas et al. (2022) aimed to offer a theoretical framework enabling businesses and organizations to integrate sustainability criteria into the project management process through a conceptual lens, utilizing the Project Management Institute's guidelines and qualitative techniques like "text analysis" and "content analysis." Special focus was given to the advantages that companies gain from incorporating sustainability practices into their decision-making to operate responsibly and positively influence the environment they work in and the individuals impacted either directly or indirectly.

Theory Underpinning the Study

In 1984, Israeli business management expert Eliyahu M. Goldratt introduced the theory of constraints as a management philosophy through the publication of The Goal. He further delved into project management with the release of Critical Chain in 1997.

The Theory of Constraints (TOC) is a methodology that targets the identification and correction of constraints or root causes of bottlenecks in order to enhance processes. Addressing these constraints can lead to increased profitability for businesses and improved efficiency for organizations striving to achieve their objectives (Safety Culture Content Team, 2024). TOC is centered on enhancing systems, which are defined as a series of independent processes (Trojanowska & Dostatni, 2017).

The theory address project constraints that could impede project performance. The TOC emphasized on identifying and eliminating major constraints in order to ensure the timely completion of construction projects. The significance of this theory lies in optimizing project performance through the identification and removal of constraints (Mishra, 2020).

Unlike traditional sustainability project management which only focuses on the triple bottom line (environment, community, finance) to develop projects, Green Project Management (GPM) advocates for the inclusion of additional elements to align projects with the core corporate strategy. As a result, they introduced the PRiSM methodology,

incorporating five elements (People, Planet, Profit, Product, and Process) as a new bottom line.

Projects integrating Sustainable Methods (PRiSM) merge traditional project phases with sustainability through the incorporation of activities from ISO standards such as ISO-9001 (Quality Management), ISO-14001 (Environmental Management), and ISO-50001 (Energy Management Standard). Furthermore, it integrates ISO Guidelines like ISO-26000 (Corporate Social Responsibility) and ISO-21500 (Guidance on Project Management) to attain additional environmental and social advantages (Gutiérrez, 2024).

Conceptual Framework

Studies by Marques et al. (2023), Mamdouh and Ahrouch (2022), and Ndayishimiye and Gachiri (2024) have provided strong support for the relationship between the PRiSM methodology and improved project delivery performance. They also found a link between project implementation methodology and stakeholder satisfaction. These earlier investigations identified the foundations for upcoming theoretical and empirical advancements. The study's conceptual framework is shown in Figure 2.

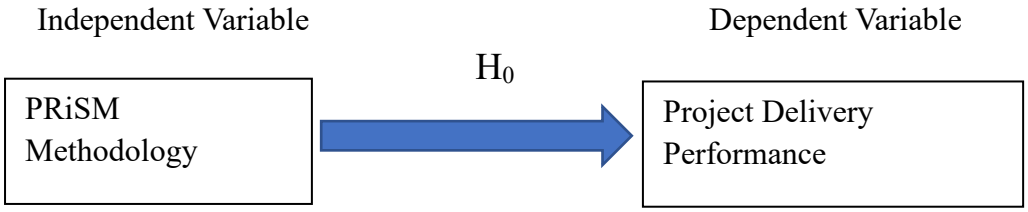

Figure 2: Conceptual Framework
Source: Authors' Construct (2024)

The relationship between the PRiSM approach and project delivery performance is seen in the figure. According to Cabeças (2022), improving PRiSM methodology can improve sustainability in project delivery performance. To investigate the connection between the PRiSM technique and project delivery success, a hypothesis was formulated.

H_0: There exists no significant relationship between PRiSM methodology and project delivery performance.

RESEARCH METHODOLOGY

This study utilized a quantitative approach to examine how stakeholders perceive the impact of PRISM methodology on infrastructure project performance in Nigeria. The primary data consists of responses from contractors, consultants, and professionals involved in construction activities. The study population comprises construction professionals in the South-South geopolitical zone of Nigeria. However, due to difficulties in finding a complete list of unregistered and registered construction stakeholders in this region, the sample size was realised via Cochran's (1963) formula.

$$n_0 = \frac{Z^2 pq}{e^2}$$

$$n_0 = \frac{1.96^2(0.5*0.5)}{0.05^2}$$

$n_0 = 384$

Thus, the sample size realised was 384 construction professionals.
To begin with, three states out of seven were selected using simple random sampling. An equal number of respondents were then chosen from each of these states. Subsequently, data from construction professionals such as Builders, Architects, Engineers, Construction/Project Managers, Contractors and Quantity Surveyors in the Southern region of the country was gathered using purposive sampling. The collected data was later analyzed using regression analysis.

Results and Discussion

Information was collected by using a questionnaire from selected participants. 384 questionnaires were given to construction experts in the South-south region of Nigeria, and 239 were returned. Both descriptive and inferential analysis were used to analyze the data. The findings were discussed and compared with previous studies.

Descriptive Statistics

The background information of the respondents was showcased in a tabular format using descriptive statistics, displaying the respondents' characteristics through percentages and frequencies. Table 1 shows the background of the respondents.

Table 1: Descriptive Statistics of the Background Respondents Information

	Freq	Valid %	Cum %		Freq	Valid %	Cum %
Gender				**Level of Education**			
Male	163	68.2	68.2	National Diploma	25	10.5	10.5
Female	76	31.8	100	Higher National Diploma	68	28.5	39
Total	239	100.0		First Degree	77	32.2	71.2
Age				Master's Degree	55	23.0	94.2
20-30 years	34	14.2	14.2	PhD	14	5.8	100.0
31-40 years	56	23.4	37.6	**Total**	239	100.0	
41-50 years	74	31	68.6				
51-60 years	48	20.1	88.7				
61 and above years	27	11.3	100				
Total	239	100.0					
Profession of Respondents				**Duration of involvement in Building Construction Project Management**			
Project Manager	46	19.2	19.2	Less than 3 years	41	17.2	17.2
Quantity Surveyor	36	15.1	34.3	3 – 7 years	89	37.2	50.2
Architects	31	13	47.3	Above 7 years	109	45.6	100.0
Engineers	35	14.6	61.9	**Total**	239	100.0	
Site Managers	33	13.8	75.7				

Estate Surveyor	32	13.4	89.1	**Duration of using Project Management Software**			
Urban & Regional Planners	26	10.9	100	Less than 3 years	40	16.7	16.7
Total	239	100.0		3 – 7 years	92	38.5	55.2
				Above 7 years	107	44.8	100.0
				Total	239	100.0	
				How much do you know about PRiSM Methodology as a Project Management Tool			
				Not at All	41	17.2	17.2
				Moderate	69	28.9	46.1
				Very Much	129	53.9	100.0
				Total	239	100.0	

Source: Field Survey, 2024

Table 1 presents the respondents background information. It reveals that 163 (68.2%) of the respondents were male, while 76 (31.8%) were female, indicating a higher male representation in the construction industry, possibly due to the demanding nature of the profession. The age distribution of the respondents is as follows: 20-30 years (14.6%), 31-40 years (23.4%), 41-50 years (30.9%), 51-60 years (20.1%), and 61 years and above (11.3%), reflecting a dominance of the youth population in the industry. Among the professionals, 46 were Project Managers (19.2%), 36 were Quantity Surveyors (15.1%), 31 were Architects (12.9%), 35 were Engineers (14.6%), 33 were Site Managers (13.8%), 32 were Estate Surveyors (13.4%), and 26 were Urban & Regional Planners (10.9%). This indicates a high number of project managers, suggesting that construction organizations highly value project managers and structure their project sites accordingly. In terms of education, 25 (10.5%) have National Diplomas, 68 (28.5%) have Higher National Diplomas, 77 (32.2%) have First Degrees, 55 (23%) have Master's Degrees, and 14 (5.9%) have PhDs, highlighting that a First Degree is the minimum qualification necessary to acquire construction skills. Regarding professional experience, 41 respondents (17.2%) have less than three years of experience, 89 (37.2%) have 3-7 years of experience, and 109 (45.6%) have above 7 years of experience in the industry, indicating that the professionals have more experience than anticipated. On the use of construction software, 40 respondents (16.7%) have less than three years' experience, 92 (38.5%) have 3-7 years of experience, and 107 (44.8%) have above 7 years of experience, showing that the targeted respondents have more experience than expected. Additionally, 129 respondents (53.9%) have knowledge of PRiSM methodology, 69 (28.9%) have moderate knowledge, and 41 (17.2%) have no knowledge, indicating that over half of the respondents demonstrate knowledge of PRiSM, reflecting their high-level knowledge of the tools and techniques essential for construction work.

Regression Results of Impact of PRiSM Methodology on Project Delivery Performance

Based on the relationship between PRiSM Methodology and Project Delivery Performance, the hypotheses formulated include:

H_0: There exists no significant relationship between PRiSM methodology and project delivery performance.

The regression results of PRiSM Methodology and Project Delivery Performance is presented in Table 2 and Table 3.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.757[a]	.674	.672	.30354

a. Predictors: (Constant), PRiSM Methodology
b. Dependent Variable: Project Delivery Performance

Table 2 displays the R and R^2 values. An R value of 0.674 indicates a strong correlation, suggesting that 67.4% of the variation in the dependent variable, Project Delivery Performance, can be attributed to the independent variable, PRiSM Methodology. Therefore, a large portion, 67.4%, can be accounted for in this instance.

Table 3: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.301	.133		9.752	.000
	PRiSM Methodology	.665	.039	.757	17.089	.000

a. Dependent Variable: PDP

The information in Table 3's Coefficients allows us to make predictions about Project Delivery Performance based on PRiSM Methodology, and to determine if PRiSM Methodology has a statistically significant impact on the model. PRiSM Methodology has a significant contribution ($p < 0.05$), indicating a strong association with Project Delivery Performance. Consequently, the initial hypothesis stated which said that there is no significant relationship between PRiSM methodology and project delivery performance in Nigeria has been rejected. Additionally, the values in the "B" column under the "Unstandardized Coefficients" section, displayed in table 3, lead to the following regression equation:

Project Delivery Performance = 1.301 + 0.665 (PRiSM Methodology)

Thus, the PRiSM methodology is believed to have a substantial favourable impact on the performance of project delivery. It was hypothesized that there is no noteworthy impact of PRiSM methodology on project performance in Nigeria. However, the results show that there is a significant positive correlation between PRiSM methodology and the performance of project delivery. This aligns with the conclusions of Carboni et al. (2018), who stated that "PRiSM is an environmentally friendly project delivery approach that utilizes concrete tools and techniques to effectively manage the interplay between limited resources, social responsibility, and the delivery of sustainable products".

Table 4: Multiple Responses for Factors Affecting PRiSM Methodology Development

Factors	SD	D	I	A	SA
Lack of Desire for Change	5	4	5	11	214
Inadequacy of Innovativeness	20	12	13	13	181
Project Managers Insufficient Thinking Capacity	37	4	5	3	190
Sufficiency in the usage of Traditional Project Management Methodologies	5	32	5	3	194
Lack of Adaptability	5	4	33	3	194
Insufficiency of Research and Development	13	16	9	23	178
Comfortability in the usage of Traditional Project Management Methodologies	11	6	6	23	193
Total (Percentage)	96 (5.74%)	78 (4.66%)	76 (4.54%)	79 (4.72%)	1344 (80.33%)
Mean	**0.4013**	**0.3264**	**0.3179**	**0.3305**	**5.6234**

Source: Author's Field Survey, (2024).

From the table, the result shows that a high number of respondents choose Strongly Agree for these factors, with a response rate of 80.33 percent. However, other responses include Strongly Disagree, Disagree, Indifferent and Agree with responses of 96, 78, 76, and 79 indicating a response rate of 5.74, 4.66, 4.54 and 4.72 percent respectively. This implies that despite PRiSM methodology fosters effective project delivery, numerous factors affect its development in South-South Nigeria. This outcome conformed to earlier studies of Zoufa and Ochieng (2016).

Conclusion

It is widely recognized that construction projects and associated activities will persist in having a considerable effect on the global built environment. Therefore, this article explores the present condition of sustainability practices within the construction sector. An extensive study utilizing quantitative research methods was carried out to evaluate the importance of incorporating sustainability into construction projects in Nigeria, based on a survey of skilled construction experts. PRiSM aims to enhance the sustainability of the project management process. Any organization aiming to introduce a new set of measures or enhance their current scorecard should think about using the Performance Prism in the measures selection process.

The research advised, among other things, that the government needs to encourage sustainable building by offering incentives, implementing regulations, establishing

guidelines, and promoting collaboration among stakeholders to share knowledge and best practices.

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