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EVALUATION OF RISK MANAGEMENT PROCEDURES ON ROAD CONSTRUCTION IN MINNA, NIGER STATE

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ABSTRACT

This paper highlighted the impacts of risk management on Nigerian road construction taking Minna metropolis as a case study. Risk management is now a critical component of any project management organization and identifying all foreseeable risks and evaluating their likelihood of occurring as well as potential hazards that could significantly affect the project are the goals of risk management. The aim is to examine the impact of project risk management practices on the successful delivery of road construction projects with specific emphasis on identifying key risk factors and evaluating the effectiveness of risk management strategies. Two objectives are set for the paper (i) to identify risk factors that affect the delivery of road construction projects in Minna. (ii)to assess risk management practices of head office managers on road construction projects. Six construction firms were purposively sampled who had engaged in road construction activities from 2023 till 2025. Structured questionnaires were administered to the randomly selected management and on-site staff.

Introduction

The construction industry is a very important sector in every nation and its development as it provides the infrastructure that is necessary for economic growth, social interaction and improved standard of living. 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). The importance of having a well-developed road infrastructure in Nigeria, a nation with a fast-rising

The data gathered were analysed using 5-item Likert scale and Mean Item Score to measure 12 risk factors identified. It was concluded that the delivery of road construction projects is significantly but moderately impacted individually by all the 12 risk factors examined in this study.

KEYWORDS: Risk, Management, Road, Construction, Hazards

economy and population, cannot be underscored. However, there are several issues facing Nigeria's road building sector that affect both its long-term viability and efficient risk management. The road construction sector is essential to the economic and social advancement of any country because it makes it easier for people, commodities, and services to move about (Oladinrin et al., 2012). In particular, road development projects are essential for improving transportation, lowering transportation costs, and promoting trade both within and between different areas. However, because of their complexity, numerous stakeholders, unpredictable environments, and reliance on resources like plant, materials, labor, and finance, these projects are inevitably risky. 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). Risks can actually occur at any stage of a project. Sometimes it is related to specific tasks and at other times it may have its origin outside the project and may appear without prior warning. Generally speaking, risks that occur in the later phases of a project can cost more time and money than risks that occur in the initial phases. Lack of appropriate risk management practices have been linked to waste of time, cost and effort inputted in a construction project. Although risks in construction projects are inevitable and almost impossible to completely eradicate, implementing appropriate risk management practices is crucial in managing various types of risks (Adeleke et al, 2018) and unlike other industries, the construction industry is challenged with an enormous degree of risks and uncertainty (Salleh et al, 2020).

Poor risk management frequently results in overspending, delays, low quality work, and in the worst situations, complete project abandonment. Because of weak institutional frameworks, poor planning, and slow technology growth, these issues are considerably

more severe in developing nations like Nigeria. In particular, road development projects are essential for improving transportation, lowering transportation costs, and promoting trade both within and between different areas. Understanding how risk management practices influence the delivery of road construction projects in this context is therefore essential for improving performance and ensuring value for money.

Statement of Problem

Despite the importance of road construction and infrastructure to economic development, road projects in Minna metropolis have continued to experience a lot of challenges which generally include delay in completion, cost and budget overruns, low quality of work and in some cases, abandonment. These problems sometimes occur because of inadequate attention to risk management. This paper therefore addresses the gap by analyzing the extent to which project risk management influences the performance and delivery of road projects in Minna.

Aim and Objectives

The aim of this paper is to examine the impact of project risk management practices on the successful delivery of road construction projects in Minna, with specific emphasis on identifying key risk factors and evaluating the effectiveness of risk management strategies.

Objectives

1. To identify risk factors that affect the delivery of road construction projects in Minna.
2. To assess risk management practices of head office managers and on-site workers on road construction projects.

LITERATURE REVIEW

Construction industry is a risky industry with uncertainties due to many external and internal factors that influence the construction process (Enshassi *et al.,* 2008) and 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). In the past, Nigeria's road system has found it difficult to meet the demands of economic expansion and urbanisation. Congestion, higher transportation costs, and decreased economic efficiency have all resulted from inadequate road networks (Abdul Fattah, et al, 2022). Furthermore, poor roads exacerbate traffic jams, deterioration, and environmental harm. This situation emphasises the necessity of a thorough strategy that incorporates both sustainable development practices and efficient risk management techniques in order to solve the complex problems associated with road construction.

Risk management is a complex fusion of various viewpoints, attitudes, perceptions, and qualitative or quantitative methodologies, rather than being a single procedure. Stakeholder participation, two-way communication, and response are therefore essential elements of effective risk management. In order to effectively manage project risks and uncertainties, risk management is one of the most important processes. Effective risk management implementation is crucial to restoring the construction industry's dismal reputation for project execution. Risk management can be used to eliminate typical issues in construction projects, such as unsafe working conditions, poor product quality, over budget, and delays in project completion. Therefore, one may say that risk management is crucial, particularly when making risk-related decisions. (Lee Chun and Azlan, 2012).

Risk is inherent in all human endeavors, including construction activities, and the risk elements involved are diverse and varied (Odeyinka, 2000). That the success or failure of any venture depends crucially on how to deal with these risks (Dey and Ogunlana, 2004 and cited in Oyewobi *et al*., 2012). Oyewobi *et al* (2012) asserted the common consequences of project risks to include amongst others the cost overruns, time overruns, poor quality, and disputes among the partings to a construction contracts. The study also added that, risk is an important issue to contractors as well as clients and consultants of the industry. The Association of Project Managers Body of Knowledge (2019) defined project risk as an uncertain event or set of circumstances that, should it occur will have an effect on achievement of one or more project objectives. Hillson (2002) stated that this effect could either be positive (opportunity) or negative (threat). The construction industry has changed rapidly over the past 10 years; companies are faced with more risk and uncertainty than ever before (Flanagan, 2003). There are diversified expectations, needs, risks, interests and constraints which makes client-contractor collaboration difficult in a multi-party working situation (Lau and Rowlinson, 2009). Effective collaboration and a conscious sharing of project risks between clients, contractors and consultants are important factors for a successful risk management process (Akintoye and Macleod, 1997 and Osipova, 2007).

According to Urokor et al (2025), there are opportunities and challenges at the nexus of risk management and sustainable development in Nigeria's road construction sector, with important ramifications for the country's social cohesion, environmental conservation, and economic development. The necessity of combining sustainable practices with efficient risk management techniques to guarantee road construction projects' success while reducing negative effects.

Survey Respondents

This research adopted quantitative research approach with structured questionnaire administered to six purposively sampled road construction firms in Minna metropolis. 78 On-field and management staff of these road construction firms were sampled to provide information on the basis that; they have a better and more accurate knowledge about how any given project is being carried out, since they are directly responsible for the construction of the project.

Structure of the Questionnaire

Considering that the questionnaire was designed primarily to source information on the impact of project risk management on the delivery of construction of road projects in Minna, two sections were created in the questionnaire (Section A & B). The first section (Section A) was designed to seek respondent's demographic information. Specifically, it requested that information which would reveal whether the type of respondents required by the study, filled the questionnaires and consequently, whether the information supplied in the other sections of the questionnaires can be relied on. As it was anticipated/expected that professionals/personnel on the field or middle level management of any given firm will have a more comprehensive knowledge about how projects are being executed by their firms, the demographic information requested in this section were precisely; the of the respondent as well as the number of years of experience in practice, the size of their company.

Analysis of Respondents' Demographics

This section presents the results of the five (5) demographic analyses carried out on the field survey data of this study. The demographic variables examined include the current role of the respondents at their place of work, highest educational qualification obtained, the number of years of experience in the construction industry, the size of the company that the respondents worked for, and whether the respondents had ever experienced major project delays due to risks. The results of these analyses are presented in Table 1.0.

The results presented in Table 1.0 revealed that management staff made up only 12.8% of the sample. The balance of 87.2% of the sample was made up by the on-field supervisory staff. The disparity in the numbers of the different categories of staff was attributable to the fact that a single head office usually has several sites under its control. These sites contain many on-field staff, in contrast to the few management staff at the head office.

As regards the educational attainments of the respondents which was also presented in Table 1.0, 19.2% were educated only up to secondary level, while 30.8% were educated up to the Ordinary National Diploma/National Certificate of Education (OND/NCE) level. Respondents who had tertiary education up to the Higher National Diploma/Bachelor degree level made up 23.1% of the sample, while 26.9% of the respondents had acquired postgraduate qualifications. The study has thus obtained data from respondents possessing a mix of educational qualifications which increases the likelihood that the respondents possessed necessary knowledge of road construction risks.

Table 1.0: Demographic Information of the Respondents

	Frequency (n)	Percentage (%)
Current role		
Managerial Staff	10	12.8
On-Field Worker	68	87.2
Highest educational qualification		
SSCE	15	19.2
OND/NCE	24	30.8
HND/BSc	18	23.1
MSc and above	21	26.9
Other	0	0.0
Years of experience in the construction industry		
Less than 1 year	8	10.3
1–3 years	13	16.7
4–6 years	18	23.1
7–10 years	19	24.4
More than 10 years	20	25.6
Size of company		
Small (1–20 employees)	14	17.9
Medium (21–100 employees)	46	59.0
Large (101 and above)	18	23.1
Experienced major project delays due to risks?		
Yes	34	43.6
No	25	32.1
Not sure	19	24.4

Source: Author's fieldwork (2025)

The results presented in Table 2.0 show that all 12 risk factors individually exert a moderate impact on the delivery of road construction projects. The level of impact was derived based on the MIS of the factors, which ranged from 3.37 for the highest ranked factor to 2.74 for the lowest ranked factor. The discovery that all of the factors had only a moderate impact on road project delivery allowed further analysis to be carried out to reveal whether risk factor identification outcomes differed, when carried out by management staff as opposed to on-field staff.

Table 2.0: Identification of Risk Factors

ID Code	Risk factors	Mean Score	SD	RII	Rank	Level of impact
B1.B1 / B2.B1	Delays in asphalt, bitumen, and gravel supply (Rain damages stored materials)	3.37	1.38	0.67	1st	Moderate
B1.B2 / B2.B2	Inflation causes material price fluctuations (Poor-quality asphalt makes road uneven)	3.27	1.27	0.65	2nd	Moderate
B1.C2 / B2.C2	Insecurity affects workforce presence (Lack of PPE puts workers at risk)	3.21	1.44	0.63	3rd	Moderate
B1.A1 / B2.A1	Equipment breakdowns are a frequent cause of delay (Machines are unavailable when needed)	3.19	1.26	0.63	4th	Moderate
B1.B4 / B2.B4	Material theft occurs frequently (Materials are poorly measured or mixed)	3.01	1.30	0.59	5th	Moderate
B1.C3 / B2.C3	Community conflicts affect labor performance (Extreme heat/rain affects work output)	2.96	1.37	0.58	6th	Moderate
B1.C1 / B2.C1	Shortage of skilled workers delays progress (Absenteeism affects team performance)	2.91	1.40	0.57	7th	Moderate
B1.B3 / B2.B3	Lack of secure storage for materials (Bitumen often arrives late or in short supply)	2.90	1.42	0.57	8th	Moderate
B1.A2 / B2.A2	Equipment not suited for terrain affects delivery (Terrain issues damage equipment)	2.88	1.42	0.57	9th	Moderate
B1.A4 / B2.A4	Frequent power/fuel shortages disrupt machinery (Training on machine use is inadequate)	2.86	1.34	0.56	10th	Moderate
B1.A3 / B2.A3	Poor logistics for transporting heavy equipment (Tools are unsafe or outdated)	2.82	1.32	0.56	11th	Moderate

ID Code	Risk factors	Mean Score	SD	RII	Rank	Level of impact
B1.C4 / B2.C4	Religious/cultural events reduce labor availability (Communication with supervisors is poor)	2.74	1.30	0.54	12th	Moderate

Source: Author's fieldwork (2025)

Impact of risk management practices on reducing delays and cost overruns on road project

The results in Table 3.0 showed that none of the four correlations between 'reduced delays and cost overruns' (the second of five aspects of road project delivery that were tested) and the four groups of risk factors was statistically significant. This was because the 'Sig.' values obtained (which ranged from 0.115 to 0.448) were much higher than the preset 'alpha' (α) level of 0.05. The strength of the correlations between 'reduced delays and cost overruns' and all four risk factor groups was very weak, the highest being 3.24%. This meant that none of the risks accounted for more than 3.24% of any reductions in delays and cost overruns in the delivery of road projects. This meant that all of the four risk factor groups (material-related, plant-related, manpower-related, and environmental/external risks) did not exert significant impact on reductions in delays and cost overruns in the delivery of road projects. Another inference drawn from this result was that using the impact of risks to predict the level of reductions in delays and cost overruns in road project delivery is impossible because none of the coefficients of determination (R^2 values) obtained was up to 70%.

Table 3.0: Correlation analysis of risk factors' impact on reducing delays and cost overruns

x	y	N	Correlation Coefficient (Spearman's rho)	R^2 (%)	Sig. (2-tailed)	Strength of Correlation	Remark
Plant-Related Risks	Reduced delays cost overruns	78	-.146	2.13	.202	Very weak	NS
Material-Related Risks	Reduced delays cost overruns	78	.093	0.86	.418	Very weak	NS
Manpower-Related Risks	Reduced delays cost overruns	78	.180	3.24	.115	Very weak	NS
Environmental External Risks	Reduced delays cost overruns	78	.087	0.76	.448	Very weak	NS

Source: Author's fieldwork (2025)

Notes: *. Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed); NS = Not Significant; SS = Statistically Significant

DISCUSSION

Five out of the 12 risk factors were found to exert a high level of risk on the delivery of road projects. These factors were (i) Delays in asphalt, bitumen, and gravel supply; (ii) Inflation causes material price fluctuations; (iii) Lack of secure storage for materials; (iv) Equipment not suited for terrain affects delivery, and (v) Equipment breakdowns are a frequent cause of delay. It was observed that three of these high-impact factors concerned materials, while the other two factors had to do with road construction plant. This underscores the paramount importance of materials and plant in road works.

The next group of five factors were believed to have moderate impact on the delivery of road projects, as perceived by the head office management staff of selected road construction firms. These factors included (i) Material theft occurs frequently; (ii) Poor logistics for transporting heavy equipment; (iii) Insecurity affects workforce presence; (iv) Shortage of skilled workers delays progress, and (v) Frequent power/fuel shortages disrupt machinery. It was observed that two of these moderate-impact factors concerned plants and equipment, a further two factors were associated with site labour while the last factor had to do with road construction materials.

The last two factors were found to have only a low level of impact on the delivery of road projects. These were (i) Community conflicts affect labor performance, and (i) Religious/cultural events reduce labor availability. Both of these two factors concerned labour; in the opinion of the head office management staff, the factors would only impact road project delivery to a low extent.

Conclusion

This study examined risk management practices on road construction projects in Minna, with a view to identifying measures for improving the positive impact of such practices. The analysis of the data employed mean item scores and Spearman rank-correlation analysis. The results of the analysis carried out led to the conclusions presented in this chapter.

The study concluded that the delivery of road construction projects is significantly but moderately impacted individually by all the 12 risk factors examined in this study. The ranking of risk factors in terms of impact differed between management staff and on-field staff. Head office management staff are more concerned about the risks that can threaten material and plant availability than those risks that have to do with labour availability (5 out of 12 risk factors). On the other hand, on-field supervisory staff devote an almost equal level of attention to all 12 risk factors, supporting the thinking that site

supervisors must maintain constant awareness of all risks to prevent disruptions to the works. On a final note, this study has concluded that only material-related risks were significantly correlated with improved delivery of road construction projects in Minna, Niger State.

Recommendations

As a result of the conclusions reached in this study, the following recommendations were made:

1. Site supervisors on road construction projects need to be continuously exposed to trainings that would empower them to recognize other risks outside of the 12 that this study has examined.
2. There is need for more research into the financial impact of the 12 risks examined in this study. This could provide a reliable guide to whether the present focus of head office management staff is too restrictive or if it is adequate. It will also shed more light on what other risks could be included in the focus.
3. The tools that will help on-field supervisory staff mitigate the effects of the 12 risk factors examined in this study should be provided. Some of these tools and facilities are (i) Secure site housing that prevents rain damage to materials, (ii) Personal protective equipment (PPE) that reduces the risks that workers are exposed to, and (iii) Purchasing high quality materials to guarantee the quality of the finished roads.
4. As at present both head office management staff and on-field supervisory staff consider that only material-related risks need to be handled to ensure improved delivery of road construction projects. Since this study has established that other risks also exert moderate impact on the delivery of road projects, it was recommended that more attention needs to be paid to these 'other risks'. Such risks include manpower, plant, and environmental risks.

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