RISK MANAGEMENT SUPPORT FRAMEWORK FOR SUCCESSFUL CONSTRUCTION PROJECT EXECUTION IN NIGERIA

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ABSTRACT

This research was carried out develop Risk Management Support Framework for Successful Construction Project Delivery in Nigeria to help handle potential hazards during construction works. This will help to guarantee project's goals on schedule, budget, standard, precaution, and societal impact. Descriptive design of research was employed to gather opinions from contractors. The sample group was selected through random sampling while some Information were obtained through a literature review and analysed using relative Importance Index and Analysis of variance. The results revealed that risks present in both building projects can be grouped into several categories, such as financial, physical, construction, design, political, legal, and environmental dangers. The most vulnerable risks were found to be financial, construction, and physical. In terms of risk level. Most financial dangers were classified as catastrophic, while others were considered moderate. For construction and physical risks, most were classified as high, with a few rated as moderate. In conclusion, various steps were highlighted to mitigate risks in construction projects, including: ensuring proper funding, gathering extensive data, conducting feasibility evaluations, establishing practical contract schedules, acquiring information on work and revision costs, implementing staged pricing, preparing in advance for necessary permits and addressing utility and zoning needs, determining fixed pricing, and utilizing seasoned personnel.

Keywords: Risk Management, Analysis, Development, Framework, Construction Projects

INTRODUCTION

This research will focus on developing a risk management support framework for successful construction Project delivery in Nigeria will help stakeholders in the construction industry to determine the occurrence of danger factors in projects and also to determine the current practices of management of risks in Nigerian building sector. The building sector significantly drives economic growth by generating employment opportunities, adding value, and impacting on the GDP. Developing risk management support framework for successful construction delivery will be achieved through some of these following objectives like, Identification of the existing risk management framework that helps successful constructing

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project delivery, identification of the deficiencies in the already existing management framework in the construction industry, verification of risk management techniques applied during construction project execution and verification of the impact of applying risk management techniques in construction project execution in Nigeria.

Every construction project is different, and hazards can arise from a variety of sources. Management of risk remains vital to the attainment of goals due to the intricacy involved in building endeavours that involve multiple risks affecting a variety of stakeholders. Effective risk management in projects can lead to improved results by guaranteeing the successful achievement of project goals and exploring opportunities to positively impact objectives.

Risk remains a speculative event that could have impact on project objectives. The process of risk management and limiting the occurrences in order to decrease the impact of bad consequences and advance positive benefits is known as risk evaluation. Throughout the course of the project, a number of failures take place due to the risky and unpredictability of environmental project structure. Management of risk enhances the outcome of a project by ensuring its targets get achieved and through identifying opportunities to obtain favourable results.

Kirchberger (2018) describe construction as building, repair, maintenance, alteration, and demolition of structures such as roads, bridges, sewers, trains, communication networks, highways, and streets. The industry is highly significant due to its strong connections to other economic sectors and the significant impact it has on them. However, construction activities are not devoid of risk due to the demanding, dynamic, and complex nature of the industry. Research shows that both professionals and academics assert that construction works are prone to greater risks compared to other industries due to their intricate nature.

According to Marcell et al. (2019), an inability to control risk is the prime factor in projects going over budget, schedule, and other goals. Numerous scholars have researched subpar performance in building projects, including overruns of cost, scheduling hold ups, extortion, lateness, time-consuming disputes, and frivolous claims. Various frequently ineffective ways are used to manage construction risk in developing countries, which got a negative effect on performance. Marcell et al. (2019) did research to learn how managers steer dangers at a firm. The remaining respondents were employed in IT, finance, telecommunications, and production. 6.8% of the respondents worked in civil construction.

They did not specifically tailor their conclusions to the building industry as a result. Bodea (2016) also looked at how to gauge and help improve the capacity in companies to steer risk. Their study looked at organizational maturity rather than if the orderly procedures recommended through efficient risk management systems were adhered to. In order to systematize the process, this article attempts to assess current practices in the industry through different processes. Because of the projects' essence, management of risk is a crucial procedure. This research project has been motivated by this fact and looks at the development of management technique for delivery of project. It also contributes to outlining important strategies in risk management to enhance understanding of the field.

Several risk factors are associated with construction project execution, triggered this research that is geared towards developing risk management support framework for successful construction delivery in Nigeria. These include, time overrun, cost overrun, environmental issues, transport and logistics difficulties and construction material quality issues leading to structural collapse, financial risk as well as human resources issue. These factors also affect coordination and efficiency of several construction project industry participants like clients, contractors, developers and consultants thereby creating room for incorporating risk management into construction project execution.

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Concept of Risk Management Techniques and their Classification Criteria in the construction Industry Risk Management

Through the process of managing risks, they are identified, assessed, and mitigation strategies are chosen. To carry out the project's operations, all phases in the management approach should be put into action to deal with hazards. Because building projects are inherently risky, risk control becomes an essential task. To aid the reader in comprehending the work, this segment discusses techniques of managing project dangers, strategies, as well as standards that can be used to choose such techniques. A process for managing risk knowledge is also introduced, with an emphasis on the need to improve it in order to enable efficient risk control.

The management of risk procedure has to use particular instruments. Many different methods have been created in literature to this purpose; the most popular ones are listed here. Strategies for managing risk; the studied techniques have various objectives. For instance, some of them, Tree Decision Analysis, Expected Fiscal Value, SWOT evaluation, SWIFT evaluation, and What-if evaluation, to evaluate several scenarios, depending on whether dangerous events occur. In contrast, other methodologies focus in examining reasons as well as effects of harmful occurrences to identify causal links. They include the 5 Whys Technique, ETA Analysis, FTA Analysis, Human Dependency Evaluation, and Cause-Effect Diagram or Cause Consequence Analysis, among others. When selecting among several risk management strategies for a project, various factors may be taken into consideration. One frequently employed criterion considers the type of information that is accessible while qualitative processes rely on qualitative data and provide findings as illustrations and endorsement, statistical procedures are focused on numerical knowledge (Project Management Institute 2008). This kind, scope, scale, intricacy, creativity, and stages in a project's life cycle also influence which methodologies should be employed. The objective of the risk analysis, such as tracking time delays, verifying quality variance, or monitoring economic and financial outcomes, could result in factor of choosing the best management strategies; Kmec in 2011. The procedure’s ability of directing selection of approaches to be used at various situations based on the project itself and the organization carrying it out's maturity toward risk, this in turn depends on the quantity of information provided, as one key feature. The analysis of the literature demonstrates that there are numerous varied risk management processes that may be implemented using a variety of strategies, necessitating the need for instructions on when to apply each of them. Although there are approaches that concurrently take into consideration all the significant elements that should be considered when selecting a suitable technique of appropriate coping strategies, proposed methodologies above tend to concentrate on just one or a small number of aspects. Such classifications allow for better tool selection decisions, enhancing the process of hazard management and promoting a deeper comprehension of the elements mitigation hindering mitigation together with execution on related pursuits. The created framework proposes a categorization of strategies based on the most important characterizing scene that project hazard is tackled to add to filling observed gaps. Expansion of the construction business necessitates a grasp of Using risk management procedures will help it be best positioned to satisfy client’s expectations. This sector is infamous for danger management owing to multiple uncertainties brought on by expert evaluations' subjectivity, which causes projects falling through. The first, most crucial, and riskiest stage in risk management systems is risk identification, as indicated by many researchers. However, the Project Management Institute (PMI) (2017) asserts that strategy must be prepared prior to spotting and grouping dangers with causes since the whole management process must be structured. Identification works with grouping duties, spotting possible dangers on every

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project, covering causes and effects, record features that aid in assessing those risks, devise suitable solutions to them, and more in order to develop a knowledge of the conditions and events that contribute to risks. Between identification and control lies the process of risk analysis. This method values known origin of risk as well as unpredictability regarding goals. It frequently follows assessment of the consequences of risk consequences. The identified hazards are subjected to investigation. Quantitative risk evaluation measures possibility of risks materializing as well as the seriousness of the consequences they might have in a project. The recognition in crucial hazard components are made possible through qualitative hazard evaluation, as per Banaitiene & Banaitis (2012). All the threats that have been qualitatively identified need not be quantified. Project Management Institute PMI (2017) argues, not even all projects need it. Generally speaking, the school of thought agrees on the definition of quantitative risk analysis. Quantitative risk management, as per Banaitiene & Banaitis (2012), comprises more sophisticated techniques for evaluating and analyzing risk, as well as forecasting the likelihood that recognized risk factors will occur with potential impacts. The procedure of planning to address dangers that have been identified and assessed when they arise is known as risk response. The handling of agreed-upon project hazards and created alternatives addressing the whole project risk exposure are addressed by these articulated techniques, according to PMI (2017). This agreement is based on PMI's conviction that all project team members and significant stakeholders must accept the plan. At this point, a purchasing plan is put into action for responding to identified and assessed dangers when they materialize. This is the pinnacle of systematic risk management, according to Hansen-Addy & Fekpe (2015). Throughout this time, they continue to evaluate and respond to both current and emerging threats. Monitoring is done for secondary hazards as well as residual risks, or risks that continue even after risk mitigation measures have been put in place. Boateng et al. (2022) further noted that this stage is in charge of carrying out the risk mitigation strategy, which PMI (2017) categorized as a risk response, together with reviewing effectiveness on overall procedures, monitoring ongoing hazards, with finding new risks (Table 1).

Table 1
RATING RISK IDENTIFICATION TECHNIQUE

Risk Identification Techniques	Mean	Ranking
Historical Data	3.14	2
Checklists	2.46	4
Brainstorming	2.17	5
Intuition/judgment	3.30	1
Interviewing	2.10	6
Consulting expert	2.79	3

Source: Primary Data

The results showed different strategies are utilized incorrectly. Despite the fact that risk control exists as the most important factor, most responders depend on experience as well as are not familiar with reactive and proactive risk recognition techniques or systems (Mills, 2001). Additionally, utilization depends on project's essence, the organization's strategy, project management methodology, availability of resources, and the project team members' risk tolerance. This can be an indication that there isn't a single, universal approach to risk identification techniques. The results show that various techniques are applied on an as-needed basis. Most parties rely on their own knowledge and experience. Interviewing is the key method of recognizing risks, however it remains just the 6th method (mean 2.10). The results show that rather than thorough project analysis, the main methods for identifying Yemeni hazards are dependent on previous experiences, individual mastery, and information. This shows that

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identification does not occur in accordance with the findings of studies that identified expert consultation and brain-racking as efficient methods for identification of risk. The key causes of building project failure are clarified in the conclusion. It is pertinent to keep in mind that construction projects continue to fall short of their projected costs, completion dates, and quality standards.

Risk Analysis Techniques

Analysis of risk uses both qualitative and quantitative risk assessments. The hardest part of project risk management may be the risk analysis. A review of pertinent literature revealed numerous widely used qualitative and quantitative risk assessment strategies. The degree of application of three risk analysis techniques was rated by the participants. Table 2 presents the rating of techniques using their respective means: qualitative (2.20), quantitative (1.11), and semi-quantitative (1.23). The low mean values demonstrate that analysis is rarely employed to pinpoint already known dangers. The results showed that there are not many documents that have been examined for dangers using any method, which is best considered as an insignificant endeavour. Rarely are cutting-edge quantitative risk analysis methods employed. As most businesses lack the essential capability, and knowledge to monitor projects, together with insufficient data.

Table 2
RANKING OF RISK ANALYSIS TECHNIQUES

Risk Analysis Techniques	Mean	Ranking
Qualitative analysis	2.72	1
Quantitative analysis	1.10	3
Semi quantitative analysis	1.56	2

Source: Primary Data

The low mean results suggest that these groups are unaware of the value of analysis and that it is rarely utilized to pinpoint known threats. Rarely are sophisticated quantitative risk analysis techniques applied. Most of the firms are devoid of essential groundwork, expertise, as well as aptitude to trail ongoing together with completed construction projects, another challenge remains absence of reliable information necessary for assessments. The outcomes also showed that risk analysis was not carried out consistently. But they found entire process of analysis lacks method. Although (Hansen, 2015, Ghaleb, 2022, Alfadi, 2022) cited jointly conducted analysis among significant stakeholders most used practice, the findings of this research suggest the opposite. It shows that even though this became used for some situations, they didn't utilize constantly. It is sensible because risk cannot be evaluated systematically if not systematically discovered. This tools insufficiency for assessments addresses this. Hence, priorities remain unestablished, risks are not assessed for their possibility and impact, and the overall impact of projects is not calculated.

Risk Response Techniques

According to Table 3, the overall mean rankings of the different types of responses are as follows: To decrease the possibility of harm, you could: Lessen the risk (average score of 4.47), diminish the chance of it happening (average score of 3.76), keep the negative effects to a minimum (average score of 3.64), shift the risk to another party (average score of 3.46), divide the risk among multiple parties (average score of 3.17) and keep the risk within your own control (average score of 2.80). At the top of the list, avoiding risks involves passing up

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substantial business possibilities due to an overly cautious outlook. Organizations get revenue and raise their worth by taking risks. Making wise choices and seizing opportunities that can be effectively managed are advised, while dangers that are outside the organization's scope should be avoided. Knowledge of the risk management procedures is necessary in addition to experience and solid judgment while making informed decisions. However, the quality of the decision is seen as a factor in risk management. The decision-capacity makers to reach good or terrible decisions is largely influenced by the calibre of the information they get. During the processes of risk identification and analysis, information functions as the primary origin of information. According to ranking of risk mitigation techniques, the building industry has evolved significantly beyond just splitting risk and now primarily focuses on transferring risk. The findings indicate that there are no set guidelines when passing on risk to a business collaborator. Furthermore, they possess a flawed mind-set towards risk, frequently causing disputes and hindering objectives of project. Below results highlight a mixture of the methods of risk management techniques proves more effective.

Table 3
Ranking of risk response techniques.

Risk Response Techniques	Mean	Ranking
Diminish the chance of it happening (probability)	3.76	2
Keep the negative effects to a minimum (impact)	3.64	3
Lessen risk	4.47	1
Shift risk	3.46	4
Gathering information	2.10	6
Professional consultation	2.79	3

Source: Primary Data

Design professionals, construction leaders, and managers, alongside significant participants, can analyse ongoing as well as upcoming project strategies. The findings add to previously untapped knowledge by fostering a better understanding of risk control in the Nigerian construction sector. The sector has suffered financial and other losses as a result of contractors' inadequate risk management, and a quantitative research is recommended to detect these losses.

Research Gap

New risk control technique for the delivery of projects has not been successful. From the review of different literature Risk management. A variety of risk-related topics have been addressed, but not the new risk management technique. Compliances with risk management approaches were not taken into account in the studies described above. Although risk management practices have a significant impact on building project standards, they cannot completely eliminate the possibility of project failure.

METHODOLOGY

Procedure for investigation encompasses overall plan crafted in attaining goals and objectives of the study. Research techniques are simply instruments utilized in collecting and examining information for the research. In other terms, research techniques are considered a component of the methodology. This thesis is focused on creating a management of risk approach on delivery of construction project in the Nigerian nation. The literature review uncovered the primary concerns and widely accepted truths related to the problem being investigated. This allowed the researcher to recognize and comprehend the models previously

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utilized in evaluating management. Furthermore, the report aided in identifying issues not resolved of the study, serving as central theme.

Research Design

This investigation aims to gather perspectives from civil contractors concerning risk management in projects, using a descriptive design. A descriptive survey entails the examination of a group of individuals or items through collating and evaluating data from a limited number of individuals or items regarded as part of the entire group. This design is fitting for this study as it makes conclusions about the whole group.

Study Area

This study was exercised in Owerri North LGA of Imo State, South- east geopolitical zone of Nigeria. It is made of (Agbala, Aladimma 1, Amakohia-Akwakuma. Amorie, Akwa, Egbu, Emekuku, Emekuku I, Emekuku II, Emii, Ihitta, Ihitta Orgada, Ihitta- Oha, Ikenegbu, Inyogugu, Naze, Nekede, Obibi-Uratta I, Obibi-Uratta II, Ogbeke, Orji, Owerri, Ugwu Orji and Ulako), its headquarters are in the town of Orie Uratta. It is located in 5.4567◦N, 7.1144◦E (Figure 1).

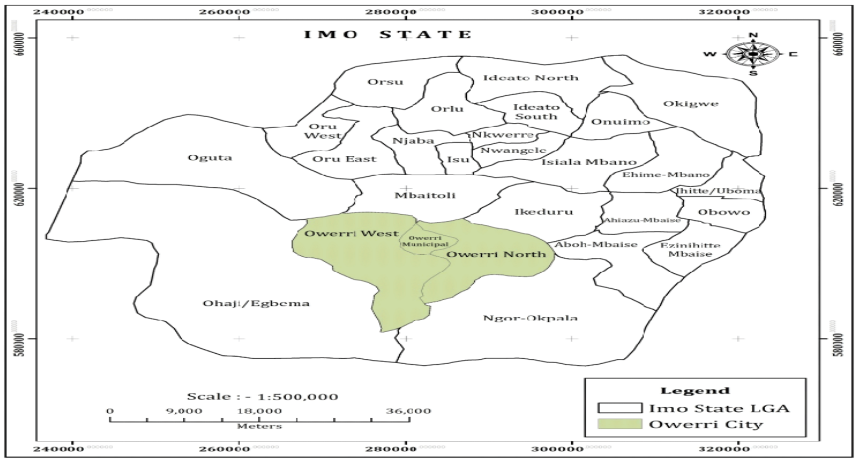

FIGURE 1
MAP OF OWERRI CITY IMO STATE

Source: Ifeanyi Chris Onwuadiochi

Population of the Study

The study's population encompasses all individuals or entities capable of executing construction projects in Owerri North LGA, Imo State. Due to the complexity and scale of obtaining the population, the sample population was limited to select professionals, including Land Surveyors Construction Project Managers, Surveyors, Engineers, Mechanical Engineers, Electrical Engineers, Architects, and Structural Engineers. Developers are also part of the population. The assessment of design expectations considers awareness of risk, identification, impact, and enhancement. The Nigerian practices are assessed against international standards, user needs, procurement procedures, and recommendations are made as appropriate (Abd El-Karim et al., 2017).

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Determination of Sample and Sampling Technique

The method for ascertaining the sample size involves utilizing the Taro Yamani formula, which was first introduced by Ken in 1994. The process is carried out below:

$$n = \frac{N}{1+Ne^2} \quad (1)$$

Where N = population, e = limit of error = 0.1, n = size of sample

Therefore, the participants group got selected from categories of owners, consultants, and contractors. As group got divided in aforementioned class, random stratified sampling was employed with the use of proportional allocation of sample size. The procedure for proportionate allocation of sample number involves:

$$\frac{n_h}{Q} = \frac{n_x}{N} \quad (2)$$

$$Nh = \frac{n_x Q}{N} \quad (3)$$

Where nh = stratum sample size, nx = total sample size, Q = stratum population size, and N = total population size. This Means that larger sample size got assigned with strata on a larger number and vice-versa.

Data sources

For this study, a variety of information sources were utilized. These can be broadly divided in dual categories: primary and secondary data. The former gathered through fieldwork and samples while the latter got obtained through professional reports, previous research, books, journals, maps, newspapers, reports, and various other documents.

Instrument of Data Collection and Measurement

A questionnaire was employed as the tool for gathering and measuring data. This questionnaire was designed through a comprehensive examination of related literature and had three sections. The initial section inquired about the background information and organizational details of the participant. The second part focused on the overarching theme from perspective on contractors together with subcontractors. The final section probed into the specific factors, with regards to their occurrence likelihood and project impact. The questionnaire also allowed for any additional remarks from the participant (Slee et al., 2012).

Method of Data Analysis

The method employed to arrive at the outcome aimed to determine the index relative on elements impacting thriving delivery of project in Nigeria's construction sector. Factor numbers were measured through aggregating numbers given by individuals surveyed. Relative importance index was determined for each factor. This was determined using the level of importance indicated by the perspectives of the stakeholders.

RESULTS AND DISCUSSION

Risks Analysis Using RII

Information gathered from the Relative Importance Index, that is a numerical process. Data was analytically processed and rated through the application of the formula of Relative Importance index (RII). RII= ∑w \ (A x N), W = Weight on individual risk (by response to questionnaire survey)

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A = Biggest weight, N = Responders who filled out the questionnaire

Risks were identified, quantified, and prioritized using the Relative Importance Index (RII) process. If values are high, it indicates a significant risk that requires immediate attention. On the other hand, if the RII value is low, it suggests a low or medium level of risk.

The ranking was done using different indicators that include, construction, design, political, topography, Land acquisition, Environmental, Organizational, accidental, utility, law and order.

The Risks ranking considered, Owner Alters, Resource of Equipment, Inadequate Planning Inadequate Construction Quality, Not preserving schedule of target, Selecting unsuitable machinery, Integrity and standard of design , Viability of methods of construction, Lack of communication , Absence of co-ordination, Inadequate Right of way, Unforeseen soil conditions, setback in submittals approval, setback in getting NOC's, Setback in expropriations, Alterations in rules, Payoffs, Governmental Ties, Risks of warfare Poorly designed contracts, Conflict in contract documents, Effect of environment on project Skillful Labor, Setback in preparing submittals, insufficient technology/skills/techniques Insufficient administration of claim, Pre-historical findings, inadequate safety measures, Material, Unexpected underground Utilities, Current traffic and Third party culpability (Table 4).

Table 4
RISK ANALYSIS USING RELATIVE IMPORTANCE INDEX (RII)

Risk Category	Risk No.	Risks	RII	Rank
Construction	R1	Owner Alters	0.513	34
	R2	Resource of Equipment	0.623	23
	R3	Inadequate Planning	0.757	7
	R4	Inadequate Construction Quality	0.773	5
	R5	Not preserving schedule of target	0.750	9
	R6	Selecting unsuitable machinery	0.843	2
Design	R7	Integrity and standard of design	0.767	6
	R8	Viability of methods of construction	0.700	12
	R9	Lack of communication	0.783	4
	R10	Absence of co-ordination	0.877	1
Topography	R11	Inadequate Right of way	0.657	17
	R12	Unforeseen soil conditions	0.673	15
Political	R13	Setback in submittals approval	0.670	16
	R14	Setback in getting NOC's	0.743	10
	R15	Setback in expropriations	0.637	20
	R16	Alterations in rules	0.567	31
	R17	Payoffs	0.430	39
	R18	Governmental Ties	0.577	30
	R19	Risks of warfare	0.397	40
Land acquisition	R20	Poorly designed contracts	0.640	19
	R21	Conflict in contract documents	0.623	23
Environmental	R22	Effect of environment on project	0.693	13
Organizational	R23	Skilful Labour	0.587	28
	R24	Setback in preparing submittals	0.647	18
	R25	Insufficient technology/skills/techniques	0.810	3
	R26	Insufficient administration of claim	0.627	22
Accidental	R27	Pre-Historical Finds	0.533	32
	R28	Inadequate safety measures	0.740	11
Utilities	R29	Material	0.580	29
	R30	Unexpected underground Utilities	0.613	25
Law & order	R31	Current traffic	0.603	27
	R32	Third party culpability	0.533	32

Source: Primary Data

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The hazards are listed in the table above under the primary categories of risks; the Construction Risks are numbered R1–R6, while the Risks Associated with Design are numbered R7–R10. Topography risks range from R11 to R12, political risks from R13 to R19, land acquisition risks from R20 to R21, environmental risks from R22, organizational risks from R23 to R26, accidental risks from R27 to R28, and utilities risks from R29 to R32. This research is based on the risk assessment gathered from the qquestionnaire survey of building projects.

Survey Response

Out of the hundred and one (101) questionnaires distributed to construction companies seventy-nine (79) or a total of 53% of participants responded to the questionnaire, which was considered sufficient for data analysis purposes. Questionnaire was filled by groups on individuals, including clients, contractors, and subcontractors, who are all involved in construction projects. These participants were defined by the NBPP in 2011:

a) A contractor is a person or entity (private, government-owned, or a combination of the two), who has submitted a bid to perform the work accepted by the employer and is named as such in the SCC and Contract. This definition also includes any legal substitutes or approved assigns.
b) A subcontractor is a person or entity (private, government-owned, or a combination of the two), including its legal substitutes or approved assigns, who has a contract with the contractor to perform a portion of the work specified in the contract, which includes work at the construction site.
c) A client entails person listed in SCC who hires contractor to perform job.

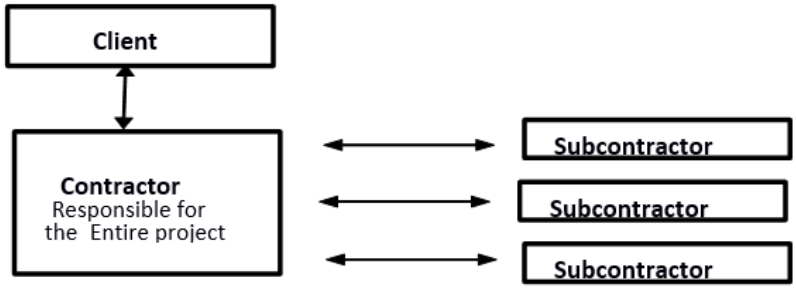

FIGURE 2
THE WAY WHICH DIFFERENT ENTITIES INTERACT AND CONNECT DURING THE COURSE OF A BUILDING PROJECT

Source: Baarimah et al., 2022

Figure 2 depicts the straightforward relationship structure between the aforementioned parties involved in a building project.

Presentation and Analysis of the Questionnaire Survey

Before distribution, researcher wrote a unique identifier in keeping track of responders' names and to organize study. For reasons of secrecy, questionnaires were made anonymous, yet the researcher was the only one who knew the answers. N (total responders) = 79

Descriptive Analysis of General Respondents' Background Information

Professional Roles

Responders' distribution through profession is shown in Table 5. Given that the respondents were professionals, it is clear from Table 5 that they should have been able to provide responses that accurately represented their expertise and general professionalism. According to the table, project managers made up the bulk of the sample (35.6%), architects

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(25.4%), civil engineers (24.5%), and quantity surveyors (14.6%). This shows that the poll included project managers heavily and that their opinions were legitimately gathered.

Table 5
RESPONSES WERE DISTRIBUTED ACROSS DIFFERENT PROFESSIONS

Profession	Frequency	Percent	Remark
Civil Engineer	20	24.5	
Architect	18	25.4	
Quantity Surveyor	15	14.6	
Project Manager	36	35.6	Dominant

Source: Primary Data

Respondents' Years of Experience

Participants were assessed in this part based on their actual experience working on projects (Table 6). Table 6 shows 41.1% of responders had job experience ranging from 6 to 10 years. The group of children aged 1 to 5 years came in second with 22.7%. Participants experienced with more than 25 years made up 0.3% of responders, while participants with experience between 21 and 25 years made up 3.5% of the total. Those that engage in construction business, particularly private organizations, got experienced from 6 to 10 years in a nation like Nigeria. Given that the respondents' combined experience ranged from one to ten years, it can be concluded that they have the necessary background knowledge to comprehend and engage in a meaningful discussion of the key problems surrounding control of risk in the building construction industry.

Table 6
DISTRIBUTION OF THE RESPONDENTS BASED ON WORK EXPERIENCE

Work experience	Frequency	Percent	Remark
1 to 5 years	16	22.7	
6 to 10 years	35	41.1	Dominant
11 to 15 years	13	18.7	
16 to 20 years	8	4.1	
21 to 25 years	6	3.5	
Over 25 years	1	0.3	
None (no response)	10	9.6	

Source: Primary Data

Project Management /Risk Management Experience

Here, responders' practical experience with management was assessed (Table 7). Table 7 reveals although 52.8% of respondents believe they may have risk management expertise, 47.2% of respondents have project management or control of risk experience. This suggests a significant portion of responders lack enough expertise to identify and manage risks in their initiatives. It exemplifies prevailing mind set at Nigeria towards idea of project risk in projects and absence of familiarity with formality procedures. Nigerian construction professionals should make an effort in getting familiar with project management/risk management techniques that would enable them to lessen the probability and severity of risk events in their project.

Table 7
RISK MANAGEMENT OR/AND PROJECT MANAGEMENT EXPERIENCE

Risk management or/and project management experience	Frequency	Percent	Remark
Yes	39	47.2	
Maybe	50	52.8	Dominant

Source: Primary Data

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Risk Encountered in Building Construction Projects

The answers of respondents whose initiatives included risk are shown in Table 8. Table 8 reveals that 98.3% of respondents reported encountering hazards in their initiatives, whereas 1.7% said they had none. According to the majority of the respondents, the Nigeria building sector suffers risk on a continual basis, which causes funding and duration overruns with standard issues. This is evident from the preliminary numbers acquired throughout this inquiry.

Table 8
RESPONSES ON THOSE WHO ENCOUNTERED RISK ON THEIR PROJECTS

Responses	Frequency	Percent	Remark
Yes	83	98.3	Dominant
No	6	1.7	

Source: Primary Data

Risk Assessment Techniques Applied in Building Construction Projects

The prevalence of risk management strategies used by respondents to building projects gets shown in Table 9. According to Table 9, the technical method to risk management is used by 13.7% of respondents, the professional advice and technicality approach with evaluation (0.6%). Project's completion on schedule, in anticipated budget and time frame, and within the necessary standards for quality, safety, and the environment are among the main thriving indicators in construction management (El-Karim, Naway and Abdel-Alim, 2015). Table 9's findings, however, show nonexistence of well-accepted management systems may aid Nigerian professionals control risk impacting building construction projects. Unskilled evaluation may cause disastrous effects on businesses and the sector as a whole. It is now important to set up a structure that will enhance project finishing while attaining the highest level of quality.

Table 9
DISTRIBUTION OF RISK MANAGEMENT TECHNIQUES

SN	Techniques	Frequency	Percent	Remark
1	None (no response)	38	11	
2	Applying expert method to the cost	11	3.2	
3	Analysis of assumptions	8	2.3	
4	Brain racking and professional judgment	8	2.3	
5	Cost factors analysis	8	2.3	
6	Evaluate LTI reports	5	1.5	
7	Professional opinion	46	13.4	
8	Identification, evaluation and technical answer	5	1.5	
9	Evaluation of impact	6	1.7	
10	Modeling and building	7	2.0	
11	Modeling and simulation	9	2.6	
12	Analysis of risk	27	7.9	
13	Techniques of risk analysis	9	2.6	
14	Risk evaluation	9	2.6	
15	Probability of risk	10	2.9	
16	Probability of risk and impact evaluation	30	8.7	
17	Urgency of risk	6	1.7	
18	Approach of technicalities	47	13.7	Dominant
19	Approach of technicalities and evaluation	2	0.6	
20	Approach of technicalities and impact evaluation	8	2.3	
21	Measurement of technicalities	17	5.0	
22	Technical performance	5	1.5	
23	Technical performance measurement	22	6.4	

Source: Primary Data

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Systematic Risk Management Process Applied in Building Construction Projects

Table 10 presents the findings from the survey participants regarding the significance of risk management at various stages. The results demonstrate most responders, 88.0%, believe that risk management is highly critical during the project initiation phase. This is followed by 84.5% who consider risk management as vital during the design phase. The results further indicate that 79.9% believe management of risk is crucial during the construction stage, while 64.4% hold the same belief for the project completion stage. The results are equal with belief projects entail significant organizational complexities due to the wide varieties on unpredictable events that can impact the project's outcome (Taillandier et al., 2015). Overall, results tell most responders at Nigeria acknowledge importance in incorporating risk management throughout the entire projects lifespan.

Table 10
IMPORTANCE OF RISK MANAGEMENT IN THE DIFFERENT PHASES OF THE PROJECT

Phases of the project	Unimportant	%	Not so important	%	Fairly very important	%	Important	%
Project initiation	0	.00	29	8.5	12	3.5	302	88.0
Design	0	.00	1	0.3	52	15.2	290	84.5
Construction	0	.00	1	0.3	68	19.8	274	79.9
Project completion	2	0.6	18	5.2	102	29.7	221	64.4

Source: Primary Data

H₁: *Significant impact of risk management on the project delivery*

Table 11
ANALYSIS ON VARIANCE (ANOVA[a])

Model	Sum of squares	Df	Mean Square	F	Sig.
Regression	6000.882	4	1500.221	4.1775	.555[b]
Residual	359.118	1	359.118		
Total	2360.000	5			

Source: Primary Data

a) Dependent variable: project delivery
b) Independent variable:(constant), maybe, fair, high, low

A statistical analysis using the F-statistics was conducted to examine the variance in the regression (Table 11). The F-statistics is utilized to determine the significance of the overall effect of the independent variables (high, fair, low, and maybe) on the dependent variable (delivery of project).

Hypothesis 2

The results indicate that capitalization of construction firms in risk management has no significant effect on project delivery in Nigeria's construction sector. This stays according to the findings in Table 12 which examines the level of knowledge on capitalization.

Table 12
RESULTS INDICATE THAT CAPITALIZATION OF CONSTRUCTION FIRMS IN RISK MANAGEMENT

Opinion	Frequency	Percent	Valid percent	Cumulative percent
Yes	77	62.1	70	70
No	11	8.9	10	80
Little	22	17.7	20	100
Missing system	14	11.3	-	
Total	124	100	100	

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Primary Data

Table 12 shows that 70% of the survey participants possess a strong understanding of capitalization and merger and acquisition. On the other hand, 10% of the respondents have limited knowledge of these concepts, while the remaining 20% have a fair level of understanding. These results indicate that most responders have a good idea on capitalization.

Hypothesis 3

Significant impact of risk Identification in construction project delivery

According to the following table, regression analysis for hypothesis 3 revealed that the r square = 0.120, which suggests that 12% of the dependent variable project thriving could be forecast by the identification of independent variable risk (Table 13).

Table 13
ANALYSIS OF REGRESSION FOR H3 MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.346[a]	.120	.112	2.48427

Predicators: (Constant), Identification

The F-value is 15.919, and the p-value is less than 0.01, which implies that both project success and risk identification have a significant contribution to the regression analysis. The table displays the constant and beta values, with the constant being 5.160, indicating that the project success score is 5.160 when the risk identification score is zero. The beta value is 0.346, indicating that for every unit increase in risk identification, the project success score is predicted to change by 0.346 (Table 14).

Table 14
COEFFICIENTS

Model	Un standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(constant)	5.160	.765		6.741	.000
Identification	.363	.091	.346	3.990	.000

Dependent Variable: Project Success

Risk Management Framework

Construction businesses may choose the security measures they believe are required to protect the organization, its members, as well as its operations and assets by using a framework (Figure 3).

FIGURE 3
RISK MANAGEMENT FRAMEWORK FOR SUCCESSFUL PROJECT DELIVERY

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The proposed framework is the main emphasis of management of risk, which encompasses identification of risk, assessment of risk, risk reaction, with objective of evaluating risk treatment. This research highlights the importance of adopting the management cycle for project thriving in firms. The framework involves:

a) Using identification techniques to identify risk events
b) Analysing the origin and impact of risks
c) Assessing and responding to risks using risk response techniques
d) Managing the dangers and chosen response techniques
e) Employing management cycle to help contractor businesses complete projects successfully.

The analysis presents applied techniques and a correlation analysis that demonstrates the connection among the techniques with realized advantages. The correlation analysis was conducted using Pearson's correlation to examine the relation between successful management of risk and project success (Table 15).

Table 15
PEARSON CORRELATION BETWEEN EFFECTIVE RISK MANAGEMENT AND PROJECT SUCCESS

Indicators of Risk	Risk Identification	Risk Assessment	Risk Response	Project Successes
Risk Identification	1.000			
Risk Assessment	0.778 [a]	1.000		
Risk Response	0.809 [a]	0.730 [a]	1.000	
Project Successes	0.780 [a]	0.649 [a]	0.774 [a]	1.000

Source: Primary Data

Correlation is significant at the 0.05 level (2-tailed).

The results indicate that, at a significance level of 0.05, the project success values were significantly linked to risk identification, risk analysis, and risk response, as shown by the positive Pearson coefficient. This supports the hypothesis that effective risk management, which includes the three components, positively impacts project success. The findings align with the research of Tang et al. (2007) that showed that betterment of an aspect of management of risk leads to positive outcomes in other risk management processes.

Steps in Risk Management Framework

Step 1: Information system categorization

This action establishes a framework for the framework, its associated procedures, and security strategy. The risk management must first classify the information system and record the outcomes of that classification.

Step 2: Picking security measures

According to a 2018 survey on evaluation of risk indices, 62% of Organizations have gone through a critical risk event three years prior to the evaluation. This implies that organizational security measures are most crucial currently. In order to boost performance, common controls on security now include hybrids controls and scheme controls. The methods for conducting regular control monitoring should be implemented in this stage.

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Step 3: Put Security Controls in Place

The security measures selected previous stage are put into practice in this measure. Then, they have to observe to ensure they meet standards. In that stage, adequate information system utilize patterns and security engineering approaches are chosen. To effectively control risk, the enterprise has to imbibe the proper security precautions. This is why a risk management framework must be successfully implemented; it ensures employee safety, the organization's general health, and the public's perception of the brand.

Step 4: Evaluating security controls

An external evaluator is summoned to the firm to scrutinize and validate the procedures once all safety measures have been implemented and all standards for assurance and compliance are satisfied. The reviewer will look for any security control inconsistencies. Should any imperfections be uncovered, the company will rectify them prior to revising its security plan as necessary.

Step 5: Authorization of Information System

The company must provide a package for approval that addresses the complete evaluation and identification of risks for the company after the assessment procedures have been completed. The manager of this procedure will keep necessary parties abreast of decision for authorization.

Step 6: Keeping an eye on all security measures

Continuing risk management is the last phase in framework creation procedure. The company must consistently and effectively monitor all security controls. Additionally, they must keep in mind any modifications based on changes to the environment or the system. Regular updates are also required for the risk management framework's security status. Periodically, reports are created and distributed to see if any flaws need attention.

Risk Management Support Framework

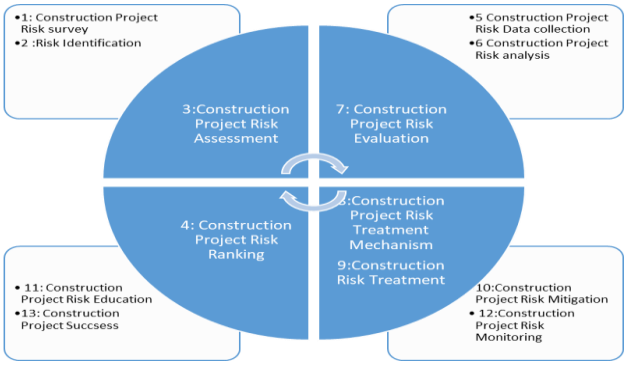

FIGURE 4
RISK MANAGEMENT SUPPORT FRAMEWORK

Source: Research result

a) Construction Project risk survey will help the stakeholders in the construction industry to identify the select the observed risk during construction project execution (Figure 4).
b) Risk Identification: This framework applies and utilizes three risk identification methods, namely the Delphi technique, the Nominal Group Technique, and Brainstorming, which have been adapted from

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non-construction industries. Brainstorming emerged as the most widely used method for identifying risks. Critical security control (CSC) can be used in to input potential risk into the system. This could be accompanied by performance of pen test that would be computed into the system and subsequently encouraging employees to enter risk into the system as well as performing control gap analysis to identify the security baseline via suitable cyber security framework. Vulnerability management system should also be applied in the process.

c) Construction project risk assessment; for determination of gaps in compliance of the stipulated standard and assessment of possible effect of vendor risk on the construction industry.
d) Construction project risk ranking to prioritise risk according the weight of low risk, moderated risk, high risk, very high risk
e) Risk data collection which implies that accumulated risk data would be collected to give assess to stakeholders to calculate the extent of risk using statistical methods of calculation.
f) Construction project risk analysis would allow construction project managers to analyse risk to find possible solution to best risk management practices that could be sustainable and globally acceptable.
g) Risk evaluation is designed to compare any estimated risk with any stated risk indices in other to determine any possible risk significance. This would help project risk managers to determine how tolerable risk can be as well as in taking best decision on how risk can be treated. European Union Agency for Cyber Security (2023).
h) Construction project Risk Treatment Mechanism include, risk avoidance in the course of construction project execution and management, risk acceptance in the course of construction project execution and management, risk control in the course of construction project execution and management, and risk transfer to another party in the course of construction project execution and management. Granite Insurance (2020)
i) Construction project risk treatment involves the process of selection and implementation of ways or strategies of risk modification.
j) Construction project risk mitigation is the process of reduction of risk exposure during construction project execution and management. This would involve risk mitigation planning. Riskoptics (2023).
k) Construction Project risk monitoring is involving the process of assessing construction project risks and making informed decisions about their management. Safety Culture (2023).
l) Construction project risk Education involves
m) Define the risk strategy: The currency risk sharing method (CRSM) is made available as a risk model to aid contractors locate threats, carefully evaluate and control them. Some of the strategies for managing risk are avoidance, transfer, and retention, reduction in loss, prevention, and insurance.
n) Develop risk processes: Three stages of a risk management method in construction are risk detection, risk evaluation, and risk reaction. The evolution of risk procedures, especially in Nigeria, is the main topic of this essay. The risk in the risk management methods of many different businesses is reactive and informal to deal with since the construction industry's current risk management strategy often aims to prevent or transfer these risks. However, there is presently a strong desire to learn from previous mistakes and a rising understanding of risk management.

Discussion of Findings

Risk evaluation is an important activity that must be carried out to prevent negative impacts from emerging at the start of a highway project. The goal of this research is to learn more about risk evaluation and how crucial it is to a project's success. The risk evaluation process would aid a clearer comprehension of potential outcomes throughout the highway building phase. By making decisions and preparing for preventative actions, it helps avert certain calamities. There will be some performance gains in the project thanks to risk assessment. This analysis made it evident that the top five key hazards in the highway building project are mostly inadequate construction quality, unsuitable equipment selection, an absence of communication, an absence of coordination, and inadequate tech, expertise, and procedures. Understanding these significant risks will aid in creating preventative measures, resulting in less issues, reduced downtime, and improved budget planning throughout the implementation of the building project.

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Received: 04-Nov-2024, Manuscript No. JIACS-24-15527; **Editor assigned:** 05-Nov-2024, Pre QC No. JIACS-24-15527 (PQ); **Reviewed:** 19-Nov-2024, QC No. JIACS-24-15527; **Revised:** 25-Nov-2024, Manuscript No. JIACS-24-15527 (R); **Published:** 29-Nov-2024

Citation Information: Enyinna, G.C., Oguzie, J.O.C., Moneke, U.U., Chukwu, E.E., Nmesoma, O.B., Okangba, S., Anyanwu, C.I., Onwuka, U.S., Okonkwo, C.B., Okwara, I.D. (2024). Risk management support framework for successful construction project execution in Nigeria. *Journal of the International Academy for Case Studies, 30*(S3), 1-18.