Analysis of the Barriers of Construction Project Planning and Scheduling for Effective Project Delivery in Southeast, Nigeria[1]

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Abstract

The study analyzed the identified barriers of construction project planning and scheduling for effective project delivery in Nigeria. The objectives are to: determine which of the identified barriers of project planning and scheduling that have significant effect on construction project delivery; determine the extent to which the identified barriers of project planning and scheduling can significantly affect construction project delivery collectively. Survey design was used and data were collected using questionnaire and analyzed using descriptive statistics and multiple regression analysis. The result indicates that lack of management support, resource constraints, technology implementation challenges, communication breakdowns and, unforeseen external factors are significant barriers while regulatory and permitting delays is not a significant barrier. Hence, the study advocates periodic training and retraining of staff, design of effective communication channel for constant and adequate communication of project objectives and responsibilities, adoption of appropriate planning and scheduling technology, strict compliance and adherence to legal and professional ethics, and proper weather, economic and financial forecasting to predict and consider future behavior of unforeseen external factors during planning and scheduling of construction projects.

Keywords: barriers, construction projects, project planning and scheduling, project delivery, Southeast Nigeria.

1.0 Introduction

Project planning and scheduling play a key role in controlling project performance and they form core elements of management. These two integral parts of management are often used interchangeably rather than two distinct stages in determining the duration of a project and the feasibility of achieving the milestones involved in bringing the project to reality. Shash and Ahcom (2006) identified the precondition of successful project scheduling as the identification of all the activities involved in achieving project objectives, arrangement of these activities in their order, allocation of resources and durations to those activities. These two concepts are crucial in achieving project objectives, they must be carefully analyzed to avert potential risks that may

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hinder the quality of project planning and scheduling and ultimately affect project performance as a whole. without compromising quality and to enhance the reputation of a firm in term of quality delivery. Effective communication between construction plan, project objectives and management of changes during implementation also depend on project scheduling.

When there is a lack of understanding, applying project management concepts results in incomplete project plans and scheduling, as well as poor project performance (Ahern, Leavy, & Byrne, 2014). A lack of information about how to apply theories in practice like failure to identify and mitigate potential risks in environmental, geopolitical can lead to unanticipated challenges during project execution is a primary cause of poor project planning (Ahern et al., 2014). Project planning and scheduling should be rethought as a critical component or creative activity in deciding the ultimate success of a project, rather than as a preparatory function used to produce project timetables and resource plans. The planning outcomes should be properly integrated and presented to project stakeholders, who are the key players in a construction project, i.e. owners or clients (Public and Private), project managers, designers (or consultants) and contractors.

The importance and impact of project planning and scheduling on a project cannot be overstated, as poor scope definition in the early planning stages, environmental and geopolitical factors, such as regulatory changes, political instability, and community opposition leads to schedule slippage and cost overruns in mega projects. Such situations resulted from inappropriate initiation and preplanning, leading to poor definition of the project scope and scheduling: ‘’the requirement to make major changes in the objectives, scope, precise location, or any other major elements after the start of the detailed definition phase can make Project unmanageable” (Merrow, 2011)

At the preplanning stage, project stakeholders should be confident that they are making the most effective decisions about the defining of project scope as the foundation for more thorough planning. In summary, project managers and other stakeholders should understand how to bridge the gap between planning and scheduling theories and practices. This necessitates more thorough project planning and scheduling considering all barriers which could result from environmental, economic fluctuations and geopolitical space of the project location which could be accomplished through a competent team where learning is encouraged at both the organizational and project levels.

It is no news that construction projects in Nigeria are infamous owing to the perception of costs exceeding budget and project schedules stretching beyond contract period. This public perception is not entirely unfounded considering the increasingly large number of construction projects that exceed their contract periods and contract prices. The dearth of comprehensive Nigeria-centric studies on project performance in construction projects is a major reason for this research. The huge theoretical and empirical literature available globally on this subject suggests that Nigeria is not immune to the global scourge of time and cost overrun. Instructively, the different literature and studies have shown that the factors responsible for time and cost overrun and their remedies differ from one country to another. This points to the need for local and home-grown experiences and underscores the justification of this study. This study will, among other things analyze the barriers of construction project planning and scheduling for effective project delivery. It will also serve as fundamentals to practice and the strategies that could help mitigate them to deliver successful projects.

In most rural regions such as the Southeast region, the majority of construction projects undertaken by the government and organizations are categorized as failed projects (Hanachor, 2023). As Babu and Suresh (2016) put it, a project is a short-term endeavor with the goal of producing a one-of-a-kind output. Note (2015), on the other hand, defines a project as a collection of distinct and connected activities having a specified aim that must be met within a specific time frame, within a specific budget, and according to specific standards. There is no single definition of project failure, and there appear to be disagreements in what constitutes an acceptable definition. According to Nzekwe et al. (2015), regardless of a project's completion time and cost, it can still be judged a failure if it fails to meet its intended goal. Additionally, Belout and Gauvrean, (2004) suggest that the main indicators of project failure are cost overruns, schedule overruns, and poor quality. Other causes include poor planning, changes in project design and scope, inflation, contractor competency, and insufficient cost estimation (Nzekwe et al., 2015).

The causes of project failure vary in both developed and developing countries, and studies have shown that governments and organizations have lost substantial sums of money because of unsuccessful initiatives (Damoah, 2015). These variables that contribute to project failure have resulted in dwindling progress in national development (Nweze, 2016). To combat this ugly threat, numerous authors have advocated for increased research on the causes and consequences of project failure, particularly in developing nations (Damoah, 2015). Of course, project failure has resulted in significant sums of money being lost all over the Southeast region of Nigeria. Project failure rates in developing nations have been found to be higher than in developed countries (Damoah, 2015), necessitating the need to undertake additional development projects. However, these projects face several barriers, including ineffective planning (Akande et al., 2018), cost volatility (Alabi et al., 2018), as well as difficult stakeholders (Usman, 2020). Currently, the rate of project failure in the Southeast region of Nigeria is disturbing and these failed projects have significant financial consequences (Akande et al., 2018), impeding the rate of development.

Despite the evidence identified in various research that linked inefficient planning and scheduling to negative project outcomes, there is a need to analyze the common causes that militate against successful planning and scheduling in theory and practice peculiar to Southeast region of Nigeria. However, Adebayo (2000) was able to identify problems associated with construction planning and scheduling with the focus on some aspects such as planning techniques, planning technology and planning manpower. This approach has not provided the necessary solution to the problem of construction planning and scheduling in theory and practice in Nigeria. This is because, the problem of project failure still persists. The study of Adebayo (2000) select few construction companies, compared the project planning and scheduling techniques they adopt in planning and scheduling, this only provide result relating to only planning and scheduling technique in the selected organizations. But planning is influenced not only by technique but also other aspects of planning such as technology and other external factors. Hence, the need to undertake research to study more variables categorized as barriers relating to construction planning and scheduling should be to be considered. Other studies, such as Fabian and Amir (2011) studied cost planning relating to construction project, Heagney (2021) studied how planning techniques affects construction project planning, while Liang et al, (2010) studied the impact of software applications in construction project planning. Each of the research was able to identify at least an existing problem relating to construction planning but was not able to provide the necessary understanding of the problems collectively, their causes and how to improve planning taking into consideration

key variables used in planning of construction projects. Nigerian indigenous construction companies were known to be associated with inefficient planning which result into low productivity and growing rate of delay (Alabi et al., 2018). They were also found to be wrongly adopting methods and procedures of planning which was shown to reduce the profitability of the companies and cause frequent cases of contract abandonment (Usman, 2020). Most research in construction were able to identify some inefficiency in planning and scheduling but failed to provide holistic analyses to understanding the barriers of construction project planning and scheduling for effective project delivery.

It is against this background that this study was set to examine the barriers of project planning and scheduling for effective delivery of construction projects.

Hence, the main objective of this study is to analyze the barriers of construction planning and scheduling for effective project delivery in the Southeast region of Nigeria. The specific objectives are: to determine which of the identified barriers of project planning and scheduling that have significant effect on construction project delivery; and to determine the extent to which the identified barriers of project planning and scheduling can significantly affect construction project delivery collectively.

In the attempt to achieve the above objectives, two hypotheses were postulated.

H_{01}. The identified barriers of project planning and scheduling do not have specific significant effect on construction project delivery.

H_{02}. The identified barriers of project planning and scheduling do not have significant collective effect on construction project delivery.

In conclusion, this study holds significance for various stakeholders within the construction industry, including project managers, policymakers, investors, and researchers. By providing a comprehensive analysis of barriers, this research aims to inform decision-making processes, improve industry practices, and contribute to the body of knowledge in construction project management.

2.0 Conceptual Review

Project planning and scheduling are essential for successful project delivery. According to the Heagney (2021), the most important responsibility of a construction manager is project scheduling. Project planning and scheduling is regarded as the construction industry's "heartbeat" since it is the primary tool that can be modified to maximize profit performance.

Project managers can maximize their chances of success by planning, scheduling, coordinating, and executing the project using applicable management tools considering variety of aspects that could influence the performance of project scheduling which may include communication system, safety, organizational structure, quality assurance, and management expertise.

Therefore, identifying and analyzing the barriers of construction project planning and scheduling is crucial for ensuring effective project delivery.

Possible barriers to effective construction project planning and scheduling.

The following are the possible barriers to proper project planning and scheduling as identified by various renowned authors in the area of study;

a. Inadequate Planning

While it is unlikely that project managers/planners have knowledge of all activities and resources needed to effect successful project planning, scheduling, and operations, it is imperative that they understand much about the project goals before project launch. Such planning items as project definition and scope are critical. Usman (2020) identified causes of project failure as; poor definition of project at the beginning, lack of clearly defined project goals and objectives, inadequate data for project planning. Heagney (2021), identified lack of regular project planning meetings, failure to set realistic goals for team members early, lack of constructability, failure to define requirements properly, poor design review, and short time spent in planning the project infrastructure. Each of these contains some aspect of project planning as a concern.

Project planning can be improved by involving key players up-front. Project team members, along with representatives from upper-level management, finance, purchasing, vendors and contractors, clients, and others should all be part of the project planning process (Babu & Suresh, 2016). Many pitfalls can be avoided through the advice and insight shared by planning team members. For example, a vendor might be aware of an impending steel shortage for a bridge building project, which may bring the project to a halt for several months. In a project to remodel a hospital wing, an electrical engineer might be able to point out that some present wiring may have to be reconfigured for new computer hardware, and this information can be input before walls have been built and sealed.

b. Lack of support and involvement of top management

Upper-level management should make it clear within the company culture that the project is worthwhile and that they support it. Their role in the project is to select a project manager who will be most effective in leading the project and will provide the resources necessary to complete it. On the other hand, over-involvement by upper-level management undermines the project manager's authority and the respect of team members, subcontractors, customers, and others (Babu & Suresh, 2018). However, the role of upper-level management in a project is not to be the project manager, but to be a sponsor and facilitator of the project.

Other survey suggests that sometimes projects fail because of the owner meddling in the project manager's affairs, removal of team members from the project for long periods of time to complete other company tasks, poorly defined project scopes, and insufficient time allocation (Fabian & Amir, 2011).

c. Limited financial resources

Liang et al., (2010), reiterated that inadequate financial resources can lead to compromises in planning and scheduling. Appropriate funding levels should always be determined at the planning

stage of the project. Failure to provide adequate funding resources will make it difficult to meet project objectives and satisfy the customer (internal or external).

d. Cost containment

Failure to contain costs can also cause project failure. Funding projections for a proposed project might be adequate, but if project costs escalate beyond initial estimations, the project can still be derailed. Failure to contain costs often occurs because of changes made in the scope of the project after it is under way. According to Liang et al., (2010), to maximize cost containment, the project team and project manager need to show discipline and to focus on the original project plan as much as possible. During inflationary periods, it is imperative that the project stay on schedule so that the costs of materials, supplies, and labour do not increase beyond the project budget. The inclusion of company purchasing agents in project planning and scheduling can be helpful in developing realistic goals (Alabi et al. (2018).

e. Skilled labor, equipment, and facility shortages

A project may be doomed to failure if inadequate non-funding resources are allocated to the project. Human resources as well as equipment and facilities are usually determined at the project planning phase. Insufficient or ill-fitting equipment or inadequate facilities can sidetrack a project, causing a drain on the time and energy of the project team. Insufficient human resources will usually slow a project down or place an inordinate burden on project team members, resulting eventually in burnout, mistakes, poor morale, or any combination thereof (Alabi et al., 2018). A case also be argued that an over-assignment of human resources to a project can slow the project down. According to Usman, (2020), to mitigate the barrier and minimize the risk at the planning and scheduling stage, all the stakeholders of the project should be included in the planning process, thereby maximizing the input from the various vested interests, and broadening the understanding of the project manager and team members.

f. Technology Implementation Challenges

The unique characteristics of project activities in the construction industry, the large amount of diverse data, and the complex communication structure require the adoption of technology to manage and integrate the construction process efficiently across the planning, procurement, construction, controlling, and commissioning phases of projects (Heagney, 2021). However, professionals in the Nigerian construction industry poorly coordinate these complex tasks resulting in delays due to rework and low rate of project completion (Akande et al., 2018). Although new technologies are available to improve project performance, scholars have identified that project managers in the Nigerian construction sector avoid their adoption (Akande et al., 2018). Whereas the adoption and utilization of cutting-edge technology have advanced among project managers in developed countries, project managers in the Nigerian construction industry are still generally about five years behind in the adoption spectrum of new technology (Okpo et al., 2023). Project management practices deal with the use of proven traditional practices that are widely applied as well as innovative practices that are emerging in the project management profession (Heagney, 2021). Project managers in the Nigerian construction industry are yet to fully adopt and embrace innovative technology such as BIM (Nweze, 2016), virtual team (Nzekwe et al., 2015), project management platform (Heagney, 2021). Project performance is measured and evaluated relative to the set success criterion for cost, time, and quality (Akande et al., 2018).

However, the task of monitoring and evaluating project performance using an automated approach has not been given serious attention. It appears to be sidelined among project managers in the Nigerian construction industry (Alabi et al., 2018) leading to delay in the issuance of project reports and ineffective reporting (Usman, 2020).

g. Insecurity

In the data on the kidnapping incidence released by Damoah (2015) subtitled "Global Kidnapping hot-spots", Nigeria is seen as the 5th among the countries that have experienced high kidnapping incident in that year. Another risk consultancy firm, Control Risks, reported recently too that 74 percent of kidnappings recorded in Africa in 2012 occurred in Nigeria, (Heagney, 2021). According to Nzekwe et al., (2015), Nigeria in the recent years is among the top ten countries with high kidnapping incidence globally. Both the foreign and local businessmen in Nigeria have experienced the cruel treatments of kidnappers in the country. Some foreigners who wanted to invest in the country after hearing the story of kidnappers in the country decided to quit instead of having their money hijacked by the hungry kidnappers in the country (Uzochukwu 2022). Those that manage to invest in the country or carry out construction activities decided to hike their price to pay for huge security. Hence, this invariably affects the planning, scheduling, and the cost of construction cost in Nigeria and most especially the Southeast states or region.

According to Uzochukwu (2022), the impact of a "seat at home" in the South-East Nigeria on construction projects are significant and include project delays, labour shortages, supply chain disruptions,

To mitigate these impacts, project managers should maintain open communication with stakeholders, closely monitor the situation, and adapt project plans as needed. Additionally, developing contingency plans and understanding the local context and dynamics are essential for navigating challenges associated with socio-political disruptions like a "seat at home" in South-East Nigeria. It is important to note that specific details and circumstances may vary, and staying updated on the current situation is crucial for accurate assessments.

Addressing barriers is essential for effective construction project planning and scheduling. Utilizing advanced technologies, fostering effective communication, investing in workforce development, and proactively managing risks are critical steps in ensuring successful project delivery. Identifying and mitigating barriers early in the planning phase is key to minimizing disruptions and optimizing project outcomes.

Considering the existing theories, contingency theory was found to be more applicable to project planning and scheduling.

Contingency Theory

This theory was first proposed by Fred Fielder in early 1960s via the contingency theory of effectiveness. Contingency theory is based on the assumption that the result or output of any situation relies on the demands of the situation at any point in time (Shivairo & Were, 2011). No project can be studied comprehensively without considering its context (Hanisch & Wald, 2012). Although contingency concept can be applied in the planning and scheduling of projects, it has some shortfalls as listed by Hanisch and Wald (2012). The shortfalls are related to the weak and incoherent definitions of contingency factors, identification and analysis of a large number of

influencing factors and deficiencies in completeness of topics under contingency theories (Sang, 2010). This study adopted the concept of contingency theory based on its assumption that the outcome of any situation depends on the existing circumstances at that time. However, the concept of contingency theory was applied with caution due to its failure to deal with a large number of factors influencing a particular outcome. This argument corroborates with the position of Howell et al. (2010) who argued that contingency theory is narrowly used in project management.

However, this study is based on contingency theory where projects are considered unique and their planning and scheduling is influenced by different variables depending on the country's contextual situation. Considering the fact that projects are temporary undertaken embarked upon for a particular objective, and that the construction projects are being undertaken in many countries, the planning and scheduling of these numerous construction projects is assumed to be determined by specific situations in different countries. Therefore, Contingency theory was identified to be more relevant to this study. Also, construction project planning and scheduling are confronted with different challenges based on the environment in which they are implemented (Heupers, 2011). It must be noted that some projects are successful while others are not, the issue is to find out the influential factors that affect or determine effective planning and scheduling of projects for successful delivery.

3.0 Empirical Review

Numerous authors have identified various barriers to effective planning and scheduling of construction projects. Among them are: Inadequate Planning and lack of management support (Nzekwe, et al. 2015; Ahern, et al. 2014; Damoah, 2015), Resource Constraints -Financial, Skilled Labour, Equipment & facility (Akande, et al, 2018; Alabi, et al. 2018; Hanachor, 2023; Okpo, et al. (2023), Technology Implementation Challenges (Alabi, et al. 2018), Communication Breakdowns (Rajkumar, 2010; Belout, & Gauvreau, 2004), Unforeseen External Factors (Risks) (Uzochukwu, 2022; Hanachor, 2023; Nweze, 2016; Nzekwe, et al., 2015), and Regulatory and Permitting Delays (Uzochukwu, 2022; Akande, et al. 2018; Hanachor, 2023; Belout, & Gauvreau, 2004; Damoah, 2015).

In the context of analyzing the barriers of construction project planning and scheduling for effective project delivery in Nigeria, potential research gaps identified is that existing literature lack a thorough study of how project planning and schedule barriers affect the global best practices in construction project in Nigeria. Hence, the need to addresses the unique barriers within the Nigerian construction industry.

4.0 Methodology

This study adopted a descriptive survey research design to address the major barriers of planning and scheduling towards achieving construction project success. This is because, it enabled the researcher to obtain first hand data which assisted in designing the questionnaire used to solicit for information from the selected respondents. Hence, the data collected were analyzed quantitatively using multivariate techniques (factor and multiple regression analyses). Therefore, the research technique includes the following process;

a.) Statement of the research problem,

b.) Establishing the research objectives,

c.) Collection of the relevant data for analysis,

d.) Analysis of the collected data using appropriate technique,

e.) Discussing the findings and making conclusions.

Nevertheless, the population of the study is three hundred (300) respondents comprising of the personnel that are directly involved in the planning and scheduling of construction projects. They include the 60 Architects, 60 Civil Engineers, 60 Contractors, 60 Clients and 60 Construction technologists. The respondents from the construction firms are made up of different members of staff of different categories as well other personnel at their different construction sites in Nigeria. this population size was retrieved from the existing databases of the various professional bodies (Nigeria Society of Engineers, Nigeria Institute of Architects, etc.) in the Southeast region of Nigeria on the registered practicing professionals. The choice of this class of construction personnel was made on the basis that the firms from which they are selected are well established and the personnel are directly engaged in the planning and scheduling of the construction projects executed by the construction firms.

To ascertain the sample size for the study, Taro Yamani sample size was applied.

Sample size (n) = $\frac{N}{(1+Ne2)}$ where: N = population size, e = level of significance (0.05), n = sample size.

n = $\frac{300}{(1+300*(0.05*0.05)}$ = 171

The study sampled one hundred and seventy-one (171) respondents for questionnaire administration. This was done using purposive sampling method, since only the personnel that plan and schedule construction projects were targeted.

The researcher conducted the pilot study for this study in Owerri Municipal Council Area of Imo State. The drafted questionnaire was administered on twenty-five (25) respondents from the target population (5 Architects, 5 Civil Engineers, 5 Contractors, 5 Clients and 5 Technologists). The data collected from them were analyzed and used to test for the validity and reliability of the research instruments (questionnaire).

This study was content validated by three experts from the Departments of Project Management Technology from Federal University of Technology, Owerri. Two other experts from the construction industry were also part of the instrument validation. Their responses, comments and preliminary analysis were used to modify and fine tune the instrument.

This research study used a test-retest technique to ascertain the reliability or otherwise of the research instrument. Using this technique, the same test is administered to twenty-five (25) respondents drawn from the respondent group in Imo State, who have participated in the planning and scheduling of construction projects. After three weeks, the same questionnaire was administered to the same group of respondents and the scores obtained in the two different occasions were correlated in order to ensure that there was no substantial deviation in the construct

being measured on the two events. Using Kendall's test of concordance, a value of 0.897 was obtained which indicated that the research instrument is reliable.

The data collected were analyzed and modeled using multiple regression analysis model. The result of the multiple regression analysis was used to develop a predictive model that was used to draw conclusions and make recommendations. The F – test and t – test was applied in testing the significance of the hypotheses.

Variables that represent the Barriers of Project Planning and Scheduling

B_1 = Lack of management support
B_2 = Resource Constraints (Financial, Skilled Labour, Equipment & facility)
B_3 = Technology Implementation Challenges
B_4 = Communication Breakdowns
B_5 = Unforeseen External Factors
B_6 = Regulatory and Permitting Delays
Y = Construction Project Delivery

5.0 Results and Discussion

One hundred and seventy-one (171) copies of questionnaire were distributed to the respondents, and one hundred and sixty-three (163) were retrieved and certified to be properly completed. Hence, 163 represents 95.3% of the study population, implying a good response rate.

Multiple Regression Analysis of the Barriers of Project Planning and Scheduling

Table 1 shows the generated result of the multiple regression analysis which was used in creating a model for predicting the behavior of identified barriers of project planning and scheduling regarding construction project delivery and testing hypothesis one.

Table 1 The Coefficients of Multiple Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	48.451	4.018		12.060	.000
	B1	-.546	.095	-.439	-7.485	.000
	B2	-.750	.077	-.553	-9.952	.000
	B3	-.484	.083	-.328	-4.005	.016
	B4	-.524	.080	-.384	-7.027	.007
	B5	-.317	.100	-.238	-3.171	.022
	B6	-.123	.085	-.116	-1.456	.147

a. Dependent Variable: Y

From Table 1, the following model was generated for predicting the identified barriers;

$Y = 48.451 - 0.546B_1 - 0.750B_2 - 0.484B_3 - 0.524B_4 - 0.317B_5 – 0.123B_6$…… (1)

The model (eq. 2) indicates that all the identified project planning and scheduling barriers (B_1 = Lack of management support, B_2 = Resource Constraints, B_3 = Technology Implementation Challenges, B_4 = Communication Breakdowns, B_5 = Unforeseen External Factors and, B_6 = Regulatory and Permitting Delays) have negative influence on construction project delivery. The implication of negative influence is that for 1unit increase in the behavior of the barriers of project planning and scheduling will decrease the construction project delivery by the coefficient possessed by the barrier.

Hypothesis Testing of the Identified Barriers

The t-test results shown in Table 1 were used in this hypotheses testing.

H_{01}. The identified barriers of project planning and scheduling do not have specific significant effect on construction project delivery.

Considering the values of the t-test results in Table 1, at 5% level of significance, five of the six identified project planning and scheduling barriers (lack of management support, resource constraints, technology implementation challenges, communication breakdowns, and, unforeseen external factors) have negative significant effects on construction project delivery, while regulatory and permitting delays is not a significant barrier. Therefore, the study accepts the null hypothesis and conclude that all the identified barriers of project planning and scheduling do not have specific significant effect on construction project delivery.

Table 2 Analysis of Variance (ANOVA) of Multiple Regression

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	853.487	6	142.248	7.341	.000[b]
	Residual	3023.040	156	19.378		
	Total	3876.528	162			

a. Dependent Variable: Y
b. Predictors: (Constant), B6, B3, B2, B4, B1, B5

The F-test score in the ANOVA result in Table 4.6 was used to test hypothesis four.

H_{02}. The identified barriers of project planning and scheduling do not have significant collective effect on construction project delivery.

The F-test score of 7.341 is significant at 0.000, indicating that at 5% asymptotic level, lack of management support, resource constraints, technology implementation challenges, communication breakdowns, unforeseen external factors and, regulatory and permitting delays collectively affect construction project delivery. Hence, we reject the null hypothesis with a conclusion that the identified barriers of project planning and scheduling have significant collective effect on construction project delivery.

Priority Ranking of the Barriers of Project Planning and Scheduling

The ranking was done using the standardized coefficients of the barriers.

Table 3 Priority Ranking

S/No	Barriers of Project Planning and Scheduling	Unstandardised B Coefficients	Ranks
1	B_1 = Lack of management support	-.546	2nd
2	B_2 = Resource Constraints	-.750	1st
3	B_3 = Technology Implementation Challenges	-.484	4th
4	B_4 = Communication Breakdowns	-.524	3rd
5	B_5 = Unforeseen External Factors	-.317	5th
6	B_6 = Regulatory and Permitting Delays	-.123	6th

Based on the ranking, resource constrained (skilled workforce, finance, etc.) is the most critical project planning and scheduling barrier. The second most critical barrier is lack of management support. While, regulatory and permitting delays is the least project planning and scheduling barrier.

Result Discussion

From the study findings, the following deductions can be made;

Lack of management support, resource constraints, technology implementation challenges, communication breakdowns, and, unforeseen external factors have negative significant effects on construction project delivery, while regulatory and permitting delays is not a significant barrier. This is also a surprise owing to the fact that bureaucratic hitches experienced at the hands of the regulatory bodies who approve the design, planning and scheduling of projects should significantly affect construction project delivery.

Top management support have been viewed by scholars like Akande et al., (2018) and, Usman (2020) as being critical to construction project planning and scheduling. Top management support is significant because they appropriate the resources needed for effective planning and scheduling of projects. However, due to internal politics within some construction firm's resources require to develop proper planning and scheduling of projects are delayed resulting to improper planning and scheduling and failure of construction projects. The need for top management support has been seriously advocated in many quarters as a panacea for successful project delivery, especially, construction projects.

Resource constraints in the form of skilled personnel, adequate finance, equipment, etc are critical to effective planning and scheduling for successful delivery of construction projects (Hanachor, 2023). Unfortunately, lack of adequate resources have greatly affected project planning and scheduling objectives in many instances. Okpo, et al, (2023) have also warned that these resources, if not adequately provided suffocates the objectives of project planning and scheduling and by extension successful delivery of projects. So, it has become very imperative for management to endeavor to avail the necessary resources needed for proper project planning and scheduling so as to enhance construction project delivery.

Challenges faced by technology implementation is critical to planning and scheduling of projects. Heagney. (2021), shared this view in their article. Poor adoption and use of available modern

techniques for adequate planning and scheduling of construction projects, is a major challenge confronting construction project delivery.

Communication breakdown negatively affect project planning and scheduling as also viewed by Rajkumar, (2010). Akande et al., (2018) have expressed fear on the level of lock-downs and language barriers are the major hindrances to planning and scheduling of projects and construction delivery, especially in the Southeast region of Nigeria. There is an urgent need for the adoption of a common language and clear specification of channels of communication in the process of construction project management.

Lastly, unforeseen external factors like weather condition, economic and social condition is a significant barrier to planning and scheduling of construction projects for successful delivery. This finding was corroborated by Uzochukwu (2022), Nweze (2016) and, Nzekwe et al., (2015) in their various articles. These external factors are serious barriers to proper project planning and scheduling which affect successful delivery of construction projects. Accurate forecasting is needed for minimizing the effect of unforeseen external factors and improve planning and scheduling of projects for enhanced construction project delivery.

There is a collective significant effect of lack of management support, resource constraints, technology implementation challenges, communication breakdowns, unforeseen external factors and, regulatory and permitting delays on construction project delivery (see Table 2).

In general, the study discovered that low level of skilled workforce, poor communication management and low level of technology adoption are the major barriers of project planning and scheduling of construction projects in the Southeastern Nigeria.

6.0 Conclusion

a.) Periodic training and retraining of staff saddled with planning and scheduling projects is needed by construction firms and agencies involved. This will improve their skills by exposing them to the best practices and techniques for effective planning and scheduling of construction projects for successful delivery. The Government should provide enabling environment for skilled professional to practice and minimize the mass exit of skilled professionals to foreign countries.

b.) Construction firms and contractors must ensure constant and adequate communication of project objectives and responsibilities using common language. Communication experts should be engaged to design effective communication channel among construction personnel. This will improve communication and minimize breakdowns which affect planning and scheduling construction projects.

c.) Modern project planning and scheduling tools and techniques like MS project management, Primavera project planner, etc. are available for adoption and use. However, these tools are underutilized due to poor technology adoption. Therefore, the study advocate adequate adoption of appropriate technology needed for effective planning and scheduling projects. With this, project personnel will be exposed to the effectiveness of these modern tools and techniques that assist in project proper planning and scheduling for successful construction project delivery.

d.) Strict compliance and adherence to the stipulated legal and professional ethics is crucial to project planning and scheduling. This will ensure professionalism in the planning and scheduling projects and improve successful construction project delivery.

e.) Weather, economic and financial forecasting experts should be employed by construction firms to determine from time to time, the future behavior of these unforeseen external factors that inhibit planning and scheduling projects and affect effective construction project delivery. This will ensure that some of these unforeseen external factors are taking into consideration during planning and scheduling of construction projects.

7.0 Contributions to Knowledge

a.) The study was able to develop models for predicting the behavior barriers of project planning and scheduling for successful construction project delivery in the South east region of Nigeria, given the variables highlighted in this study.

b.) Above all the study empirically confirmed a view that has been widely held by many project professionals, research experts and organizations though not previously empirically verified by any research, that regulatory and permitting delays are not critical barriers to project planning and scheduling in the Southeastern region of Nigeria.

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