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Continuous Improvement and Project Performance of Construction Firms in South-South, Nigeria

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Abstract: *The study examines continuous improvement and project performance of construction firms in South-South, Nigeria. The population comprises 695 managers and supervisors of the construction firms. Sample size of 248 was established using Krejcie and Morgan's (1970) table. The Simple random sampling approach, was applied and Bowley's (1964) formula was utilised in the assignment of copies of questionnaire to each firm. The primary data for this study were collected through the use of a structured questionnaire. The bivariate analysis was analysed using Structural Equation Modelling (SEM) with the aid of Smart PLS 3.3.3. The findings reveal a significant relationship between continuous improvement and project performance. The study conclude that continuous improvement relates with project performance of construction firms in South, South Nigeria. The study recommends enhancing continuous improvement for a viable and successful project performance.*

Keywords: *Continuous improvement, Project Performance, Project Timeliness, Project Quality, Project Efficiency.*

1.0 Introduction

Construction projects are considered a success when it is finished on schedule, on budget, and meet performance goals. The ability to manage time, make decisions, and be productive are all closely connected to project performance. According to Chan and Tam (2000), a number of additional critical elements, such as health and safety, environmental performance, user expectation/satisfaction, client satisfaction and commercial value are utilized to evaluate project performance. The construction firms is a major sector that act as a vehicle through which countries improve their economies and social wellbeing (Anil & Danielraj 2016). It is one of the most important industries that contributes to economic development and civilization; as a result, its significance cannot be overstressed (Meshksar 2012).

Effective leadership and commitment from senior management instills confidence in all stakeholders about the organization's gradual improvement. The relationship between continuous improvement and project performance of construction firms in South-South Nigeria has not been empirically studied, despite the fact that scholars have made numerous attempts to improve project performance (Ali, 2011; Githae & Stephen, 2014; Issa & Akhigbe, 2022). The purpose of this study is to fill in this noted gap.

Statement of the Problem

The problems synonymous with construction firms in Nigeria have been noticed to lie within the conference of poor project performance which are traceable to low project

quality and poor project timeliness. Owing to the fact that majority of the firms in Nigeria lack sophisticated and up-to-date computerized systems to meet the changing demands of project construction clients, poor project performance tends to be the order of the day (Issa & Akhigbe, 2022). The importance of project quality has not been given enough consideration and is frequently taken for granted. As a result, a lot of time and money are lost every year due to ineffective quality management systems. The lack of an efficient quality planning process prior to implementation is the main cause of this discrepancy between expectations for quality improvement and the benefits being realised (Juran & Godfrey, 2000). According to Oyedele (2016), delay in project payment processes is a key issue confronting many construction companies which has negatively affected their project performance. Maintaining high quality and ensuring continuous may help address the issue of project performance. Hence, this study examined the relationship between continuous improvement and project performance of construction firms in South-South Nigeria

Aim and Objectives of the Study

The aim of the study is to examine the relationship between continuous improvement and project performance of construction firms in South-South, Nigeria. The specific objectives are to examine the relationship between;

i. continuous improvement and project timeliness.

ii. continuous improvement and project quality.

iii. continuous improvement and project efficiency.

Research Hypotheses

The following hypotheses served as tentative answer to the research questions.

The following null hypotheses serve as a tentative answer to the research questions;

Ho_1: There is no significant relationship between continuous improvement and project timeliness in construction firms in South-South, Nigeria.

Ho_2: There is no significant relationship between Continuous improvement and project quality of construction firms in South-South, Nigeria.

Ho_3: There is no significant relationship between Continuous improvement and project efficiency of construction firms in South-South, Nigeria.

2.0 Review of Related Literature

This work take its precept from complexity theory**.** Complexity theory emphasizes on the system of the organization. How the organization function. It also partly explains how organized systems emerge out of chaotic situations. Corporations are not viewed merely as complicated, static organizations, but as a complex set of self-organizing components made up of employees, business units, resources, and stakeholders. The value of complexity theory to organizational research is its ability to account for the development of new structures within an organization (such as the consumer-to consumer market on

eBay) and the development of new business models (Sammut-Bonnici & McGee, 2002). On the one hand there has been a massive development of what Morin (2008) called 'restricted complexity' which understands the complex as the emergent product of interactions among simpler 'agents' and relies to a considerable degree on simulation. Furthermore, it explains the behavior of traders in the stock market who decide the value of a flotation and determine future share value as it relate to quality management system and project performance.

Project Performance

Project performance, in its simplified form, is setting a criterion or a standard for measuring project deliverables. Project performance was initially evaluated using the limited, generally recognised metrics of time, scope, and expense over a considerable amount of time. Over the years, this has now been expanded to include other criteria such as meeting strategic objectives and financial objectives of the enterprises and generally enveloped in stakeholder satisfaction. Pinto and Slevin (1988) searched for a broader framework for project performance. Postulating that project performance was a result of both intrinsic (project) and extrinsic (proponents) factors. Intrinsic (project) factors being time, cost, and performance all of which the project manager has substantial control over. extrinsic(proponents) factors being utility, gratification, and efficacy of the project outcome; regrettably, these factors cannot be assessed before the completion of the project; one can only guarantee them during project execution, up to a certain point, by way of comprehending client needs and transforming them into specifications of the project deliverables.

The discourse on project performance, will gravitate around critical success factors (CSFs) of projects. In this case Critical success factors can be described as those key factors absolutely necessary to realizing the project goals (Rockart, 1982). Notably, despite the chance for occasional review, essential elements for success include largely static (Nuland, Broux, Grets, De Cleyn, Legrand, Majoor, & Vleminckx, 1999). Rad and Anantatmula (2010) proposed three areas of project performance in which they picked project meeting cost, duration targets, and achieving strategic and financial objectives of the enterprise. Project performance is evolving over the project life. There is therefore some uncertainty on this subject therefore. Jugdev and Thomas (2002) opine that managing expectations is what projects are all about; the perceptions of success, suggesting that project performance is beyond the issue of bearing a common mission and the ability to excel in the project.

Shenhar, Levy, and Dvir's (1997) argued about advancing new ways of examining project success revolving around time. There are short terms issues such as the design goals, impact to customer dimensions and the like yet benefit to the organization is a long term issue and so is getting ready for the next level of complexity. Baker, Fisher, and Murphy (1988) separately, found out that the level of customer success was telling of a projects success. According to Papke Shields, Beise, and Quan (2010) the complexity and costs of projects had dramatically peaked in the 10 years before their study. Quoting a survey by KPMG (KPMG, 2005) done among six hundred organizations across twenty-two countries in which project outcomes fell short of planned expectations, according to 86% of the respondents". In an even more recent survey, the Standish Group International

appear to intimate that the project success percentage had dropped to 32 in the year 2009 from 34n in 2004 In bringing it all together, project management seeks to effectively and efficiently utilize resources for delivery of project meeting time, scope, and cost expectations. In this study, we consider the definitions of project success and selected four success criteria to include: time, cost, scope, and stakeholder satisfaction.

Project Timeliness

The complexity of today's building projects increases the potential for scheduling errors to result in cascading delays and other problems. Most crucially, inaccurate timeline estimates may also cause planners to underestimate the amount of time necessary to accomplish a project or to prioritize tasks less wisely. As a result, a transportation program's overall performance depends on a precise project timetable. The initial scope of work also makes it possible to prepare a preliminary project timeline. It is very important to accurately define all activities that have been identified as necessary to deliver the project, and to sequence these activities in their necessary logical order so as to avoid unexpected delays. As is the case with the preliminary cost estimate, the preliminary timeline that is prepared during early planning stages will include a lot of uncertainty, and therefore a significant amount of scheduling contingency should be incorporated into the timeline. The timeline's contingencies will be replaced by more precise analyses as project development proceeds.

The process of scheduling entails developing a timetable of project activities. The goal is to fit the final work plan of the project to a specific time-scale, which lays out the duration and order of each item to be carried out. A well-thought-out schedule breaks down a project into its detailed activities, categorizes them into different phases, and determines when to begin work on each activity. A well-crafted, accurate schedule can aid in the lengthy process of bringing a project from idea to completion. After a transportation project need and relevant funding sources are identified, the project enters into a planning process, which includes preliminary design, environmental study, right-of-way acquisition, and utilities analysis. Then, the project continues into detailed design and ultimately into construction, operations, and maintenance. Even without any delays, the completion of this process can take many years. A well-made schedule not only serves to keep the project on a stable course throughout this duration, but also allows planners to get a better understanding of the duration and the requirements of the project before making funding decisions.

Project Quality

Project quality management includes methods, procedures, and strategies to guarantee and enhance quality. However, project quality management techniques have not gotten as much attention, and when they do, statistical process control is the main focus. Planning and control make up a substantial portion of management. Therefore, one would anticipate that project quality management would cover these two topics as well. Planning and quality control are both considered to be parts of quality assurance (QA), which is sometimes viewed as a holistic programme (PMI, 2004). However, the perspective

adopted in this study is to describe quality planning, quality assurance, and quality control in terms of the Shewhart cycle, also known as the Plan-Do-Check-Act cycle (Deming, 1986). QC is referred to as the "Check-Act" elements, whereas QA is the "Do" element. Thus, there are three components that make up project quality management: quality planning, quality assurance (carrying out the plan), and quality control (QC). QC is the procedure used to make sure that quality assurance follows the plan. If quality assurance (QA) is the "healthy lifestyle" to prevent nonconformities, then quality control (QC) is the "medication" to treat defects and other nonconformities when the healthy lifestyle is insufficient to do so.

Project Efficiency

Efficiency has been described as a gauge of the calibre and volume of team performance results by Randeree and Ninan (2011). However, when employees collaborate to accomplish shared objectives, they are achieving "team effectiveness" (Jiang et al., 1997 cited in Randeree and Ninan, 2011). Both of these terms—"efficiency" in the latter case and "efficacy" in the same article—heavily overlap the latter phrase. The efficiency of organisations and projects in solving problems was found to be related by Cavaleri et al. (2012). According to Cavalieri et al. (2012), project teams can attain optimal levels of project performance by balancing the two important functions through effective management of a project problem-solving pattern. Individual self-worth, job efficiency, and personal impact were measured using the three words by Emil Berg and Terje Karlsen (2014).

Ika et al. (2010) addressed project efficiency and effectiveness and related it to project success, but there was no explicit interpretation of the terms “efficiency” and “effectiveness”. Alam et al. (2010) talked about how a professional development programme for project managers in Britain affected individual workers' productivity. In regards to the operational efficacy of project managers, Emil Berg and Terje Karlsen (2014) conducted a similar study. Efficiency is a gauge of the calibre and volume of team performance results, according to Randeree and Ninan (2011). Conversely, the concept of "team effectiveness" was employed, and it was explained as occurring when employees collaborate to accomplish shared objectives (Jiang et al., 1997 referenced in Randeree and Ninan, 2011). This latter term significantly overlaps with the earlier utilised term "efficiency"; similarly, the concept "efficacy" falls within the same article. According to Cavaleri et al. (2012), problem-solving effectiveness is correlated with project and organisational effectiveness. Furthermore, project teams can attain the highest possible levels of project effectiveness by balancing the two important functions through effective management of a project resolving issues pattern (Cavaleri et al., 2012). The three phrases were adopted by Emil Berg and Terje Karlsen (2014) to represent self-worth, workplace productivity, and personal productivity on an individual basis.

Empirical Review

Tiong, Norhayati, Muhamad, Mohd and Choy (2014), examine the existing and new performance indicators to measure the effectiveness of quality management system (QMS) maintenance and practices in construction industry. This research is carried out with a questionnaire based on QMS variables which are extracted from literature review

and project performance indicators which are established from project management's theory. Data collected was analyzed using correlation and regression analysis. The results show that time variance and customer fulfilment have a positive and substantial association with QMS whereas other project performance indicators do not show significant results. The efficiency of the QMS in other sampling areas can be investigated in subsequent research using the same project performance metrics to enhance the generalize ability of the findings.

A study by Adeoye, Adeleke, Adebayo and Odedeji (2017), examines performance evaluation on project delivery by academic staff of selected tertiary institutions in Ogun State. Descriptive and inferential statistics were employed in the data analysis after 110 respondents were chosen through the use of multistage sampling techniques. Results showed that 91.8% of respondents were between the ages of 30 and 55, and 73.6% of respondents were male with majority (97.3) had Msc and Ph.D qualifications. Proper co-ordination and effective management ranked first with the mean value of ($\bar{x}$ = 2.49) among factors that encourage project delivery. Result revealed that promotion procedures in the selected institutions are fair with the mean value of ($\bar{x}$ = 3.49) among the procedural justice. Also, result on interactional justice revealed that academic staff suggestions are constantly ignored by the management with mean score of ($\bar{x}$ =3.90). Chi-square and correlation analyses show that there were significant relationships ($p < 0.05$) between marital status ($\chi 2 = 4.365$), department ($\chi 2 = 21.103$), age ($r = 0.240$), household size ($r = 0.249$) and the workers perception on procedural and interactional justice. It is therefore recommended that proper motivation should be giving in other to enhance adequate support from the academic staff.

Tunde and Onuoha (2023) examined the relationship between Project Management Practices and Project Performance of construction firm in Rivers state, Nigeria. The cross-sectional survey design was utilized and a total population of 280 supervisors and managers from eight (10) construction firms in Rivers State were covered. A sample size of 162 managers and supervisors were drawn as the sample size of the study. Data were collected using copies of well structured questionnaire and the simple random sampling technique was utilized in the study. The data was analyzed using the Spearman's Rank Order Correlation and Partial Correlation. The result of the analysis revealed that the dimensions of Project Management Practices (project cost management and project risk management) have a significant positive relationship with project quality and project timeliness.

3.0 Methodology

Sixty-five managers and supervisors from construction companies make up the population. Using the sample size determination method proposed by Krejcie and Morgan (1970), the sample size for this investigation was determined. 248 respondents made up the overall sample size, according to the table. Therefore, 248 managers of construction companies in South-South Nigeria make up the sample size for this study. The questionnaires were sent to each firm using a simple random sample technique using Bowley's (1964) algorithm. The structured questionnaire was utilised to gather the main data for this investigation. With the help of Smart PLS 3.3.3, structural equation modelling

(SEM) was used to evaluate the bivariate data that is intended to investigate the relationship between the quality management system and project performance.

4.0 Result and Discussion

In order to test the bivariate hypotheses via the SEM, the bootstrap method was applied. Path coefficients (β values) of .10 to 0.29, .30 to .49 and .50 to 1.0 are weak, moderate and strong correlations, respectively. Also, for a two tailed test, t values greater than 1.96 are significant, while t values less than 1.96 are non-significant (Hair et al., 2014). Furthermore, hypotheses with p-values less than 0.05 level of significance were accepted, while those above 0.05 were rejected. The coefficients of determination (R2 or predictive accuracy) were identified. R2 values for endogenous variable are assessed as: 0.00 to 0.25 (weak), 0.26 to 0.50 (moderate), ≥ 0.75 (substantial). The effect size (f2) of each path in the model by means of Cohen's (Cohen, 1988).

Continuous improvement and Measures of Project performance

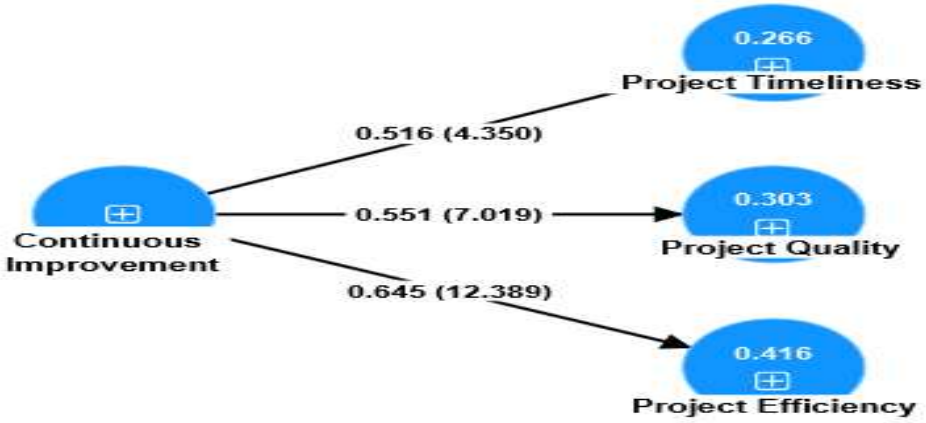

Figure 1: Continuous improvement and Measures of Project performance
Source: SmartPLS 4.0 output on Research Data, 2023

Figure 1 shows the result of the Path relationship between Continuous improvement and Project timeliness. This shows a β = 0.516. An increase in Continuous improvement will lead to a corresponding increase in Project timeliness and reduced Continuous improvement will bring about a decrease in Project timeliness. This implies that there is strong positive relationship between Continuous improvement and Project timeliness. This answers the fourth research question which seeks to find out the relationship between Continuous improvement and Project timeliness. The analysis shows a significant level of 0.000 which is less than 0.05. This implies that there is a significant relationship between Continuous improvement and Project timeliness. Considering this, the study therefore rejects the null hypothesis and accept the alternate hypothesis that that *there is a significant relationship between Continuous improvement and Project timeliness of construction firms in South-South, Nigeria.*

Figure 1 shows the result of the Path relationship between Continuous improvement and Project quality. This shows a β = 0.551. An increase in Continuous improvement will lead

to a corresponding increase in Project quality and reduced Continuous improvement will bring about a decrease in Project quality. This implies that there is strong positive relationship between Continuous improvement and Project quality. This answers the fifth research question which sought to find out the relationship that exists between Continuous improvement and Project quality. The analysis shows a significant level of 0.000 which is less than 0.05. This implies that there is a significant relationship between Continuous improvement and Project quality. The study therefore rejects the null hypothesis and accept the alternate hypothesis that that *there is a significant relationship between Continuous improvement and Project quality of construction firms in South-South, Nigeria*.

Figure 1 shows the result of the Path relationship between Continuous improvement and Project efficiency. This shows a β = 0.645. An increase in Continuous improvement will lead to a corresponding increase in Project efficiency and reduced Continuous improvement will bring about a decrease in Project efficiency. This implies that there is strong positive relationship between Continuous improvement and Project efficiency. This answers the sixth research question, "What is the relationship between Continuous improvement and Project efficiency?" The analysis shows a significant level of 0.000 which is less than 0.05. This implies that there is a significant relationship between Continuous improvement and Project efficiency. The study therefore observes that there is a positive and significant association between Continuous improvement and Project efficiency. The study therefore rejects the null hypothesis and accept the alternate hypothesis that that *there is a significant relationship between Continuous improvement and Project efficiency of construction firms in South-South, Nigeria*.

Discussion of Findings

Continuous improvement and Project timeliness

The outcome of the analysis on how Continuous improvement relates with Project timeliness revealed that there is a noteworthy relationship between Continuous improvement and Project timeliness, given the p-value of 0.000 which is less than the level of significance of 0.05 (p=0.000< 0.05). The hypothesis which was given in null form was thus rejected and the alternate hypothesis was accepted. The path coefficient (β) was 0.516. This indicates a positive relationship between Continuous improvement and Project timeliness in the construction firms in south-south, Nigeria. The positive relationship implies that the Project timeliness increases when there is Continuous improvement in place. Furthermore, the coefficient of determination (R^2) was 0.266. This denotes that a unit change in Continuous improvement in the construction firms will account for up to 26.6% total variation in Project timeliness. Hence, Continuous improvement improves Project timeliness. This finding concurred with that of Jørgensen et al. (2003) who asserted that the essence of continuous improvement is to be when all members of the organization contribute to improve performance by continuously implementing small changes in their work processes.

Continuous improvement and Project quality

Based on the bivariate analysis on the connection between Continuous improvement and Project quality, it was observed that Continuous improvement relates significantly with Project quality with P-value of 0.000 which was less than 0.05 level of significant (p-value

= 0.000< 0.05). Thus, the null hypothesis was rejected owing that Continuous improvement relates with Project quality significantly. However, the outcome revealed a positive correlation between Continuous improvement and Project quality (β =0.551). This indicates that when Continuous improvement of construction firms increase, the Project quality increases. The path coefficient of 0.551 shows that Continuous improvement to a high extent influences Project quality. The coefficient of determination (R^2) of 0.303 shows that a unit change in the Continuous improvement will account for up to 30.3% variation in Project quality. Thus, Continuous improvement in the construction firms is very vital in achieving Project quality. This finding agrees with that of Neyestani (2016) who noted that quality management system (QMS) offers general guidelines and standards for setting up a suitable quality management procedure, with the goal of reducing costs, raising client fulfilment, profitability, and market share within the organisation.

Continuous improvement and Project efficiency

The bivariate analysis on the association between Continuous improvement and Project efficiency shows that Continuous improvement relates significantly with Project efficiency with P-value of 0.000 which was less than 0.05 level of significant (p-value = 0.000 < 0.05). Thus, the null hypothesis was rejected owing that Continuous improvement relates with Project efficiency significantly. However, the outcome revealed a moderate positive correlation between Continuous improvement and Project efficiency (β =0.645). This indicates that when Continuous improvement of construction firms increase, the Project efficiency increases. The path coefficient of 0.645 shows that Continuous improvement to a high extent influences Project efficiency. The coefficient of determination (R^2) of 0.416 shows that a unit change in the Continuous improvement will account for up to 41.6% variation in Project efficiency. Thus, Continuous improvement in the construction firms is important in achieving Project efficiency. This finding agrees with the study of Mohamed and Mohd (2023) who discovered a significant positive relationship between the competitive performance of a firm and the quality management techniques under investigation.

5.0 Conclusion and Recommendations

The present research investigates the correlation between the project performance of construction firms operating in South-South, Nigeria, and continuous improvement. The commitment and proactive role of senior executives in cultivating a culture of quality and accountability is critical to the success of building projects. After doing a thorough analysis of project timeliness, quality, and efficiency, it is apparent that successful project outcomes are contingent upon competent leadership at the top levels of the organisation. A crucial success criterion is the timely completion of projects. Time management-focused leadership creates a sense of urgency and unites all project stakeholders in their pursuit of meeting deadlines. Second, a major factor in determining the success of a construction project is project quality. In addition to satisfying customer expectations, quality-focused leadership helps the construction company's reputation over the long run. Finally, project efficiency is a metric that is relevant to the financial sustainability of construction companies. It includes aspects like resource utilisation and cost-effectiveness. Achieving financial goals and preserving a competitive advantage depend heavily on effective leadership. In a dynamic and demanding business, the dedication to excellence exhibited by leaders not only increases the chances of project success but

also supports the general expansion and sustainability of construction companies. It is thus recommended that;

1. The construction firms should embrace lean construction principles to streamline processes, reduce waste, and enhance project flow. Adopting practices such as Just-In-Time (JIT) delivery, Last Planner System (LPS), and Value Stream Mapping can significantly improve project timeliness by minimizing delays and optimizing resource utilization.
2. The construction firms should implement advanced project management and monitoring tools that provide real-time insights into project progress.
3. The construction firms should develop and implement a comprehensive quality management system (QMS) that aligns with international standards.
4. The construction firms should invest in ongoing training programs for construction teams to enhance their skills and knowledge.

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