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RISK MANAGEMENT AND ITS INFLUENCE ON CONSTRUCTION PROJECT IN NIGERIA

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Abstract: Construction industry is a risky industry, but plays a vital role in driving economic growth of developed and developing nations. This paper presents the results of studies conducted on the Risk Management and its influence on Construction Project in Nigeria. Data was collected through field survey using well-structured questionnaire, administered personally to the sampled professionals in the built environment in south western part of Nigeria. Data collected were analyzed using frequency and descriptive statistical tools. The result revealed that inadequate site investigation, new technology, contractor's experience constitutes the top major types of risk associated with construction project. Resource availability was the greatest factors affecting risk management in the study area. The effect of risk management on construction project was high on all the sampled variables. The study concluded that cost of project, project completion time, project quality, project health and safety and environmental sustainability are more vulnerable to risk whenever risk management on construction project is not properly handled.
Keywords: risk, management, risk management, construction, Project

1. INTRODUCTION

Infrastructural development has been identified as one of the most important activities that in no small measure contributed to the Gross Domestic Product (GDP) of any country (Patel, et al., 2013). It also plays a vital role in driving economic growth of a nation (Odimabo and Oduoza, 2013, and Muhammad and Fazdliel, 2015). The scope of construction is very broad as it includes new construction of all forms, renovation, and demolition for both private, institutional and public works projects. However, the nature of construction is also unique involving complex and dynamic projects that require multiple feedback processes (Bobick, 2000, Uher and Loosemore, 2004). The broadness in scope and unique nature of construction activities gave rise to many risks from many sources, which according to Nerija and Audrius (2012) include finance, construction related, legal, environment, political etc.

Klemeti, (2006) as cited by Jimoh, et al., (2016) define risk as an unsure happening or state that has impact that contradicts project expectations when the project is completed. Kartam and Kartam (2001) defined risk as the probability of occurrence of uncertain, unpredictable and even undesirable events that would change the prospects for the profitability on a given investment. For example, construction activities could be unduly prolonged, or involved complicated processes, or domiciled in abominable environment, or financially involved, or under the management of a dynamic organizational structures (Flanagan and Norman, 1993; Akintoye and MacLeod, 1997; Tah and Car, 2000; Smith, 2003). This creates uncertainties (Kangari, 1995). According to (Patel et al., 2013) risks and uncertainties inherent in the construction industry are more than any other industries hence the need for risk management. Most of the risks are very dynamic all the way throughout the project lifecycle hereby jeopardizes the realization of the project objectives (Uher and Loosemore, 2004). Improper handling of risk in construction can affect the productivity, performance, time, quality and cost of the project (Burcu and Martins, 1998; Wang and Chou, 2003; Simu, 2006; Wysocki, 2009; Odimabo and Oduoza, 2013). Unmitigated risks according to Royer, (2000) are one of the key causes of project breakdown. Baker, (2005) also showed that there are many examples of non-achievement of time, cost and quality of projects due to the absence of risk management techniques in project management.

Edward and Bowen (1998) identified risk management as an important tool to cope with construction risks and to overcome problems of a project failure. Uher, (2003) described risk management as a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses. Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives (ICE, 2005 and PMI, 2007). As observed by Abujnah and Eaton, (2010), risk management determines the success or failure of construction projects.

Managing risks in construction projects has been recognized as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability (Mill,

2001). Risk management helps the key project participants - client, contractor or developer, consultant, and supplier - to meet their commitments and minimize negative impacts on construction project performance in relation to cost, time and quality objectives (Banaitiene, et al., 2011). If risks in construction are not properly identify, analysed and develop strategies to deal with them, the project is likely to lead to failures in meeting the construction target and high rate of construction abandonment will be recorded. A study conducted by Aminu (2013) on risk management in Nigerian construction industry showed that knowledge of cost and quality management as well as the attitude of the construction participants is the factors responsible for risk management application in Nigeria. Since it has been observed that a properly implemented risk management process will enhance the successful completion of construction projects and thereby make the projects more profitable. This research work is therefore aimed at studying the risk management and its influence on construction project in Nigeria.The objectives are: to identify the types of risk associated with construction project, identify the factors affecting risk management in construction project and evaluate the effects of risk management on construction project.

2. METHODOLOGY

Data collection method for this research was divided into primary and secondary data.

Primary data is achieved through a well-structured questionnaire which was distributed within the southwestern part of Nigeria.The professionals in the built environment constituted the targeted population because of their educational background and there vast experience on risk management in construction sector. Secondary data is referring the relevant literature such as journal, article, research and others. The questionnaire was sectioned into four. The first section solicited general information about the respondents. The second section aims to collect the respondents' opinion on the types of risk associated with construction project. The third section aims to assess the factors affecting risk on construction project and the fourth section includes the effects of risk management on construction project.To evaluate the topic area and identify the risks associated with construction project, the surveyed respondents were asked to tick an appropriate option from list of options and appropriate rating on the Likert scale 1-5 against each identified factor that reflected their opinion where necessary.The Likert scale was selected to obtain the types of risk associated with construction project and factors affecting risk on construction project that were identified in the literature review. A 5-point Likert scale was adopted, where 1 represents "very low", 2 "low", 3 "moderate", 4 "high", and 5 "very high". Likert scale was also adopted to obtain the effects of risk management on construction project where 1 represents "not severe", 2 "not sure", 3 "moderately severe", 4 "severe", and 5 "very severe". The questionnaire was administered personally to the construction professionals in both private and public sector within the south-western part of Nigeria using random sampling method. A total number of 80 questionnaires were administered and distributed. Out of this, 74 questionnaires, representing 92.50% completed and returned. The data collected were analyzed using descriptive statistical tools of frequency distribution, percentage and mean item score.

3. RESULT AND DISCUSSION

The results of the analysis of the answers and responses by the respondents in this study are presented in Tables.

— Profile of respondents

Figure 1show the respondent's year of experience in construction sector. It can be seen from the figure that 41.9 %, 33.8 % and 10.8 % respectively have 11 – 15, 16 – 20, and over 20 years of experience in the construction industry.

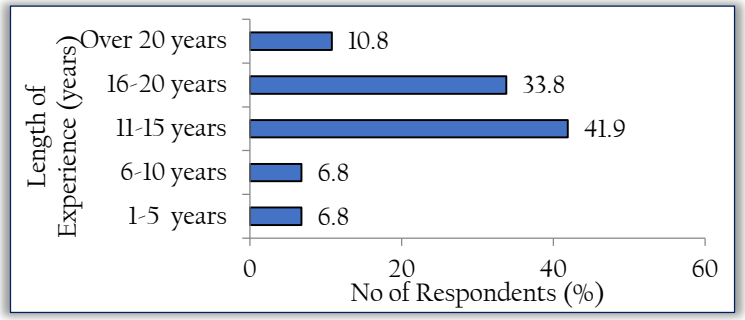

Figure 1: Years of working experience in the construction industry

This means that 86.5 % of the respondents have more than 10 years of working experience in the construction industry, and thus are expected to demonstrate adequate knowledge of construction projects, processes involved and the associated risks. The implication is that their response to the questions in this questionnaire can be considered reliable.

3.2. Types of construction related risk

What the respondents consider as construction-related risk as per their responses is presented in the Table 1. It can be seen from the Table 1 that inadequate site investigation is the first type of technical risk that was experience in construction with mean score 4.0135 and Std. Deviation of 0. 45309 followed by inadequate specification with mean score 4.0135 and Std. Deviation of 0.45309. Construction procedures and insufficient resource availability were as well revealed as another risk types which was seen to be major. Change in scope

and incomplete design were the fifth and sixth in ranking. It can be deduced that inadequate site investigation constitutes the greatest risk, this is in line with the work of Hamish, 2002 and Chen, 2014 who observed that inadequate knowledge of subsurface conditions of the domain of construction has led to many problems like cost overrun, delay in projects executions, and a times, complete abandonment of the project. It has also been one of the major reasons for contractor to invoke the force majeure clause of the contact as reasons for inability to performance under the contact.

Table 1: Technical risk in construction industry

Types	Frequency	Minimum	Maximum	Mean	Std. Deviation	Ranking
Inadequate site investigation	74	3.00	5.00	4.3514	.53462	1
Inadequate specification	74	3.00	5.00	4.0135	.45309	2
Construction procedures	74	3.00	5.00	3.9459	.40177	3
Insufficient resource availability	74	3.00	5.00	3.9189	.90291	4
Change in scope	74	3.00	5.00	3.4324	.62111	5
Incomplete Design	74	2.00	5.00	3.3378	1.07623	6

— Organization and environmental related risks

In construction industry, organization and environmental risk also affect contractual performance and ability or otherwise of the contactor to perform. Some of these risks are presented in Table 3. From table 2, contractual experience was considered by the respondents to be the primal risk.

Table 2: Organization and environmental related risks

Types	Frequency	Minimum	Maximum	Mean	Std. Deviation	Ranking
Organization Risks						
Contractor's experience	74	3.00	5.00	4.3784	.63468	1
Communication	74	3.00	5.00	3.4459	.70501	2
Contractual relations	74	1.00	4.00	3.4324	.64279	3
Attitudes of participants	74	3.00	4.00	3.2838	.45391	4
Inexperienced work force	74	2.00	5.00	3.1351	1.08948	5
Environmental Risks						
Weather Implications	74	2.00	5.00	3.7027	.83960	1
Natural Disasters	74	3.00	5.00	3.4324	.70383	2

It was followed by communication, contractual relations, attitudes of participants and inexperience work force in that order. The fact that contractor's experience is considered the major risks is very instructive. This experience is in relation to contractual and legal risks (Zaghloul and Hartmann, 2002) and performance related risks like productivity of labour, productivity of equipment, suitability of materials, defective work, conducts hindering the performance of the work, labour disputes and accidents (Panthi, 2007).Where the experience of the contractor is needed to manage risks, according to Al-Bahar and Crandell, (1990) associated with issues of the physical environment, financial matters, the political climate, and construction operations. It will constitute a high risk for client to engage a contractor that is inexperience in those issues. Weather issues topped the list of the environmental issues considered.

— Construction coordinating-related risks

In order to assess the coordinating risk associated with construction, respondents were asked to rate the variables as listed in Table 4. The analyses of the responses to the questions were presented in the Table.

Table 3: Coordinating-related risks

Coordinating-related risks types	Frequency	Minimum	Maximum	Mean	Std. Deviation	Ranking
New technology	74	4.00	5.00	4.4730	.50268	1
Shortage of resources (Plant, Labour and Materials)	74	3.00	5.00	4.2838	.74980	2
Late completion	74	3.00	5.00	4.2703	.50470	3
Postponement of site activities	74	4.00	5.00	4.0811	.27482	4
Discrepancies found in contract documentation	74	3.00	5.00	3.8649	.66876	5
Too high quality standard	74	2.00	5.00	3.8378	1.27168	6
Delay in the issue of instructions	74	2.00	5.00	3.6757	.86179	7
Design changes	74	3.00	5.00	3.6081	.65830	8
Equipment failures	74	2.00	5.00	3.5811	.64121	9
Labour productivity	74	2.00	4.00	3.5811	.54914	9
Effects on contractor's production by artisans engaged directly by the client	74	2.00	5.00	3.2973	.56689	11
Site condition	74	3.00	5.00	3.2568	.49824	12
Interference by numerous variation in quantity of work	74	2.00	5.00	3.2568	1.06064	12
Labour disputes	74	2.00	5.00	2.8378	1.17073	14

Top on the list of primal risk is the new technology. This was followed by plant/labor/materials. That new technology and resources issues took the major position in ranking may be due to the fact that they could influence the project objectives if not well manage this is in agreement with the submission of Zou et al. (2007) that construction resources were identified as part of key risks which were deemed to be able to influence the project objectives. That resource available, state of construction technology, designer knowledge of structural behavior and analysis, and the skill of the construction worker have been recognized as corporate driver of construction development and evolution (Leet et al., 2011). Although labour disputes with mean score 2.8378 and Std. Deviation of 1.17073 was last in Table 3. That is by no means to suggest that it is not important. Researchers (Chan and Suen, 2005; Kassab et al. 2006 and Ikechukwu, 2011) have found out labor disputes are major reasons for inability of construction companies to break even and accounted for many unsuccessful projects especially that are international in nature.

— Factors affecting risk management on construction project

Table 4 present some of the factors affecting risk management for the respondents to rate base on their own opinion so as to establish the effect degree of each factor on construction project in the study area.

Table 4: Factors affecting risk management on construction project

Factors	Frequency	Minimum	Maximum	Mean	Std. Deviation	Ranking
Resource Availability	74	2.00	5.00	4.7703	.58631	1
Complexity of project	74	4.00	5.00	4.6892	.46598	2
Time Compression	74	3.00	5.00	4.3514	.58362	3
Staff expertise and experience	74	3.00	5.00	4.2297	.63131	4
History of past project	74	2.00	5.00	3.6622	.62542	5
Management Stability	74	3.00	5.00	3.6486	.65024	6
Team Size	74	2.00	5.00	3.4459	.99508	7

From Table 4, it can be seen that resource availability ranked first, and follow by complexity of project, time compression, staff expertise/experience, history of past project, management stability and team size, in that order. The resources availability considered as the major factor affecting risk management is very instructive because of its international implication. A study conducted by Saminu et al. (2015) in India also found out that resource availability and its management is one of the major factors affecting risk management in construction. According to Ehsan et al (2016), availability of resources, especially money, facilitates the services of qualified professionals, purchase of quality materials and acquisition of best equipment, as well as enabling responses to problems in real time as they arise.

— Effect of risk management on construction project

The variables considered by the authors as some of construction project performance variables that can be influenced by risk management in construction were listed in Table 5 for the respondents' consideration base on their experience in construction industry.

Table 5: Effect of risk management on construction project

Factors	Frequency	Minimum	Maximum	Mean	Std. Deviation	Ranking
Project Cost	74	4.00	5.00	4.9189	.27482	1
Completion Time	74	3.00	5.00	4.7027	.51630	2
Productivity	74	4.00	5.00	4.5541	.50046	3
Project Quality	74	3.00	5.00	4.3378	.62542	4
Project health and safety	74	3.00	5.00	4.1351	.53184	5
Environmental sustainability	74	3.00	5.00	4.0000	.40544	6

The results from the table showed that effect of project management is more severe on project cost, followed by completion time, productivity, project quality, project health/safety and environmental sustainability, in that order. Although, the work of Burcu and Martins (1998), Nerija and Audrius (2012) and Odimabo and Oduoza (2013) were ranked differently, Mehdi et al., (2012) opined that construction risk can be related to the loss associated with three primary constraints: time, cost and quality. Cheng and Hamzah, (2013) identified financial and time risk as major risk in Malaysian construction industry which has negative impact on time, cost and quality of project, it can be concluded that cost of project, project completion time and project quality, project health and safety and environmental sustainability are at risk if risk management on construction project is handled with levity.

4. CONCLUSIONS AND RECOMMENDATIONS

From the results of the analysis, the following can be concluded:

— The major type of risk shown were inadequate site investigation and inadequate specification for technical risk, contractor's experience, communication, weather implications and natural disasters for organization and environmental related risks, new technology, shortage of resources (Plant, Labor and Materials), late completion and postponement of site activities for coordinating-related risks.

— The factors affecting risk were dominated by resource availability, complexity of project, time compression and staff expertise and experience.
— The effect of risk management on construction project was pronounced on project cost, completion time, productivity, project quality, project health and safety and environment sustainability.

In view of this conclusion, a number of recommendations are put forward to provide some direction for improvement in this regard as follows: (i) to avert technical risk, proper and adequate site investigation should be carried out before commencement of construction project and specification should be clear, non-ambiguous, less phraseology and comprehensive and concisely written for construction work, (ii) construction resources such as material, money, machine and men should always made available sufficiently on construction project, construction design should not be made complex and staff should be motivated to stay with the organization for a reasonable period when their experience will count, and (iii) risk in construction should be well managed so as to achieve the project aim of delivery to time, within cost and of good quality. Also for construction project to stand the taste of time hence contribute to a good sustainable environment.

This study has provided some bearing for research into the risk management in the construction industry, hence suggesting some clues to potential areas of improvement and further study to include earlier risk identification, risk averting measures in construction industry and the needs for risk management in construction.

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