Lean Project Management and Project Performance among Selected Construction Companies in Lagos State, Nigeria

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ABSTRACT

Lean Project management are regarded as a set of principles that describe the best practices to plan, develop and control projects along the continuous process of implementation and successful completion. Despite the importance of lean Project Management, projects still faces challenges of wastage of resources as a result of late delivery of project. These challenges raise questions as to what extent lean project management enhance project performance among selected construction companies in Lagos State. Hence, this study was carried out specifically to evaluate the impact of lean project management on quality of project delivered by construction companies in Lagos State. A survey research method was adopted for the study while data were collected using structured questionnaires and validated using content validity. Cronbach's Alpha was used to determine the reliability at $\alpha = 0.81$. The study target population was 474 members of the project team of the selected building construction companies registered with the Federation of Construction Industry. Census sample size determination was used to determine the sample size of 474. Percentage distribution, mean rating and standard deviation techniques were used for the descriptive analysis, while simple linear regression analysis was used to test the formulated hypotheses. Out of the total number of 474 questionnaires distributed, 432 usable questionnaires were received yielding a response rate of 91.1%. The findings revealed that there was a significant relationship between lean project management and quality of project delivered ($R = 0.771$; $p < 0.05$) in construction companies in Lagos State. The result also shows that lean project management explain 59.4% of quality of project delivered by construction companies Lagos State. Conclusively, It could be deduced from the study that lean project management has a positive and significant effect on quality of project delivered.

Keywords: Project, Project management techniques, Lean project management, Quality of project delivered, construction industry.

INTRODUCTION

The construction industry plays a significant role in the development of every nation's economy through value creation, employment creation and its general contribution to Gross Domestic Product (GDP) (Shaqour, 2022). The construction process has been identified as being very complex, fragmented and unique (Wibowo & Ammar, 2025). It involves the inputs of different categories of professionals and non-professionals who specializing in different phases of work (Babalola, Ibem & Ezema, 2019). Time, money, and materials are wasted in Nigeria's construction industry due to ineffective project management procedures. Finding particular tactics and methods that can assist in reducing these difficulties is crucial.

Techniques for managing projects are thought as a collection of guidelines that outline the most effective ways to organize, create, and oversee projects as they move through the ongoing phases of implementation and successful conclusion. The needs of the project team are met by numerous project management strategies. Diverse project management methodologies employ distinct strategies to bolster project outcomes (Xuan, Moslehpour & Tien, 2018). Xuan et al. (2018) and Watt (2021) are two previous researchers who have discovered various project management strategies. Among the useful methods for managing projects are lean, agile, critical chain project management and waterfall.

Lean was created at Toyota by Taiichi, who called it lean manufacturing principles. Lean project management and lean philosophy were later developed (Singh & Kumar 2020). When compared to traditional construction management techniques, lean project management is a unique new method that will positively impact the construction sector (Shaqour 2022). It is well known that lean project management can guarantee that clients and end users obtain value for their project while at the same time reducing all forms of waste (Francis & Thomas, 2019).

It is also noted by Shaqour (2022) that Lean is an approach aiming to reduce waste and to improve production rate according to customer requirement. The first application to lean concepts was in manufacturing production by the Toyota production system (Singh & Kumar, 2020). It was establish in the study of Singh and Kumar (2020) that Lean is a systematic approach towards reducing the waste, continuously attempt to improve further and to maintain the production rate as per the requirement of customer. Lean concept is all about getting the right things to the right place at the right time, in the right quantity whilst minimizing waste and being open and responsive to change (Umar et al., 2022). The Lean concept is a philosophical tool of management that focuses on finding and eradicating wastes from the whole process of production value chain. It is not only applied on production organizations but also along the chain of supply and implementation (Nwaki & Eze, 2020). The main objective of lean manufacturing is waste minimization and value maximization (Nwaki & Eze, 2020). Many manufacturing organizations understand that the isolated application of lean techniques will not achieve sustainable development. The success of the lean system depends on how to provide energy and intelligence to it. The organization culture, structure and leadership styles influence the success of lean project management (Shaqour, 2022). Lean project management has significantly improved the performance of industry experts, particularly in design, building, and facility management. As a client, it improves project quality while saving time and money, fosters relationships with service providers, and adds value for end users who would otherwise not be involved in the entire process, Umar et al, (2022):

Singh and Kumar (2020) identified lean strategies which are; Waste minimization, Just-in-time approach, Value based approach, Continuous improvement, Quality Management System and Agility towards required change. Koskela et al, (2002) noted that value maximization and waste minimization are neglected in the traditional delivery of building projects, nevertheless, Lean technologies that have already been successful in manufacturing have been applied to the construction sector with comparable success. Lean project management theory focuses on managing and developing a culture of continuous improvement and enables employees to make wise choices. This was with a view to increase value, reduce waste, and strive for perfection through ongoing improvement. The direct application of the lean project management concept in a construction project will bring an effect of change towards the way work is conducted by an organization responsible in realizing the related construction activities

Many businesses, including those in the construction industry, have implemented lean principles. The application of this methodology has shown results in the United States, the United Kingdom, Singapore, Brazil, Chile, The Netherlands, South Africa, Turkey, and many other countries, including Nigeria (Sarhan 2018; Babalola et al, 2019; Singh and Kumar, 2020; Umar et al, 2022).

Despite the importance of lean project management, construction industry in Nigeria still faces challenges of late delivery of project, poor quality, cost overrun and waste of material. This study therefore, tends evaluating the impact of lean project management on quality of project delivered in construction companies in Lagos State. The idea of lean project management was brought to the construction industry with the explicit goal of raising the sector's productivity level by eliminating unnecessary activities that impede the progress of building projects. The Nigerian construction industry has several challenges, including waste and value loss, poor quality, poor health and safety, cost overruns, and delays in project execution. These difficulties could be as a result of tradditonal method of managing project or improper adoption of lean project management.

Most of the recent studies Wibowo and Ammar (2025), Yaro *et al.* (2024), Oyedemi and Udechukwu (2023), Shaqour (2022), Umar *et al.* (2022), Byrne *et al.* (2021), Hossain and Haq (2020), Nwaki and Eze, (2020), Singh and Kumar (2020), Ahmed, Hossain and Haq (2020) and Babalola *et al.* (2019) on Lean Project management methodologies focused largely on the awareness, level of adoption and importance of Lean

Project Management. Thus, the studies failed to critically assess the extent of impact of lean project management on project quality in construction industry.

Based on the identified gap above, this study tend to fill this gap by evaluating the impact of lean project management on project quality in construction industry.

METHODS

A survey research method was adopted for the study while data were collected using structured questionnaires and validated using content validity. Cronbach's Alpha was used to determine the reliability at $\alpha = 0.81$. The study target population was 474 members of the project team of the selected building construction companies registered with the Federation of Construction Industry (FOCI). According to the Federation of Construction Industry (FOCI, 2025), the registered construction companies in Lagos State are 79 in number. For the purpose of this study, 20 building construction firms were selected. Therefore, the total population of the respondents will be four hundred and seventy - four (474) members of a project team from the selected construction companies as at the time of carrying out this research. The project team consist of Project managers, Engineers, Quantity surveyor, Architect, Site supervisors and others. Census sample size determination was used to determine the sample size of 474. Percentage distribution, mean rating and standard deviation techniques were used for the descriptive analysis, while simple linear regression analysis was used to test the formulated hypotheses. Out of the total number of 474 questionnaires distributed, 432 usable questionnaires were received yielding a response rate of 91.1%. Simple random sampling technique was used to ensure that each respondent has an equal chance of being selected. For judgmental, it required the opinions of the project managers on the bases of their expertise. To test the validity of the research instrument, the questionnaire was reviewed by a group of experts in the field of the study. They were requested to identify the internal validity and to what extent it is suitable to be used as an instrument to realize the goals and aims of this research. The panel ensured that the items adequately represent concepts that cover all relevant issues under investigation. Orodho (2004) describes reliability as the degree to which empirical indicators are consistent in two or more trials in an attempt to measure the theoretical concept. The Cronbach Alpha was used to test the reliability of the research instrument. A construct composite reliability co-efficient (Cronbach alpha) of 0.83 was achieved. According to Seifer (2012) the acceptable reliability coefficient of 0.7 and above is accepted.

RESULTS

Descriptive Statistics of the study variable

Table 1. Table 4.3: Descriptive statistics of Lean Project Management

Description	**Level of Agreement**					**Average**	
Lean Project Management	**SD**	**D**	**I**	**A**	**SA**	**Mean**	**Std. Dev.**
There is use of visual tools to aid communication at construction site	3.0%	6.0%	10.0%	50.0%	31%	4.24	.863
Work methods are correlated with worker's skills and abilities	5.0%	2.0%	8.0%	42.0%	43.0%	4.04	.955
There is empowerment and involvement of workers in task planning and scheduling	4.0%	2.0%	4.0%	54.0%	36.0%	4.36	.854
Meetings are conducted on daily basis to increase communication between teamwork	0.0%	6.0%	6.0%	45.0%	43.0%	4.05	.811

There are standard procedures to maintain clean and organized working environment.	8.0%	5.0%	9.0%	48.0%	30.0%	4.21	.756
Grand Average						**4.18**	**0.848**

Source: Researcher's Field Survey (2025).

The table 1 presents a study that measures the adoption of lean project management in construction of project. The results show the level of adoption of lean project management by the construction companies. The first statement revealed that 81% of the respondent concurred to the statement that there is use of visual tools to aid communication at construction site. The implication of the result is that majority of the respondent use visual tools at construction site, with a mean score of 4.24 and a standard deviation of 0.826, indicating that most of the respondent agreed to the statement but there is some variation in level of adoption. The second statements show that 85% of the respondents agreed that work methods are correlated with worker's skills and abilities. This implied that work is being allocated to the worker based on their skills an ability with a mean of 4.04 and a standard deviation of 0.955. The result of the third statement shows that a good number i.e. 90% of the respondent agreed to the statement that there is empowerment and involvement of workers in task planning and scheduling with mean 4.36 of and standard deviation of .854 indicating that most of the respondent agreed to the statement but there is little variation in their response. From the fourth statement, 88% of the respondent agreed to the statement that meetings are conducted on daily basis to increase communication between teamwork with mean value of 4.05 and standard deviation of .811 signifying that most of the respondent agreed to the statement but there is slight variation in their opinion. The last statement from the table show that 78% of the respondent concur with the statement that there are standard procedures to maintain clean and organized working environment with the mean value of 4.21 and standard deviation of 0.756 indicating that large number of the respondent agree to the statement with little differences in their opinion.

Table 2: Descriptive Statistics of Quality of Project Delivered.

		Level of Agreement				Average	
Quality of Project Delivered	**SD**	**D**	**I**	**A**	**SA**	**Mean**	**Std. Deviation**
The quality of project delivered complies with design criteria	-		8.3%	52.8%	38.9%	4.31	.624
The project was completed at reasonable cost.	-	11.1%	5.6%	58.3%	25.1%	4.31	.577
The projects quality meets the requirement of the stakeholder.	-	8.3%	13.9%	41.7%	36.1%	4.06	.824
The functional requirement of the project is met	-	5.9%	5.9%	50%	38.2%	4.21	.808
The project is simple to maintain	2.8%	27.2%	-	50%	20.0%	4.42	.649
GRAND TOTAL						**4.26**	**0.72**

Source: Field Survey (2025)

The table 2 presents a survey that measures the quality of project delivered in construction of building project. The results show if projects are delivered as per quality requirement by the construction companies. The first statement revealed that 91.7% of the respondent agree to the statement that he quality of project delivered

complies with design criteria. The result has a mean score of 4.31 and a standard deviation of 0.624 indicating that most of the respondent agreed to the statement but there is some variation in their opinion. The second statements show that 83.4% of the respondents agreed that the project was completed at reasonable cost with a mean value of 4.31 and a standard deviation of 0.577 showing that most of the respondent agreed to the statement but there is variation in their opinion. The result of the third statement shows that a good number i.e. 77.8% of the respondent agreed to the statement that the projects quality meets the requirement of the stakeholder with mean score of 4.06 of and standard deviation of 0.824 indicating that most of the respondent agreed to the statement but there is little variation in their view. From the fourth statement, 88.2% of the respondent agreed to the statement that the functional requirement of the project is met with mean value of 4.21 and standard deviation of 0.808 signifying that most of the respondent agreed to the statement but there is slight variation in their opinion. The last statement from the table show that 70% of the respondent concur with the statement that the project is simple to maintain. The result has a mean value of 4.42 and standard deviation of 0.649 indicating that large number of the respondent agree to the statement with little differences in their opinion.

Test of Relevant Hypothesis

Ho1: there is no significant effect of Lean Project Management on the quality of projects delivered in construction companies in Lagos State, Nigeria.

Table 4.9a: The model summary of the effect of Lean Project Management (LPM) on the quality of projects delivered in construction companies in Lagos State, Nigeria.

Table 4.9b: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	43.940	1	43.940	156.671	.000[b]
	Residual	30.009	430	.280		
	Total	73.949	431			

a. Dependent Variable: QPD

b. Predictors: (Constant), LPM

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.771[a]	.594	.590	.52959

a. Predictors: (Constant), LPM

Table 4.9c: Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.438	.126		11.386	.000
	Lean project management	.532	.043	.771	12.517	.000

a. Dependent Variable: QPD.

The model summary table 4.9a shows a strong positive relationship between Lean project management and quality of project delivered in construction companies in Lagos State. (R = 0.771). The model further indicates the extent to which lean project management explains the change in quality of project delivered by construction companies in Lagos State. The coefficient of determination (R^2 = 0.594) shows that lean project management explains 59.4% change in quality of project delivered by construction companies in Lagos State. The implication of the result is that lean project managent has significant impact on quality of project deliverd in construction industry in Lagos State i.e there is improvement in quality standard of project delivered by the construction industry. The remaining 40.6% is explained by other factors not capture in the study. It could be depicted from table that the result is statistically significant because the p-value of the model outcome (0.00) is less than the 0.05 level of significance used for the study. Therefore, the research hypothesis that there is no significant effect of Lean Project Management on the quality of projects delivered by construction companies in Lagos State was rejected. This implies that lean project management has significant impacts on quality of projects delivered by construction companies in Lagos State, Nigeria.

Table 4.9b shows that p = 0.000 which is less than 0.05. This implies that the lean project management regression model predicts quality of project delivered by construction companies in Lagos State, Nigeria. Thus, we reject the null hypothesis Ho; there is no significant effect of lean project management on the quality of projects delivered by construction companies in Lagos State. Thus, lean project management has significant impacts on quality of projects delivered by construction companies in Lagos State, Nigeria.

The following regression model was fitted from table 4.9c

$$y_1 = \beta_0 + \beta_1 x_1 + \varepsilon_{i1}$$

$$QPD = 1.438 + 0.532LPM + \varepsilon_{i1}$$

Where y_1 = Quality of Project Delivered, β_0 = constant, x_1 = Lean project management

β_1 is the coefficient of the independent variable and ε_{i1} = error term

Table 4.9c shows that the unstandardized coefficient (B) for lean project management (LPM) is 0.532, indicating that lean project management contribute 0.532 to an increase in quality of project delivered by the construction companies in Lagos State. The p-value of 0.00 indicate that the result is statistically significant. Consequently, the null hypothesis was rejected, indicating that lean project management do have a significant effect on quality of project delivered by the construction companies in Lagos State ($\beta 1 = 0.532$, $t = 12.517$, $p > 0.05$).

DISCUSSION

The study examined the effect of lean project managent on quality of project deloivered by the construction companies in Lagos State, Nigeria. The study hypothesis tested if lean project management does not have a significant effect on the quality of project delivered by the construction companies in Lagos State. The study found that that lean project management has 0.594 (59.4%) significant effect on quality of project delivered by building construction companies in Lagos State with other factors explaining the remaining 40.6%. The implication is that the construction companies believes that by adopting lean project management, the project will meet up with the quality standard thereby achieving client satisfaction. This shows that the construction companies use visual tools at the construction sites, they also involve both the junior and senior staff in project planning, allocating task to workers based on their skills and ability. Also, by conducting meeting on regular basis. The above finding is supported theoretically by the flow theory of project management. The theory was propounded by Koskela and Howell (2002). The theory sees the project realization process as a conversion (transformation) process that passes through a flow (waste elimination and efficiency improvement) and value matching to customer requirements (customer requirements integration). The principle behind the theory is in correlation with the objectives of lean project management.

This finding was is in line with the findings of Wibowo and Ammar (2025), Wu et al. (2021), Abdelkhalek et al. (2019) and Sighn and Kumar (2021) that lean project management focused on adding value to a project and eliminating waste thereby improve the quality of the product.

CONCLUSION AND RECOMENDATION

The study concluded that the adoption of lean project management principles by the construction companies in Lagos State has improved the quality standard of the project delivered by the construction companies. As a result, the study recommended that the management of the construction industry should improve in the adoption of lean project management principles of the use visual management at construction site, last planner system, conference management, to enhance quality of project in the industry. Also, the management of the construction companies should educate their staff more on the importance of lean project management in achieving quality project.

Suggestion for Further Study

Further research is needed to examine the impact of lean project management tools on project safety system, quality and Project environment.

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