
Evaluation of the risk management practices in the process of construction project in Anambra state, Nigeria

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ABSTRACT

Risk is inherent in all construction activities and this inherent nature of risks contributes to the inability in achieving the triple constraint factors of time, budget, and quality objectives. This study is to evaluate the risk management practices in the process of construction project in Anambra state, Nigeria. Considering the nature of this research, survey research method was adopted for this research. Data for this study were obtained from both primary and secondary sources which are classified as primary and secondary data. The population of this study is the number of identified building contractors registered with the Ministry of Works, Awka and have on-going projects within the cities of Awka and Onitsha. Fifty-two (52) of such contractors were identified and considered as the population. The sample size for the study is fifty (52) being the total population. The study used the SPSS and Microsoft excel to analyze data. The results were analysed in percentages and figures using descriptive statistics and presented in the form of bar charts and tables. It was also used to rank the identified risk factors and the risk management practices being used by contracting firms. The study revealed that Majority of the identified risks have significant effects on construction projects. It is recommended that qualified professionals be involved in construction activities in Nigeria. Quackery should be discouraged.

KEYWORDS

risk management practices

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INTRODUCTION

In construction projects, it is virtually not possible to record a zero risk. Risk is inherent in all construction activities. The inherent nature of risks contributes to the inability in achieving the triple constraint factors of time, budget, and quality objectives (Loosemore, 2006). Construction projects can be very complex and full of uncertainties. The risks and uncertainties can have potentially harmful effects on projects (Mills, 2001; Flanagan et al, 2006).

In order to fulfil project objectives with specific attention on quality, environmental sustainability, time, cost and safety, Construction Project Risk management has been identified as a key step to undertake. In a twist of events, most studies conducted in the area of risk management have directed attention on certain aspect of construction project risk management to the neglect of a comprehensive and holistic approach with a focused view aimed at identifying construction risks, their probability of occurrence and the impact on project objectives (Abu-Mousa, 2005).

The construction sector with its myriad of activities arguably is embedded more with risks and uncertainties compared with other industries. In dealing with risks, some industries have developed suitable risk management techniques to make them more proactive in handling risk associated with projects. The usage of these risk management techniques is not popular within the construction industry and therefore not generally used. Risk is inherently part of all projects, irrespective of area of operation and magnitude of project. There isn't any absolute risk-free project and therefore if the risks are not carefully identified, properly analyzed and workable risk management strategies put in place, then the likelihood of the project failure will be high (Mahendra, 2013).

From the aforementioned insights on risk and its management, it can be pointed out that players within the construction industry are faced with a challenge of an effective risk assessment and management system needed to help in the risk management process. Construction Risk management is presented to aid in identifying project risks, systematically analyze them and use appropriate tools and techniques in managing them. Hence, in order to unravel project complexity and reduce construction risk, there is the need for systematic risk management (Al-Bahar, 1990).

From the foregoing challenges and issues relating to risk in the construction sector and using the Anambra state Construction sector as a case study, this study sought to identify risks in the current construction sector and evaluate the severity through an extensive study of literature and to examine the risk management techniques and practices if any being used by the Contractors.

Aim and Objectives of The Study

The aim of this study is to evaluate the risk management practices in the process of construction project with view to providing measures that would reduce risk occurrence in projects in Anambra state, Nigeria.

In order to achieve the above stated aim, specifically the study sought to:

- (1) Identify the risk management techniques that are being practiced in Anambra State.
- (2) Identify Challenges/constraints to risk management in construction projects in Anambra state.

Research Questions

Drawing from the research problems, the following questions were posed:

- (1) What are the risk management techniques and practices being used to control the identified risks in Anambra State?
- (2) What are the Challenges/constraints to risk management in construction projects in Anambra state?

Hypothesis

H₀: Risk have no significant effect on the Construction projects in Anambra State.

REVIEW OF RELATED LITERATURE

Concept of Risks Management

Managing risk has existed since the beginning of civilization when people needed to store their harvest for future use, and when forts and fences were built to protect villages and possessions. Another example is when a tradesman manages his risk when moving goods from one place to another by having the buyer pay the seller a security deposit to be returned once the buyer receives the merchandise in good condition, so if the tradesman faces any disasters during his journey, he receives compensation. From Babylonian times until the Age of Enlightenment, risk was not managed thoroughly, but was based on „gut feeling“. However, a more orderly methodology was seen after statisticians and theorists developed quantified techniques for assessing risk (Douglas, 2009).

In construction project management, management of risk is an integral of the decision-making channel (Tang et al., 2007). Risk management (RM) improves the future prospects of a project as it identifies uncertainties and probabilities (Borge, 2001). It is defined as a systemic process by which all project related risks are identified and evaluated by quantifying them, in order to take a sound decision in handling the risk (Zou et al., 2007). According to Walker (2000), Construction project management is defined as:

“ The planning , co-ordination and control of a project from conception to completion (including commissioning) on behalf of a client requiring the identification of the clients’ objectives in terms of utility, function, quality, time and cost, and the establishment of relationships between resources, integrating, monitoring and controlling the contributors to the project and their outputs, and evaluating and selecting alternatives in pursuit of the client’s satisfaction with the project outcomes.”

The Institute of Risk Management (IRM) states that risk management (RM) is a rapidly developing discipline with no clear viewpoints or consensus on what is involved in risk. The IRM identifies risk as having two dimensions: positive and negative. Positive risks could have positive impacts on the success of a project, and negative risks are associated with the possible failures of a project (IRM, 2002).

Empirical Literature

The subject of risk management has been influential ever since colonies of people have evolved.

Jekale (2015) discussed the attitude of large United States construction firms toward risk and determined how the contractors conduct construction risk management through a survey of the top 100 contractors. The study showed that in the recent years contractors are more willing to assume risks that accompany contractual and legal problem in the form of risk sharing with the owner. The survey also found that contractors assume the risk associated with actual quantities toward the practice of defensive engineering is determined.

Akintoye and MacLeod (1997) studied the construction industry's perception of risk associated with its activities and the extent to which the industry uses risk analysis and management techniques with the help of a questionnaire survey of general contractors and project managers. The authors concluded that risk management is essential to construction activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time and quality. Risk analysis and management in construction depend mainly on intuition, judgement and experience. Formal risk analysis and management techniques are rarely used due to a lack of knowledge and to doubts on the suitability of these techniques for construction industry activities.

Shen (1997) identified the most serious project delay risks and the effective actions for managing these risks. Practitioners' risk management actions and their effectiveness have been investigated through a questionnaire survey. It revealed that methods where practitioners' experience and subjective judgement are used are the most effective and important risk management action, and that methods using quantitative analytical techniques have been rarely used due to limited understanding and experience. The findings also suggest a need to promote the application and awareness of various analytical techniques for risk management in a proper context in the Hong Kong construction industry.

Wang (2017) conducted an international survey on risk management of build operate and transfer projects in China. The overall objectives of the survey are (1) to identify the unique or critical risks associated with China's build operate and transfer projects; (2) to evaluate the effectiveness of measures for mitigating these risks; (3) to examine the key contract clauses used in Laibin B's concession agreement; and (4) to provide a risk management framework for investing in future build operate and transfer projects in China. The study discussed the adequacy of key contract clauses in Laibin B's concession agreement related to the political and force majeure risks in China, from the perspective of foreign developers, lawyers, and lenders. The contract clauses discussed include changes in law, corruption, and delay in approval, expropriation, and force majeure.

Sudong et al (2013) formed a systematic classification of existing evaluation methods developed a new method—the net-present-value-at-risk (NPV-at-risk) method—by combining the weighted average cost of capital and dual risk-return methods. The evaluation of two hypothetical power projects showed that the NPV-at-risk method can provide a better decision for risk evaluation of, and investment in, privately financed infrastructure projects. Shou (2014) based on their survey on risk management of build-operate-transfer (BOT) projects in developing countries, with emphasis on infrastructure projects in China, discussed specifically the criticality of the political and force majeure risks. Based on the survey, critical risks, in descending order of criticality, were identified: Chinese Parties' reliability and creditworthiness, change in law, force majeure, and delay in approval, expropriation, and corruption. The measures for mitigating each of these risks are also discussed.

Hastak and Shake (2015) developed a risk assessment model for international construction projects named ICRAM-1. The paper discusses some of the existing models for country risk assessment, presents potential risk indicators at the macro, market, and project levels, and explains the ICRAM-1 methodology through an applied example. Four main results are obtained from the ICRAM-1 analysis: (i) High-risk indicators; (ii) impact of country environment on a specific project; (iii) impact of market environment on a specific project; and (iv) overall project risk.

Hastak and Shaked (2015) in their study classified all risks specific to whole construction scenario into three broad levels, i.e. country, market and project levels. Macroeconomic stability is partly linked to the stance of fiscal and monetary policy, and to a country's vulnerability to economic shocks. Construction market level risks, for a foreign firm, include technological advantage over local competitors, availability of construction resources, complexity of regulatory processes, and attitude of local and foreign governments towards the construction industry while project level risks are specific to construction sites and include logistic constraints, improper design, site safety, improper quality control and environmental protection, etc.

APM (2001) studied the problem of risk management of international and joint venture projects with foreign co-operation in Russia. The author identified classified and assessed risks inherent to joint venture projects in Russia and practical recommendation for risk management.

Shen et al (2001) based on their survey, established a risk significance index to show the relative significance among the risks associated with the joint ventures in the Chinese construction procurement practice. Real cases were examined to show the risk environment faced by joint ventures. Kartam and Kartam (2001) based on a questionnaire survey found that contractors show more willingness to accept risks that are contractual and legal related rather than other types of risks. Their research also indicated that the application of formal risk analysis techniques is limited in the Kuwaiti construction industry.

Kapila¹ and Hendrickson (2001) they identified the financial risk factors associated with international construction ventures from an integrated perspective. They examined the most effective mitigation measures adopted by construction professionals in managing these risks for their construction projects and suggest other means of risk aversion.

Thomas et al (2003) of IIT Madras, carried out risk perception analysis to evaluate the risk criticality, risk management capability, risk allocation/sharing preference, and factors influencing risk acceptance of major stakeholders in BO projects. They surveyed various senior project participants such as government officials, promoters, lenders and consultants of Indian BOT road projects. Eight types of risks have been identified as very critical in the Indian road sector under BOT set up with traffic revenue risk being the most critical. The study revealed that the factors and their relative influence on the risk acceptance of stakeholders are considerably different.

Sheen (2003) established a risk significance index, based on a survey to show the relative significance among the risks associated with the joint ventures in the Chinese construction procurement practice. Real cases were examined to show the risk environment faced by joint ventures. The paper also investigated practical applications of risk management in the business of joint ventures. Jannadi and Almishari (2003) developed and computerized a risk assessor model (RAM) to determine the risk associated with particular activity and the justification factor

Nasir et al (2003) developed a method to assist in the determination of the lower and upper activity duration values for schedule risk analysis by program evaluation and review technique analysis or Monte Carlo simulation. Probabilities for various combinations of parents for each risk variable were obtained through an expert interview survey and incorporated into the model. Finally, sensitivity analysis was performed. The model was tested using 17 case studies.

Sudong and Robert (2003) used Monte Carlo simulation, to evaluate the mean net present value (NPV), variance and NPV-at-risk of different concession period structures. They analyzed the influence of project characteristics on concession period design to evaluate the feasibility of the design. They concluded that a well-designed concession period structure can create a 'win-win' solution for both project promoter and the host government.

Hillson (2004) presented a risk assessment methodology for underground construction projects. A formalized procedure and associated tools were developed to assess and manage the risks involved in underground construction. The suggested risk assessment procedure is composed of four steps of identifying, analyzing, evaluating, and managing the risks inherent in construction projects. The main tool of the proposed risk assessment methodology is the risk analysis software. The risk analysis software is built upon an uncertainty model based on fuzzy concept. Other tools developed in this study include the survey sheets for collecting risk-related information and the detail check sheets for risk identification and analysis. They finally discussed a detailed case study of the developed risk assessment methodology performed for a subway construction project in Korea.

Lyons and Skitmore (2007) conducted a survey of senior management involved in the Queensland engineering construction industry, concerning the usage of risk management techniques. Their survey results are compared with four earlier surveys conducted around the world which indicates that: the use of risk management is moderate to high, with very little differences between the types, sizes and risk tolerance of the organizations, and experience and risk tolerance of the individual respondents; risk management usage in the execution and planning stages of the project life cycle is higher than in the conceptual or termination phases; risk identification and risk assessment are the most often used risk management elements ahead of risk response and risk documentation; brainstorming is the most common risk identification technique used; qualitative methods of risk assessment are used most frequently; risk reduction is the most frequently used risk response method, with the use of contingencies and contractual transfers preferred over insurance; and project teams are the most frequent group used for risk analysis, ahead of in-house specialists and consultants.

Wang (2017) conducted multiple-case studies using a systematic analytical procedure to identify risks in highway projects in Taiwan, to recognize risk allocation by contract clauses, and to analyze the influence of risk allocation on the contractor's risk handling strategies. The results show that the owner allocates risks by stipulating specific contract clauses into five kinds of risk allocation conditions. If a risk is more controllable by the contractor, the owner has a greater tendency to allocate the risk to the contractor. Risk allocation determines which kinds of risks the contractor would take and influences the contractor's risk handling decisions. The analysis furthermore indicated that, if the probability of a certain risk event condition is uncontrollable, then with the increasing possibility of taking the risk, the contractor's tendency of risk handling changes from actively transferring the risk to passively retaining the risk. In contrast, if a risk is controllable and certainly allocated to the contractor, the contractor tends to take the initiative to reduce the impact caused by the risk event rather than retain the risk.

Shou et.al (2014) identified twenty-eight critical risks associated with international construction projects in developing countries and categorized them into three hierarchy levels (Country, Market and Project), of which 22 were evaluated as Critical or Very Much Critical based on a 7-degree rating system. The top 11 critical risks are: Approval and Permit, Change in Law, Justice Reinforcement, Local Partner's Creditworthiness, Political Instability, Cost Overrun, Corruption, Inflation and Interest Rates, Government Policies, Government Influence on Disputes and Termination of JV.

The risks at Country level are more critical than that at Market level and the latter are more critical than that in Project level. For each of the identified risks, practical mitigation measures were provided and evaluated. Almost all of the mitigation measures were perceived by the respondents to the survey as effective using a 7-degree rating system. It is suggested that when mitigating a specific risk, the measures with higher effectiveness should be given a higher priority. Taking into account the higher criticalities of higher risk hierarchy levels, the mitigation measures should also be prioritized by the higher risk hierarchy level, i.e. the risks at higher hierarchy level should be mitigated first with higher priority with their respective more effective mitigation measures. A risk model, named Alien Eyes' Risk Model, was proposed which shows the three risk hierarchy levels and the influence relationship among risks. This model will enable better categorizing of risks and representing the influence relationship among risk sat different hierarchy levels as well as revealing the mitigating sequence/priority of risks.

Bang et.al (2005) conducted a questionnaire survey to explore preferences in risk allocation in United Kingdom. Analysis of the response data shows that some risks should still be retained within the public sector or shared with the private sector. These are mainly macro and micro level risks. The majority of risks in PPP/PFI projects, especially those in the macro level risk group, should be allocated to the private sector.

Yoe (2006) studied the risks that Singapore-based architecture, engineering and construction (AEC) firms face when working in India and investigated the risk response techniques adopted by them. Data were collected from Singaporean experts who were involved in AEC projects in India through in-depth interviews. Besides the typical risks that a domestic project faces, the main risks that internationalize firms face in India include: political and social risks; high cost of financing; fluctuating currency exchange rates; and huge cultural difference between foreigners and Indians. The risk response techniques include having adequate insurances and careful planning and management. It is recommended by them that the foreign firms operating in India should not try to change Indians way of working. Instead, foreigners should respect local culture and practices, and be flexible and extremely patient.

Gap in Literature

From the literature reviewed, it observed that many studies have been carried out on risk and risk management practice in different countries but no detailed study have been carried out on risk management practice on construction project in Anambra state.

RESEARCH METHODOLOGY

Considering the nature of this research, survey research method was adopted for this research. Data for this study were obtained from both primary and secondary sources which are classified as primary and secondary data. The primary data was collected through questionnaire, oral interview and direct observations. The population of this study is 52 which comprise of all the building contractors registered with the Ministry of Works and Housing, Awka. The researcher studied the whole population. The study used the SPSS and Microsoft excel to analyze data. The results were analysed in percentages and figures using descriptive statistics and presented in the form of bar charts and tables.

DATA PRESENTATION AND ANALYSIS

Research Question One: What are the risk management techniques and practices being used to control the identified risks in Anambra State?

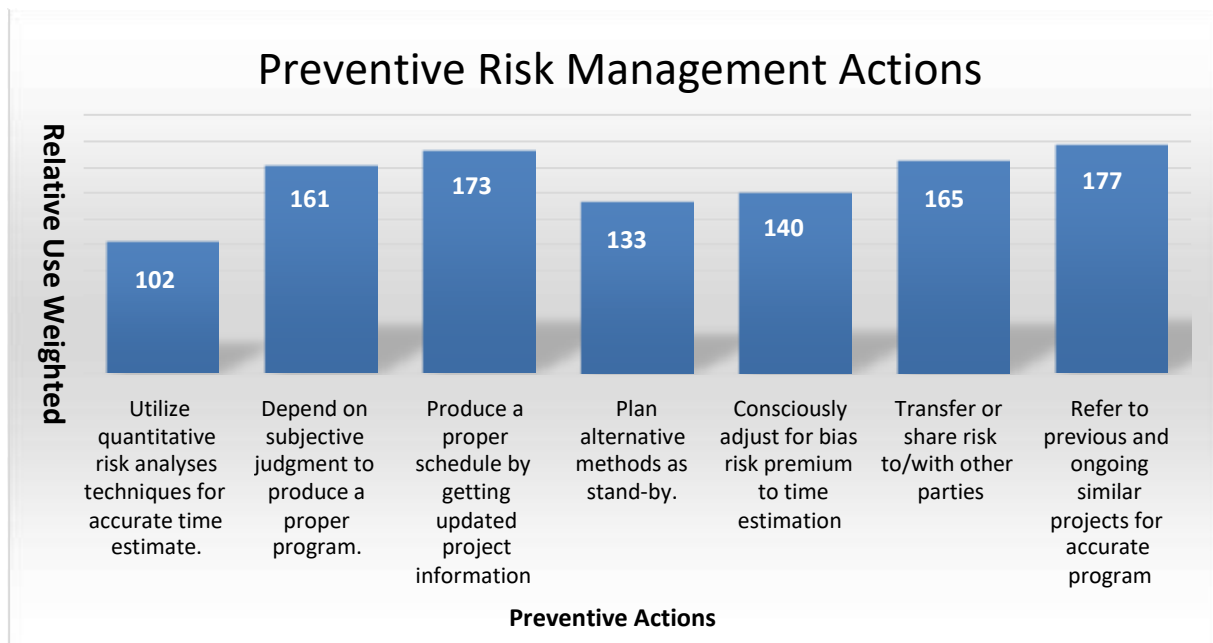


FIGURE 4.1: Relative Use of Preventive Risk Management Actions by Contractors

Source: Field Survey (2020)

Remedial Risk Management Method (Actions)

The results of the six mitigative risk methods with their respective weighted score are displayed in Figure (4.2). The most used mitigative method as identified by the contractors is close supervision of subordinates' whiles changing the construction method is the least used remedial method among the contractors.

In an effort to mitigate the negative consequences of construction projects, working and coordinating closely with subcontractors has been another most utilized method although placed second according to the weighted score as observed in Figure (4.2). The effect is that construction project progress is directly related to the collective input of available resources, since project activities usually entails a lot of man-hours in carrying out operations. Consequently, with the required resources available, increasing manhours will have a positive impact on the project progress.

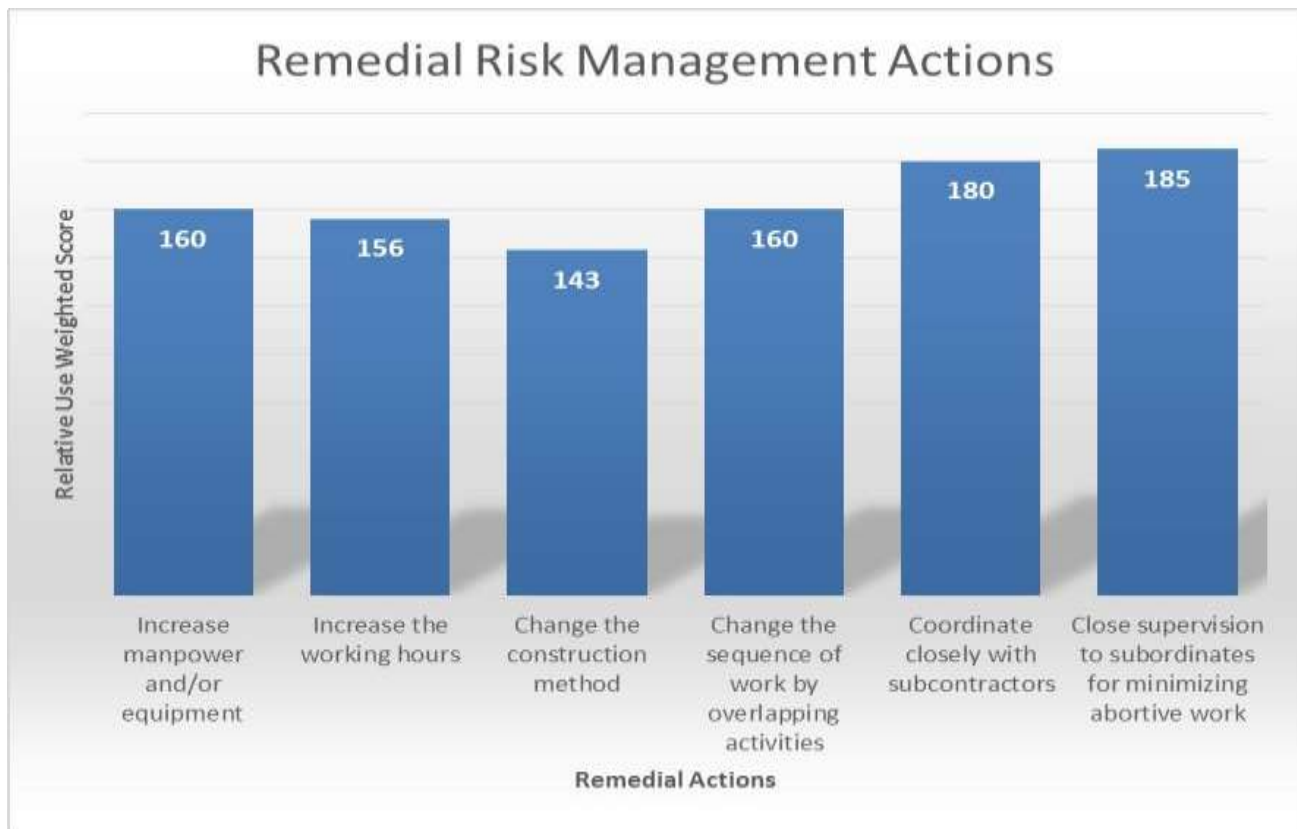


FIGURE 4.2: Relative Use of Remedial Risk Management Actions by Contractors

Source: Field Survey (2020)

Risk Analysis Technique

The results displayed in Figure (4.3) shows that the use of comparison as an analysis technique is the most used Risk Analysis Technique by Anambraian Contractors. Simulation analysis using simulator computer packages appears unpopular as it is the least used technique. The results show a deficit in knowledge and lack of experience in the application of the various risk analysis technique. In order to get an accurate risk estimation, there is a need for integration of expert techniques such as @Risk system and other relevant schedules and software.

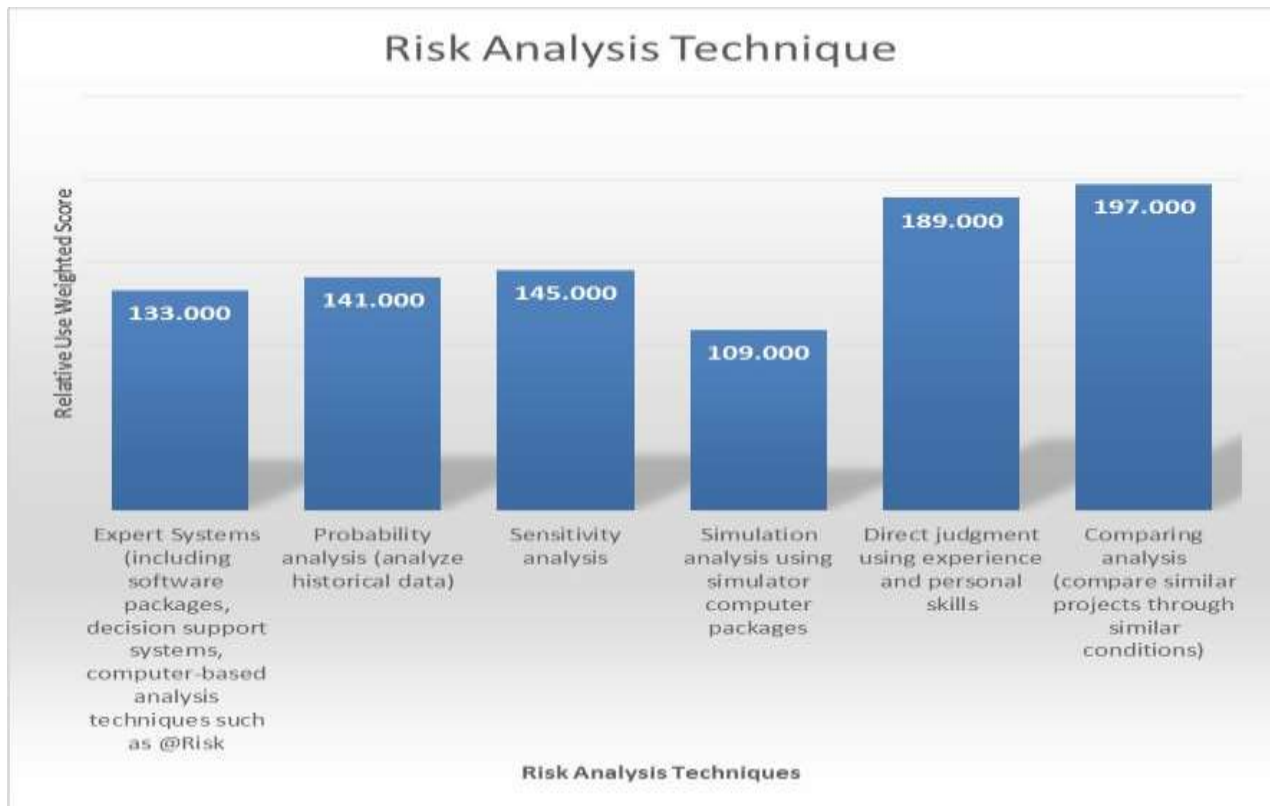


FIGURE 4.3: Relative Use of Risk Analysis Techniques by Contractors
Source: Field Survey (2020)

Research Question Two: What are the Challenges/constraints to risk management in construction projects in Anambra state?

Challenges of Risk Management

Despite the benefits that could be derived from Risk Management. Its implementation or adoption would not be without restrain or hindrance. The opinion of the respondents was sampled on this and shown.

TABLE 1: List of factors that challenges Risk Management of Nigeria construction firms

Opinion	Frequency	Percent	Valid percent	Cumulative percent
Political influence	17	13.7	17	17
Corruption and lack of integrity	41	35.5	44	61
Inadequate knowledge of the process	11	8.9	11	72
Government authorization	11	8.9	11	83
Legislative support	6	4.8	6	89
Skills and competency	11	8.9	11	100
Missing system	24	19.4	-	
Total	121	100	100	

The respondent’s opinion about the likely challenges to prevent implementation of Risk Management in Nigerian construction industry was shown in table 4.18 with corruption and lack of integrity tops with 35.5%, political influence (13.7%) is another strong factor while inadequate of the Risk Management process (8.9%) are among the identified challenging factors. There is therefore more awareness on Risk Management and its benefits to Nigeria construction industry.

Test of Hypotheses

The hypotheses for this study were tested using the Pearson Product Moment Correlation Coefficient. Correlation coefficient test is an inferential statistic and a non-parametric technique used as a tool for establishing the degree of association between two variables. The results of the returned questionnaires were captured on Microsoft Excel and then exported to Statistical Packages for Social Science (SPSS) for analysis and interpretation. Data used for the test were obtained from the responses of respondents to various questions in the questionnaire item that relate to the various hypotheses.

A 0.05 level of significance was adopted for the study.

Hypothesis

H₀: Risk have no significant effect on the Construction project in Anambra State.

Correlations

		Ent. Curriculum Dev.	Grad. Unemployment Red.
Ent. Curriculum Dev.	Pearson Correlation	1	.411
	Sig. (2-tailed)		.011
	N	203	52
Grad. Unemployment Red.	Pearson Correlation	.411	1
	Sig. (2-tailed)	.011	
	N	52	52

The result of the correlation coefficient for hypothesis one, as displayed using SPSS version 20 indicates that the Pearson Product Moment Correlation Coefficient is 0.411 showing that Risk have a significant effect on the Construction project in Anambra State.

Decision Rule: From the computation above, the probability value at 0.011 is less than 0.05 significant level. Therefore, we reject the null hypothesis and accept the alternative hypothesis which states that Risk have no significant effect on the Construction project in Anambra State.

SUMMARY, CONCLUSION AND RECOMMENDATION

Examine the risk management techniques that are being practiced

The management of the identified risk and its impact is an area of interest to the study. The work took into consideration some Preventive and Remedial methods in risk management and as well Risk Analysis Techniques being used by the Contractors. In preventive measures, reference to other projects (previous and ongoing similar projects) in order to obtain precise program with weighted score of (177) is the most used action in construction projects while the results shows that Contractors seldom employ the use of quantitative risk analyses techniques as it is the least scored weight with (102).

Examining risk management using the Remedial methods reveal that close supervision to subordinates is the most frequently use method in managing risk with a weight score of (185). Changing the construction method is not the first-choice effective action when addressing risk using the remedial method as it is the least ranked action with weight score of (143)

The assessment of the relative use of Risk Analysis Techniques reveals that contractors usually compare analysis of similar projects through similar conditions with weighted score of (197) and use it as the most effective risk analysis technique in construction risk management. Simulation analysis using simulator computer packages is the least used Risk Analysis Technique with a weighted score of (109).

Identify Challenges/constraints to risk management in construction project in Anambra State.

The major challenges or problems identified in the study include:

- (a) Corruption and lack of integrity;
- (b) The skills and competence gaps that affect negatively the ability to carry out the required risk management exercises;
- (c) Unavailability of an evaluation database. There is no information on numbers of registered construction firms in Nigeria either local or foreign. This is the fault of Corporate Affairs Commission.
- (d) It was found that professionals, especially designers protect their territories and do not engender critical evaluation of their designs for poor performance.
- (e) Institutional resistance from firms or organization that prefer monotony that does not allow them to appreciate the growth of others or allow for competitions.
- (f) Evidence from the study also showed that the level of perception and awareness of risk management is low.

The findings in this research corroborate and confirm the observations and findings of other authors on risk management. Corruption and lack of integrity, skills and competence gaps and political influence constitutes enormous threats to implementation of measures required for risk management and sustainable project delivery in Nigeria.

RECOMMENDATION

- (i) It is recommended that qualified professionals be involved in construction activities in Nigeria. Quackery should be discouraged.
- (ii) A risk management expert should be involved at different work stages in Nigeria construction industry;
- (iii) A risk management approach to procurement process should be adopted while risk management database should be established. This will minimize or completely eliminate the threat posed by risk factors in the sector;
- (iv) Government regulations should limit the participation of contractors to their capacity. The categories of contractors should be taken serious and assessment should be based on factors listed above and financial strength; and
- (v) Inflation and routine fluctuation in exchange rate needs to be looked at as a significant risk factor by stakeholders and appropriate compensation mechanism be put in place to mitigate or offset the impact of this risk on the financial wellbeing of the Contractor.

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