Risk Management Practices in Nigeria Construction Sector and Impact on Project Performance

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Abstract

The construction industry in every nation is essential to the growth of the economy and its development. The industry is characterized by complex projects, unpredictable variables, and is dependent on many different stakeholders, which subject projects in this sector to a variety of risks that can have a significant impact on project delivery. Risks in construction projects in Nigeria can lead to cost overruns, schedules not being met, and low quality of the project. The concept of risk management involves the management of identified risks which reduces the likelihood of their occurrence and the consequences of adverse risks. A project may be delivered or deemed successful, but not meet the project performance objectives. The Nigerian construction industry has undergone incredible growth and progress; however, there have been numerous challenges that have prevented project performance, such as a lack of expertise, knowledge gaps, and a drought of experienced personnel. The study examines the various risk management practices and their impact on construction project performance. Project performance implies that the project objectives are met in terms of cost, schedule, and quality. A survey research method was adopted using a questionnaire as the primary instrument for data collection on a five-point Likert scale. The questionnaire was designed to collect data relating to risk management's impact on project performance. The questionnaires were also designed to collect data on risk identification as a risk management practice and its impact on project performance. A total of 85 questionnaires were administered and analyzed. The results from the study indicate a strong relationship between risk management practices and project performance.

Keywords: Risk Management, Project Performance, Risk Identification, Risk Assessment, mitigation strategies, and Construction Sector.

1.0 Introduction

The construction industry in every nation is essential to the growth of the economy and its development (Okolie et al., 2020). The industry is characterized by complex projects, unpredictable variables, and is dependent on many different stakeholders, which subject projects in this sector to a variety of risks that can have a significant impact on project delivery (Luo et al., 2017). In Nigeria, the significance of effective risk management practices in the construction industry is more crucial than ever, considering the nation's rapidly urbanizing and expanding infrastructure (Muhammed et al., 2015).

Risk can be defined as an unanticipated occurrence or situation that could have an impact on the project's goals beneficially or detrimentally (George, 2020). Risks are also unknowns that might or might not happen, but if they do occur and there is no strategy to deal with them, they can complicate work on the project and jeopardize the success of the project (George, 2020). Recognizing risk in a construction assessing their implications and finding solutions and remediations to these identified risks is a core concept of risk management (Bayraktar, 2020).

In project management, the incorporation of a robust risk management strategy is vital for successful project delivery (Petrovic, 2017). Risk management encompasses a series of actions aimed at increasing the likelihood and positive outcomes of beneficial risks while simultaneously reducing the likelihood and impact of adverse risks. (PMI, 2018). Additionally, the successful completion of a project is closely tied to the effectiveness of project risk management. Unaddressed risks have the potential to deviate projects from their initial objectives (PMI, 2018). In this context, one of the most important fields of expertise is risk management. Risk management is a methodical approach that makes it possible to comprehend and effectively manage both specific risk incidents and total risk (APM, 2019). It would be difficult for the management team to maximize the project's outcome without the use of efficient risk management (APM, 2019).

Due to their high complexity and susceptibility to numerous risks, construction projects have a substantial impact on project performance (Assaad et al., 2020). Factors such as capacity strategy, risk management, and logistical difficulties plague the construction sector (Akinosho et al., 2020). Furthermore, these factors frequently lead to design flaws, completion backlogs, excessive costs, and disagreements over contract terms (Akinosho et al., 2020). In all these, the construction sector is poised for significant transformation. The research by Akinosho et al (2020) supports the fact that there are substantial deviations in large asset-class projects where costs can soar up to 80% above the initial budget and time requirements can extend by 20% beyond the planned schedule. Only a few companies complete the projects they undertake (Akinosho et al., 2020). Despite the prevalent issue of projects exceeding cost and schedule expectations, merely 28% of companies employ project performance techniques to improve their performance (PMI, 2017).

Measuring the performance and success of a project are distinct factors, as a project can be deemed successful without meeting its performance parameters (Venczel et al., 2021). In this context, Unegbu et al. (2022) found in their research that project performance measures such as cost, time, and quality are standards that determine construction project outcomes. The concept of the iron triangle is one of the most widely utilized standards for judging the successful outcome of a project in terms of the project performance measures of cost, time, and quality (Unegbu et al., 2022). Another method of assessing the performance measures of a construction project can also be carried out in terms of the unit costs of materials, the speed at which the project is delivered, time and cost increases, as well as other quality metrics (Konchar and Sanvido, 1999).

The goal of this paper is to study the impact of risk management practices on project performance in the Nigerian construction industry, with a focus on risk identification as one of the risk management practices. This study aims to advance knowledge of how effective risk management might influence project results by carefully examining the state of risk management approaches, their adoption, and their impact. The paper aims to identify patterns, trends, and best practices that may be used to strengthen risk management methods by examining quantitative data.

2.0 Methodology

The research methodology, according to Sileyew (2019), describes the process the research must follow to establish an objective and present all findings derived from the data gathered throughout the research period. Lewis (2015), in his research, also supported the description, as he stated that it is an approach that defines the steps and techniques used to analyze and gather information on a particular research topic, as well as how the results are reported in detail. This section is divided into 4 sections to cover the research design, sampling strategy, target population, data collection and analysis, and ethical considerations. Serpell et al. (2015) stated that one of the biggest challenges currently facing the construction industry centers around how construction companies and stakeholders manage risk and the strategies these companies adopt to ensure continuous improvement in risk management, as this affects the performance metrics of meeting budgets, schedules, and quality (Alsulamy et al., 2012; Serpell et al., 2015). The research emphasizes the need to understand the specific relationship between risk identification as a risk management practice and construction project performance in the Nigerian construction sector, as discussed in the literature review.

2.1 Research Design

This research will utilize a quantitative research design with structured questionnaires as the primary instrument for data collection. This method was selected as the opinions of the respondents regarding several variable categories are required by the study to establish the variables' relevance and arrangement (Unegbu et al., 2022). Quantitative information on important project performance metrics, such as cost overruns, schedule delays, and quality alterations, will also be gathered through the survey (Alsulamy et al., 2012).

The purpose of the surveys is to collect quantitative information on risk management practices, with a particular focus on risk identification and mitigation strategies, as well as how these practices are being applied in the Nigerian construction industry (Ugwu et al., 2019). Structured questionnaires were designed for this survey as they are intended to get targeted and precise details regarding the research problem (Aithal and Aithal, 2020). A Likert scale survey was employed in this research to evaluate the dependent variable of project performance and the independent variable of risk identification as a risk management practice

(Al-Shibly et al., 2013). A four-page questionnaire was developed for the research, which is divided into two sections. Section A conveys the respondent's personal information, role, and experience in the construction industry. Section B focuses on the impact of risk identification on project performance, planned budgets, project scheduled time, and quality of project delivery. Using this methodology, the study seeks to offer a comprehensive and nuanced understanding of the condition of risk management techniques, with a focus on risk identification and how they affect project performance in the construction industry in Nigeria.

Descriptive research was used in this research (Ajayi et al., 2022). Regression and correlation analysis are two statistical techniques that will be used to examine the quantitative data gathered to find patterns and links between various risk management strategies and project performance results (Ajayi et al, 2022). With the use of the quantitative approach in this study, a comprehensive and multifaceted understanding of risk management practices and their effects on project performance in Nigeria's construction sector would be possible.

2.2 *Sampling Strategy*

Sampling involves the process of selecting a group of people from a group of people or organizations to approximate the traits of the entire group (Singh and Masku, et al. 2014). This research study will involve the use of random and purposeful sampling methods. Purposeful sampling methods involve picking and choosing any number of people who are particularly proficient with the subject matter (Palinkas et al., 2015). A random sampling technique will also be employed to choose a representative sample of construction projects from various areas for the quantitative phase. Calculations of statistical power will be used to establish the sample size to guarantee the validity and reliability of the study results. The target population for this survey would be selected from construction companies operating in the cities of Abuja (FCT) and Lagos in Nigeria. Abuja was selected due to the concentration of construction companies grouped into multinationals, locals, and small-scale companies, as well as the ongoing construction works being carried out to boost urban influx into the city (Kadiri et al., 2014). Abuja is also the seat of power for the Federal Government of Nigeria, where major decisions on the development of the country are taken (Elaigwu, 2006). Lagos, the former capital of Nigeria, was selected for this research due to the heavy investments by both

government and private entities in building and urban renewal projects (Hamukoma et al., 2019). The population would consist of construction professionals in these companies, including managing directors, construction managers, project managers, and construction experts, with the concentration being mostly those with at least 5 years of experience in the construction industry (Ajayi et al., 2022). Referencing Kululanga and Kuocha (2010), a total of 84 questionnaires would be administered. More so, the companies will consist of multinational as well as local construction companies (Kadiri et al., 2014).

2.3 Data Collection and Analysis

The process of gathering data will be meticulously organized and carried out to guarantee the accuracy and legitimacy of the information. Standardized survey procedures will be used for the quantitative phase, and the data gathered will be arranged in a manner that allows for concise evaluation. Considering the intricacy of the construction sector and the unique obstacles encountered in Nigeria, a comprehensive plan for data collection and analysis is required to achieve incisive and thorough outcomes. Primary data collection methods will be utilized in this study. Primary data collection methods include the use of structured questionnaires (Nayak and Narayan, 2019). The data collection will be conducted using the Joint Information Systems Committee (JISC) online surveys (JISC, 2023). Survey questions will be uploaded using the JISC online survey platform and distributed via a link generated on the platform to the identified respondents. In addition to the collection of responses, the data will be exported and analyzed using standard analysis methods.

2.4 Ethical Considerations

Ethical considerations will be crucial in this research to safeguard the privacy of the participants and confidentiality (Thompson et al., 2021). Abrar and Sidik (2019) stated that researchers must take ethical considerations into account to limit harm, uphold respondents' privacy, and advance compassion. The risks involved in this research for the participants will be their exposure and privacy in terms of their responses to the survey. Every participant will be asked for their informed consent before any data is shared, and their personal information

will be kept anonymous. The questionnaires will contain relevant information about the research being carried out, including the objectives, dissertation purpose, and confidentiality of their responses. To maintain the study's ethical integrity and legitimacy, it will conform to the standards and guidelines established by the University of Northampton. Data collection in this research shall be carried out using Joint Information Systems Committee (JISC) online surveys. JISC provides a safe platform for data collection and storage as they are ISO 27001 certified for data security and comply with the EU General Data Protection Regulation (GDPR) (JISC, 2023).

3.0 Results and Discussion

3.1 Response Rate

This section focuses on the participant response rate and demographic features of the participants based on the survey questionnaires for this research. The response rate in this research study indicates that out of the potential participants approached, 85 responded to the survey on assessing the impact of risk management practices on project performance in the Nigerian construction industry. Table 1 illustrates the distribution of participants based on their roles in the construction industry and their years of experience.

Table 1. Distribution of Participants

Role	**Frequency Count**	**Percentage (%)**
Project Manger	32	39.0
Contractor	18	21.0
Construction Engineer	11	13.0
Supervisor	20	24.0
Planning Engineer	4	5.0
Total	**85**	**100.0**
Experience		
Less than 5 years	18	21.0
5-10 years	35	41.0
10-15 years	29	34.0
20-25 years	3	4
Above 25 years	0	0.0
Total	**85**	**100.0**

3.1.1 Distribution of participants based on roles

From the data collected from the survey as illustrated in Table 1, 32 participants (39.0%) are project managers, 18 participants (21.0%) are contractors, 11 participants (13.0%) are construction engineers, 20 participants (24.0%) are supervisors, and 4 participants (5.0%) are planning engineers. These percentages demonstrate the varying representation of roles within the respondent pool. For instance, project managers comprise the largest segment, followed by supervisors, while planning engineers have the smallest representation. The demographic information also includes the participants' years of experience within the industry, although this information is not explicitly provided in the table. To further buttress the response rate, this distribution may have implications for the study findings and interpretations. For instance, the higher representation of project managers might mean that the perspectives or experiences shared in the survey could be more skewed towards managerial insights, potentially influencing the perceived impact of risk management practices on project performance. Similarly, the smaller representation of planning engineers might limit the depth of insights from this particular role. However, the lower response rate from planning engineers signifies a limitation. Nevertheless, it remains crucial to comprehend how diverse roles and experiences within the construction industry could potentially influence perceptions and outcomes concerning risk management practices and project performance in Nigeria. This limitation does not diminish the significance of exploring the impact of these variables on the industry.

3.1.2 Distribution of participants based on years of experience

Similarly in Table 1, the distribution of participants in the survey based on their years of experience in the construction industry shows that 18 participants (21.0%) had less than 5 years of experience, 35 participants (41.0%) had 5 to 10 years of experience, 29 participants (34.0%) had 10 to 15 years of experience, 3 participants (4.0%) had 20 to 25 years of experience., and finally none had more than 25 years of experience. This breakdown showcases the varying levels of experience among the respondents. Most participants possess between 5 and 10 years of experience, constituting the largest segment, followed by those with 10 to 15 years of experience. However, there is a notably smaller representation of individuals with 20 to 25 years of experience, and no respondents reported having more than 25 years of experience in the construction industry. This distribution illuminates the composition of the participant

pool concerning their tenure in the construction field, which is essential when considering how different experience levels might influence their perspectives on risk management practices and project performance in the Nigerian construction sector.

3.2 Risk Identification and Analysis of the Current Risk Management Practices in the Nigerian Construction Sector.

Figure 2 illustrates the awareness levels of employees regarding risks and risk management practices across different hierarchical tiers within the organization.

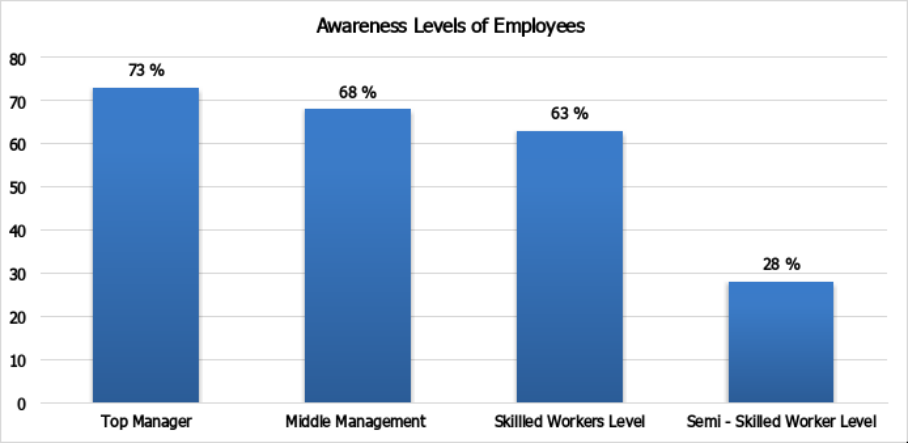

Figure 2: Awareness Levels of Employees Regarding Risks and Risk Management Practices

Figure 2 shows a 73% awareness rating for top management, 69% for middle management, 63% for skilled workers level, and 28% for semi-skilled workers' level. This depiction showcases varying levels of awareness among different employee categories within the organizational structure. Top and middle management exhibit higher awareness levels compared to skilled and semi-skilled workers. Such disparities in awareness across hierarchical levels could significantly impact the implementation and effectiveness of risk management practices within the organization.

3.2.1 Assessment of risk identification as a feasible risk management practice for planning stages in construction projects

Table 2 analyzes risk identification as a feasible risk management practice for planning stages in construction projects based on the survey conducted.

Role	Mean	SD	RII	Df	F	Sig.
Project Manager	4.03	1.402	0.806			
Contractor	4.11	1.278	0.822			
Construction Engineer	4.09	1.578	0.818	(5, 80)	0.650	0.663
Supervisor	4.05	1.433	0.810			
Planning Engineer	4.75	0.500	0.950			
	4.07	1.370	0.814			

Table 2. Risk Identification as a Feasible Risk Management Practice for Planning Stages of Construction Projects

Table 2 discloses the mean ratings given by different stakeholders (roles) regarding the feasibility of risk identification as a risk management practice during the planning stages of construction projects. The planning engineer had the highest mean score of 4.75, suggesting that planning engineers rated risk identification as highly feasible compared to other roles in the construction project. Similarly, contractor, construction engineer, project manager, and supervisor mean scores range from 4.03 to 4.11, indicating a moderately high perception of feasibility for risk identification as a risk management practice during the planning stages. The standard deviation of the planning engineer shows a remarkably low SD of 0.500, signifying high agreement among planning engineers regarding the feasibility of risk identification during the planning stages, more so among the contractor, construction engineer, project manager, and supervisor; these stakeholders have SD values ranging from 1.278 to 1.578, indicating slightly more variability in perceptions compared to the planning engineer.

The analysis of the RII provides a percentage-based representation of importance among the stakeholder groups. The planning engineer RII value of 0.950 indicates the highest relative importance among the roles, suggesting that planning engineers' opinions significantly contribute to the overall perceived feasibility of risk identification. Similarly, the contractor,

construction engineer, project manager, and supervisor had RII values ranging from 0.806 to 0.822, suggesting a relatively lower but still substantial contribution to the overall perception. Finally, the ANOVA test for statistically significant differences in mean ratings among different stakeholder groups revealed df (degrees of freedom) with (5, 80) indicating that there were 5 groups (roles) across responses. The F-value of 0.650 indicates the ratio of the variance between group means to the variance within groups. Hence, the lower F-value suggests that the differences between group means are relatively small compared to the variation within each group. Finally, the p-value obtained from the ANOVA test is 0.663, which is higher than the common significance level of 0.05. This suggests that there isn't sufficient evidence to reject the null hypothesis, indicating no significant difference in perceptions regarding the feasibility of risk identification among the stakeholder groups.

In summary, while planning engineers rated risk identification as highly feasible during the planning stages, all stakeholder groups generally perceived it as feasible, with no statistically significant differences among their perceptions.

3.2.2 Types of risk identification techniques utilized in construction projects

Table 3 showcases the mean scores, standard deviations, Relative Importance Index (RII), and rankings for different types of risk identification techniques utilized in construction projects.

Table 3. Types of Risk Identification Techniques Utilized in Construction Projects

Role	**Mean**	**SD**	**RII**	**rank**
Brainstorming	0.67	0.471	0.788	1st
Delphi Techniques	0.23	0.425	0.271	6th
Interview or Expert Opinion	0.60	0.492	0.706	3rd
Checklist	0.36	0.483	0.424	5th
Project Documentation Review	0.65	0.479	0.765	2nd
Past experience	0.6	0.492	0.706	3rd
Swot Analysis	0.47	0.502	0.553	4th

Table 3 reveals that the brainstorming technique received the highest mean score of 0.67, indicating that respondents considered brainstorming as the most effective or commonly used risk identification technique in construction projects, with an RII of 0.788, indicating the highest relative importance among the techniques based on the scale used. Followed by the project documentation review, which obtained a mean score of 0.65, ranking closely after brainstorming with an RII of 0.765, indicating substantial importance and is also highly utilized or perceived as effective. Subsequently, interview or expert opinion and past experience techniques received mean scores of 0.60, suggesting they are similarly perceived as effective with an RII of 0.706. SWOT Analysis techniques received low mean scores of 0.47, indicating average perceived effectiveness or utilization compared to others with 0.553.

Finally, checklist and Delphi techniques received the lowest mean scores of 0.36 and 0.23, respectively, suggesting they are perceived as less utilized or less effective compared to other techniques with RII values of 0.424 and 0.271, respectively). This indicates a lower relative importance compared to others.

The brainstorming, project documentation review, interview or expert opinion, and past experience techniques have SD values ranging from 0.471 to 0.492, indicating a moderate agreement among respondents regarding their effectiveness or utilization. While checklist, SWOT analysis, and Delphi techniques have SD values ranging from 0.425 to 0.502, suggesting slightly more variability in perceptions among respondents. The ranking depicts the order of perceived effectiveness or utilization of the risk identification techniques as assessed by the respondents. Brainstorming ranks first, followed closely by Project Documentation Review (2nd), Interview or Expert Opinion and Past Experience (tied for 3rd), SWOT Analysis (4th), Checklist (5th), and Delphi Techniques (6th).

From the foregoing, brainstorming, project documentation review, interview or expert opinion, and past experience are perceived as the most commonly used or effective risk identification techniques in construction projects. Checklist, SWOT analysis, and Delphi techniques are perceived as less utilized or less effective compared to others based on respondents' ratings. There's relatively moderate agreement among respondents regarding the effectiveness or utilization of these techniques, with some variability in perceptions

observed for certain methods. Acknowledging the effectiveness of these techniques aligns with a comprehensive risk management approach (Tepeli, 2023). As brainstorming and expert opinions were highly rated, organizations should encourage leadership support for collaborative risk identification sessions. This is consistent with the literature emphasizing the role of leadership commitment in risk management success (Ubani et al., 2015). The lower ratings for techniques like Delphi and SWOT analysis may indicate a need for training or familiarization with these methods. Organizations should consider providing training to ensure diverse techniques are employed effectively (Kadiri et al., 2014). Hence, the findings affirm the importance of collaborative techniques and effective risk management practices in the construction industry. The study echoes the literature's emphasis on proactive risk identification, providing practical insights for project managers and stakeholders. However, further exploration into the specific factors influencing technique preferences and familiarity could enhance the understanding of risk management dynamics in construction projects.

3.2.3 Utilization of risk management practices in risk identification in construction projects

Figure 3 below illustrates the results of the survey regarding the distribution of responses concerning the effective utilization of risk management practices in identifying risks in Nigerian construction projects.

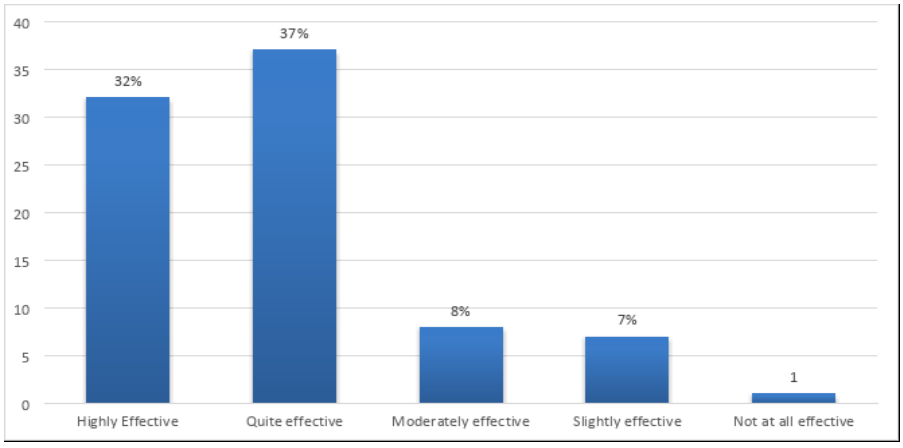

Figure 3: Effective Utilization of Risk Management Practices in the Identification of Risks in Construction Projects

Figure 3 reveals that 32 responses (37.6%) state that it is highly effective, 37 responses (43.5%) perceive that it is quite effective, 8 responses (9.4%) believed it is moderately effective, seven responses (8.2%) agree it slightly effective, and one response (1.2%) perceive it not to be effective. This distribution showcases how respondents rated the effectiveness of using risk management practices for identifying risks in construction projects in Nigeria. Most respondents perceive the utilization of these practices as highly or quite effective, with fewer indicating moderate, slight, or no effectiveness in this regard. This finding aligns with existing literature (Obondi, 2022), which highlights the importance of collaborative approaches like brainstorming in identifying diverse risks. Additionally, project documentation review, interviews, and past experience were also perceived as effective, emphasizing the significance of historical data and expert insights (Tepeli, 2023). The preference for brainstorming resonates with King (2016) emphasis on collaborative methods. The acknowledgment of project documentation and expert opinions aligns with Tepeli (2023) recommendations for comprehensive risk identification.

3.3 Impact of Risk Management Practices on Project Performance in the Nigerian Construction Sector

The results from the survey regarding the impact of risk management practices on project performance in the Nigerian construction sector are depicted in Table 4. The parameters surrounding performance in the survey focus on cost, schedule, and quality of delivery.

Table 4. Effects of Risk Management Practices on Project Performance (Cost, Schedule, and Delivery Quality

Factors	**Mean**	**SD**	**RII**	**Rank**
Risk identification * construction project Performance				
Cost	4.29	0.919	0.858	**3rd**
Schedule	4.33	0.86	0.866	**2nd**
Quality of Delivery	4.40	0.885	0.880	**1st**
Project failures * inefficient risk				
Cost Overruns	3.88	1.192	0.776	**2nd**
Schedule	3.83	1.19	0.766	**3rd**

Quality of Delivery	3.99	1.173	0.798	**1st**
Effective risk management practices contribute to the overall performance of construction projects in Nigeria				
Time	4.22	1.142	0.844	**2nd**
Cost	4.27	1.142	0.854	**1st**
Quality of Delivery	4.1	1.284	0.820	**3rd**

Effective risk management practices contribute to the overall performance of construction projects in Nigeria

On risk identification in construction project performance, the mean score for the impact of risk identification on project cost is 4.29, with a standard deviation of 0.919. This places it as the 3rd-ranked factor in terms of impact on cost. The Relative Importance Index (RII) is 0.858, indicating a substantial impact. The mean score for the impact of risk identification on the project schedule is 4.33, with a standard deviation of 0.86. It ranks 2nd in terms of impact on schedule, and the RII is 0.866, signifying a considerable impact. The mean score for the impact of risk identification on the quality of project delivery is 4.40, with a standard deviation of 0.885. It ranks 1st in terms of impact on quality, and the RII is 0.880, indicating the highest impact among the factors considered.

Similarly, on project failures in inefficient risk management, the mean score for the impact of inefficient risk management on cost overruns is 3.88, with a standard deviation of 1.192. It ranks 2nd in terms of impact on cost overruns, and the RII is 0.776, indicating a significant impact. The mean score for the impact of inefficient risk management on the project schedule is 3.83, with a standard deviation of 1.19. It ranks 3rd in terms of impact on schedule, and the RII is 0.766, signifying a notable impact. The mean score for the impact of inefficient risk management on the quality of project delivery is 3.99, with a standard deviation of 1.173. It ranks 1st in terms of impact on quality, and the RII is 0.798, indicating the highest impact among the factors considered.

Regarding the overall impact of effective risk management practices on project performance, the mean score for the overall impact of effective risk management practices on project time is 4.22, with a standard deviation of 1.142. It ranks 2nd in terms of impact on time, and the RII is 0.844, suggesting a considerable impact. The mean score for the overall impact of effective

risk management practices on project cost is 4.27, with a standard deviation of 1.142. It ranks first in terms of impact on cost, and the RII is 0.854, indicating the highest impact among the factors considered. The mean score for the overall impact of effective risk management practices on project delivery is 4.1, with a standard deviation of 1.284. It ranks 3rd in terms of impact on delivery, and the RII is 0.820, signifying a notable impact. These findings support existing literature that emphasizes the significance of risk identification in cost and schedule management (Luskova & Dvorak, (2019). Identifying risks early allows for effective planning and mitigation, reducing the likelihood of cost overruns and schedule delays. Mhetre et al. (2016) stress the importance of risk management in achieving project quality, while Okolie et al. (2020) emphasize its role in cost and schedule management. The results align with these assertions, emphasizing the multi-faceted impact of risk identification.

In summary, the results suggest that effective risk management practices, particularly in the identification of risks, significantly influence project performance in terms of cost, schedule, and quality of delivery. The impact of these practices is most pronounced in enhancing the quality of project delivery, followed by schedule and cost management. The results underscore the significance of implementing resilient risk management strategies to achieve favorable results in construction projects within Nigeria.

Table 5. Influence of Effective Risk Management Practices on Construction Project Performance

Factors	**Mean**	**SD**
Efficient risk management practices reduce the likelihood of risks in construction projects' lifecycle	4.05	0.63
Construction projects are more likely to fail in Nigeria if risk management practices are not effectively utilized	4.20	1.34
Risk identification is an important aspect of the construction project lifecycle	4.33	0.87
Proper and effective risk identification can mitigate project failure (cost overruns, not meeting time schedules, and non-adherence to project quality	4.12	1.04
Average	4.18	0.97

The analysis presented in Table 5 provides valuable insights into stakeholders' perceptions regarding the importance of risk management practices in the context of construction projects in Nigeria. Notably, the mean scores and standard deviations reveal the degree of influence attributed to specific statements. The statement asserting that "Efficient risk management practices reduce the likelihood of risks in construction projects' life cycle" receives a mean score of 4.05, indicating a moderate level of influence and highlighting the perceived significance of efficient risk management in mitigating risks. Similarly, the statement asserting that "Construction projects are more likely to fail in Nigeria if risk management practices are not effectively utilized" obtains a substantial mean score of 4.20, underlining the widespread recognition among stakeholders that effective risk management is pivotal in preventing project failures.

The statement affirming that "Risk identification is an important aspect in the construction project lifecycle" receives a high mean score of 4.33, emphasizing the paramount importance of identifying and managing risks throughout the project's life. Additionally, the statement proposing that "Proper and effective risk identification can mitigate project failure (cost overruns, not meeting time schedules, and non-adherence to project quality)" attains a mean score of 4.12, reinforcing the perceived role of robust risk identification in averting various dimensions of project failure. The overall findings underscore stakeholders' strong belief in the crucial role of effective risk identification and management practices in ensuring the success and resilience of construction projects in Nigeria.

The statement suggesting that construction projects are more likely to fail in Nigeria without effective risk management practices received a substantial mean score. This underscores the significance of robust risk management in preventing project failures. While the statement on mitigating project failure through proper risk identification ranked slightly lower, it still received a notable mean score and RII, indicating the perceived importance of risk identification in averting project failures. The statement on the reduction of the likelihood of risks through efficient risk management practices received a moderate level of influence, ranking 4th among the factors considered.

In essence, the findings confirm the vital importance of effective risk management practices, specifically in the identification of risks, in shaping the performance of construction projects

in Nigeria.The findings underscore the importance of proactive risk management in mitigating project failures and enhancing overall project success.

Table 6. Univariate Test on Influence of Risk Management Practices on Project Performance Metrics (Cost, Schedule, and Delivery Quality)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	51.14a	2	25.57	9.53	.000
Intercept	11.000	1	11.000	3.903	.000
Risk identification and the overall performance	10.064	1	10.064	1.712	.003
Risk identification and alignment with planned project budgets.	13.170	1	13.170	1.756	.008
Risk identification and the adherence to technical specifications in construction projects	12.363	1	12.363	1.545	.007
Risk identification and the capacity to adhere to project delivery quality	11.371	1	11.371	1.707	.000
Error	10.718	81			

Table 6 presents the results of a univariate test examining the impact of risk identification on various aspects of construction project performance in Nigeria. The corrected model in the univariate analysis is a statistical model that has been adjusted to consider the simultaneous effects of multiple variables, providing a more accurate assessment of the relationship between the independent variables (risk identification) and the dependent variable (overall performance of construction projects) while accounting for other relevant factors. The corrected model had type III sum of squares, value (51.14) which represents the variation in the dependent variable (for instance overall performance of construction projects) that can be attributed to the independent variables (risk management practice) in the model while accounting for the influence of other variables. The number of degrees of freedom associated with the corrected model (2 in this case). The mean square-like is Type III sum of squares

divided by its degrees of freedom (25.57). Moreover the F-statistic (9.53) tests revealed the overall significance of the model, evaluating whether there is a significant relationship between the independent variables (risk identification practices) and the dependent variable (overall performance). The p-value (0.000) associated with the F-statistic indicates the probability of obtaining the observed results if the null hypothesis (no relationship between variables) is true.

Similarly, the intercept represents the baseline value of the dependent variable when all predictors (risk identification variables) are zero. The type III sum of squares: had shown the amount of variability (11.000) in the dependent variable that can be attributed to the intercept term. The degrees of freedom associated with the intercept (1 in this case), with mean square (11.000). The F-statistic (3.903) that the model with the intercept term is significantly better than a model without it at a p-value (0.000)

Hence, both the corrected model and intercept are statistically significant, indicating that risk identification variables play a significant role in explaining variations in the overall performance of construction projects. The intercept signifies a baseline level of performance when risk identification factors are at their minimum. These results enhance the overall validity and reliability of the model in capturing the relationship between risk identification and project performance.

The study interprets the findings with respect to the stated hypotheses as follows:

H1: There is a significant impact between the extent of risk identification and the overall performance of construction projects in Nigeria.

The analysis type III sum of squares, revealed the amount of variation in the overall performance of construction projects that can be attributed to the extent of risk identification to be 10.064, with 1 degree of freedom, indicating that one predictor variable (risk identification extent) is being considered. The mean square provides an average measure of the explained variability of type III sum of squares (10.064). The F-value of 1.712 is a ratio of variances, testing whether the variability in overall performance explained by risk identification is significantly greater than what would be expected by chance. The p-value of 0.003 is less than the commonly used significance level of 0.05.

The Type III Sum of Squares and associated F-statistic suggest that risk identification explains a certain amount of variability in overall project performance. The low p-value (0.003 < 0.05) indicates that the observed relationship is statistically significant. There is strong evidence to accept the hypothesis (H1) that there is a significant impact between the extent of risk identification and the overall performance of construction projects in Nigeria. The mean square provides an average measure of the impact of risk identification on overall performance. This finding resonates with previous studies emphasizing the crucial role of risk management in ensuring technical compliance (Imoni et al., 2023).

In the context of overall performance, this analysis specifically focuses on the contribution of risk identification extent. It suggests that the extent to which risks are identified has a statistically significant impact on the overall success of construction projects in Nigeria. The findings support the idea that a thorough process of risk identification positively influences the overall performance of construction projects. Projects that identify and assess risks more comprehensively are likely to have better overall outcomes.

H2: There is a significant impact between the level of risk identification and the alignment with planned project budgets.

The result of hypothesis II revealed a type III sum of squares of 13.170 variation in the alignment with planned project budgets that can be attributed to the level of risk identification. 1 degree of freedom, indicating that one predictor variable (level of risk identification) is being considered. The mean square is the Type III Sum of Squares divided by its degrees of freedom, providing an average measure of the explained variability which is still 13.170. The F-value of 1.756 tested whether the variability in budget alignment explained by risk identification is significantly greater than what would be expected by chance, and the p-value of 0.008 is less than the commonly used significance level of 0.05.

The Type III Sum of Squares and associated F-statistic suggest that risk identification explains a certain amount of variability in the alignment with planned project budgets. The low p-value (0.008) indicates that the observed relationship is statistically significant. There is strong evidence to accept the hypothesis (H2) that there is significant impact between the level of risk identification and the alignment with planned project budgets in Nigeria. The Mean Square

provides an average measure of the impact of risk identification on budget alignment. The findings suggest that the level of risk identification has a statistically significant impact on the alignment of projects with planned budgets. This implies that projects with a higher level of risk identification are more likely to adhere to their planned budgets. The link between risk identification and project budget alignment can be explained by considering how identifying and assessing risks comprehensively can lead to better anticipation and mitigation of potential budgetary challenges. For example, if risks are accurately identified, contingency plans can be developed, and resources can be allocated more effectively, reducing the likelihood of budget overruns. The results support the notion that a higher level of attention to risk identification positively influences the alignment of projects with planned budgets. This finding resonates with established literature, particularly emphasizing the intrinsic relationship between risk management and project quality (Bayraktar, 2020).

H3: There is a significant impact between the effectiveness of risk identification and the adherence to technical specifications in construction projects.

On the third hypothesis, considering the type III sum of squares revealing the amount of variation in the adherence to technical specifications in construction projects that can be attributed to the effectiveness of risk identification to be 12.363. 1 degree of freedom, indicating that one predictor variable (effectiveness of risk identification) is being considered. This is the Type III Sum of Squares divided by its degrees of freedom, providing an average measure of the explained variability to still be maintained at 12.363. The F-value of 1.545 is a ratio of variances, testing whether the variability in adherence to technical specifications explained by the effectiveness of risk identification is significantly greater than what would be expected by chance with the p-value of 0.007 less than the commonly used significance level of 0.05.

The Type III Sum of Squares and associated F-statistic suggest that the effectiveness of risk identification explains a certain amount of variability in the adherence to technical specifications in construction projects. The low p-value (0.007) indicates that the observed relationship is statistically significant. There is strong evidence to accept the hypothesis (H3) that there is significant impact between the effectiveness of risk identification and the

adherence to technical specifications in construction projects in Nigeria. The Mean Square provides an average measure of the impact of the effectiveness of risk identification on adherence to technical specifications.

The findings suggest that the effectiveness of risk identification has a statistically significant impact on the adherence to technical specifications in construction projects. This implies that projects with more effective risk identification are more likely to adhere to technical requirements. This aligns with previous research emphasizing the financial implications of effective risk management (Nayak et al., 2019), suggesting that projects with comprehensive risk identification processes are better equipped to align with budgetary constraints.The link between risk identification and adherence to technical specifications can be explained by considering how identifying and managing risks effectively can lead to better planning and execution of technical aspects. For example, if potential risks to technical specifications are identified early, appropriate measures can be taken to mitigate these risks, ensuring better adherence to specifications. Thus, the results support the idea that the effectiveness of risk identification positively influences the adherence to technical specifications in construction projects.

H4: There is a significant impact between the effectiveness of risk identification and the capacity of construction projects to adhere to project delivery quality.

Finally, on H4, the type III sum of squares expressed the variation in the capacity of construction projects to adhere to project delivery quality to be 11.371, which can be attributed to the effectiveness of risk identification. 1 degree of freedom, indicating that one predictor variable (effectiveness of risk identification) is being considered. The mean square is also maintained as the Type III Sum of Squares since the degree of freedom is 1. The F-value of 1.707 is a ratio of variances, testing whether the variability in the capacity of construction projects to adhere to project delivery quality explained by the effectiveness of risk identification is significantly greater than what would be expected by chance. The p-value of 0.000 is less than the commonly used significance level of 0.05.

The Type III Sum of Squares and associated F-statistic suggest that the effectiveness of risk identification explains a certain amount of variability in the capacity of construction projects

to adhere to project delivery quality. The very low p-value (0.000) indicates that the observed relationship is highly statistically significant. There is strong evidence to accept the hypothesis (H4) that there is no significant impact between the effectiveness of risk identification and the capacity of construction projects to adhere to project delivery quality in Nigeria. The Mean Square provides an average measure of the impact of the effectiveness of risk identification on the capacity to adhere to project delivery quality.

The findings suggest that the effectiveness of risk identification has a highly significant impact on the capacity of construction projects to adhere to project delivery quality. This aligns with literature emphasizing the relationship between risk management and project quality (Obondi, 2022), suggesting that projects with efficient risk identification processes demonstrate a higher capacity to maintain quality standards throughout the delivery phase.

This implies that projects with more effective risk identification are more likely to maintain high-quality standards in project delivery. The link between risk identification and project delivery quality can be explained by considering how identifying and managing risks effectively can lead to better planning, resource allocation, and execution, reducing the likelihood of issues that may compromise project delivery quality. The results strongly support the idea that the effectiveness of risk identification positively influences the capacity of construction projects to adhere to project delivery quality.

The results of the univariate test strongly support all four hypotheses. There is a statistically significant impact between the extent or effectiveness of risk identification and various aspects of construction project performance, including overall performance, alignment with project budgets, adherence to technical specifications, and capacity to adhere to project delivery quality. These findings highlight the crucial role of effective risk identification in influencing different facets of construction project success in Nigeria. The study elucidates the multifaceted influence of risk identification on distinct dimensions of construction project performance. In terms of "Overall Performance," encompassing a comprehensive evaluation of project success, the analysis establishes a statistically supported connection between the extent of risk identification and a project's holistic achievements, including time efficiency and stakeholder satisfaction. "Budget Alignment" scrutinizes a project's financial discipline, revealing that a higher level of risk identification correlates with improved adherence to

planned budgets, underscoring the fiscal prudence associated with thorough risk management practices. The dimension of "Adherence to Technical Specifications" emphasizes that effective risk identification enhances a project's ability to conform to prescribed technical standards, ensuring the maintenance of technical integrity throughout the project lifecycle. Lastly, the "Capacity to Adhere to Project Delivery Quality" highlights the critical impact of risk identification on a project's capability to uphold high-quality standards, emphasizing the pivotal role of meticulous risk identification in guaranteeing the quality of the final project deliverable. Overall, the study underscores how strategic risk identification positively shapes diverse aspects of construction project performance. This finding resonates with existing literature highlighting the importance of knowledge and awareness in successful risk management (Okolie, 2022). The construction industry's dynamic nature demands continuous learning and adaptation, and addressing these knowledge gaps is crucial for effective risk identification and mitigation

4.4 Primary Obstacles and Issues Encountered by Construction Projects in Nigeria Regarding the Efficient Implementation of Risk Management Practices.

Figure 4 presents the primary obstacles and issues experienced in the Nigerian construction sector, disrupting the effective utilization of risk management techniques.

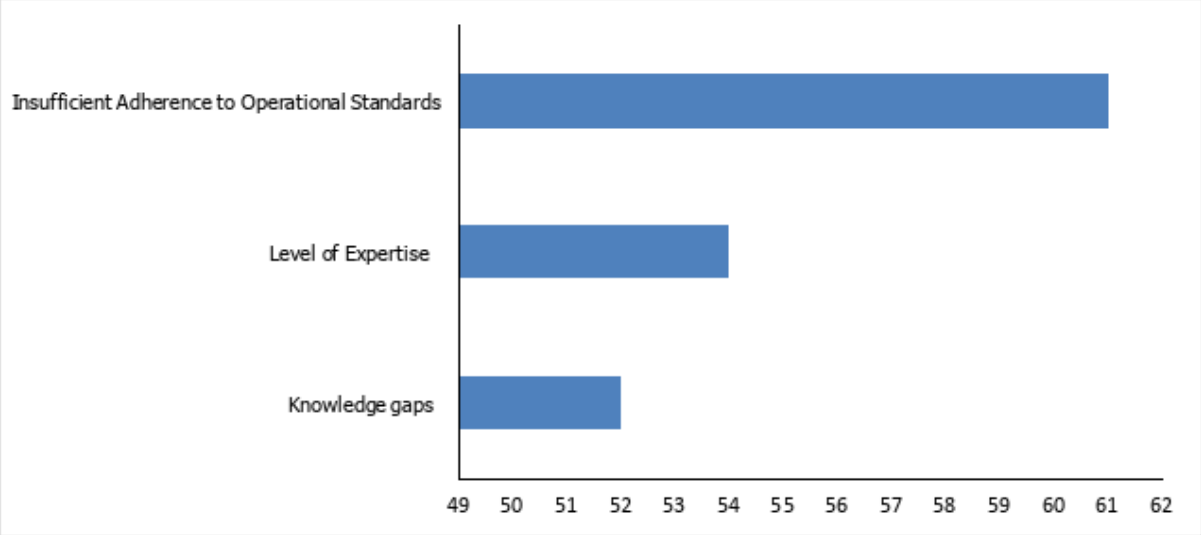

Figure 4: Challenges and Problems of Nigerian Construction Projects Affecting Effective Utilization of Risk Management Practices

Figure 4 provides insights into the key challenges and problems that construction projects encounter when implementing efficient risk management techniques. Most respondents (61.2%) identified knowledge gaps as a key challenge in implementing efficient risk management techniques. This suggests that there is a perceived deficiency in understanding or awareness of risk management practices within construction projects. A significant proportion of respondents (63.5%) pointed to the level of expertise as a challenge. This indicates that there may be concerns about the competency and skill levels of individuals involved in the application of efficient risk management techniques. The highest percentage of respondents (71.8%) highlighted insufficient adherence to operational standards as a critical challenge. This suggests that there may be issues related to compliance and consistency in applying established operational standards in the context of risk management practices. This finding is consistent with the literature emphasizing the importance of standardization in risk management (Petrovic, 2017). Inconsistent application of operational standards can undermine the effectiveness of risk management practices and result in project uncertainties. The identified challenges align with existing literature, emphasizing the importance of knowledge, expertise, and adherence to standards in effective risk management (Egwunatum et al., 2022). The data collectively underscores the importance of addressing knowledge gaps, enhancing expertise levels, and promoting adherence to operational standards as essential strategies for overcoming challenges in implementing efficient risk management techniques in construction projects. Addressing these issues could potentially contribute to more effective and successful risk management practices within the construction industry.

4. Conclusion and Recommendations

Conclusion

The study has provided a comprehensive analysis of various facets of risk management in the Nigerian construction sector, offering valuable insights into the awareness, perception, challenges, and impacts of risk management practices. The awareness levels across hierarchical tiers emphasize the importance of organizational understanding for effective risk

management. Top and middle management exhibit higher awareness levels, underscoring the significance of leadership commitment. This finding underscores the necessity for targeted awareness programs for skilled and semi-skilled workers to improve overall risk management effectiveness. Moreso study delves into perspectives on risk identification techniques, revealing planning engineers' strong belief in the feasibility of risk identification during planning stages, acknowledges the overrepresentation of project managers, and suggests future research exploring specific challenges faced by planning engineers, enhancing their involvement in risk management processes.

The evaluation of risk identification techniques indicates the perceived effectiveness of collaborative methods like brainstorming, project documentation review, interviews, and experience. These findings provide practical guidance for integrating effective risk identification techniques into construction projects. The positive perceptions regarding the effectiveness of risk management practices align with the literature emphasizing the role of robust risk management in enhancing project outcomes. The study contributes to existing literature by offering empirical evidence on the multi-dimensional impact of risk management on project performance. Notably, the highest mean score for quality underscores the importance of risk identification in ensuring the quality of project delivery.

The univariate test findings confirm the significant impact of risk identification on various aspects of construction project performance. These results contribute empirical evidence to theoretical claims, reinforcing the pivotal role of effective risk identification in project success. The study highlights the need for targeted awareness programs, training, and leadership commitment to address identified challenges and optimize risk management practices. The study contributes significantly to the understanding of risk management practices in the Nigerian construction sector. The identified challenges, perceptions, and impacts provide a foundation for further research and practical implementation. By addressing the outlined suggestions and recommendations, stakeholders can enhance risk management practices, ultimately improving the success rates of construction projects in Nigeria.

Recommendations

Organizations in the construction industry stand to benefit from a series of recommendations derived from the study's insightful findings. Firstly, adopting comprehensive risk identification practices that encompass techniques such as brainstorming, project documentation review, interviews, and experiential insights is paramount. Encouraging leadership support for collaborative risk identification sessions is essential to fostering diverse perspectives and ensuring a thorough understanding of potential risks. Secondly, the study underscores the critical role of leadership commitment to risk management. Establishing a culture of commitment at all levels of the organization, with active support and participation from top and middle management, is crucial for effective risk management initiatives. Thirdly, recognizing the dynamic nature of the construction industry, organizations should implement continuous improvement programs.

These programs should address knowledge gaps, enhance expertise, and promote adherence to operational standards, thereby facilitating adaptability in a constantly evolving environment. Additionally, a proactive risk management approach is emphasized, highlighting the significance of early risk identification and mitigation to prevent project failures and enhance overall project success. Looking ahead, there is a need for future research to ensure more balanced representation across various roles within the construction industry, promoting a comprehensive understanding of risk management perspectives. Targeted outreach to underrepresented roles, such as planning engineers, is recommended to capture a broader spectrum of insights.

Moreover, recognizing the limited participation of planning engineers, further research should explore specific challenges and opportunities for enhancing their engagement in risk management processes. Understanding their unique perspective can contribute to more inclusive and effective risk management strategies. Lastly, to address the identified challenges, including knowledge gaps and expertise concerns, tailored training programs are recommended. Construction organizations and industry associations are encouraged to invest in training initiatives that ensure a well-informed and skilled workforce capable of effective risk management. Overall, these recommendations provide a holistic approach to bolstering risk management practices in the construction industry and fostering long-term success.

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