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An Examination into the Impact of Risk Management Techniques on Building Construction Projects

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ABSTRACT
This study examined the impacts of risk management practice techniques in building construction projects in Kwara State, Nigeria. A survey design research approach was used, with targeted professionals in the public and private sectors. A total number of one hundred and seventy-four (174) questionnaires were administered but one hundred and thirty-six (136) were returned valid. Data were analysed using descriptive statistical mean scores, and standard deviation. The outcome showed that most professionals in building construction projects adopted risk reduction, Risk difference, and risk avoidance as their commonly used risk management techniques.It further affirms that; Impacts positively on building construction project cost, improves program plan (time) of construction project, and enhances construction project quality. This is because, it gives a better project output in terms of effective cost, timely delivery, and high quality. Consequently, risk management technique ensuring the entire process to minimize any negative consequences in the course of building construction process. The study concludes that risk management techniques have great positive impacts on the performance of projects in terms of cost, time, and quality.The study recommend that, the building contractors should pay critical attention to the affirmed risk techniques in the study area as a useful risk management technique to handling their projects' risk.

Keywords: Construction Industry, Risk management, Construction Management, Risk Management Techniques

I. INTRODUCTION

Risk management (RM) is a concept, that is, used in all industries, from information technology (IT) related business, automobile or pharmaceutical industry, to the construction sector. Project Management Institute (PMI, 2013) defines project risk as "an uncertain event or condition that, if it occurs, may have a positive or negative effect on a project objective, especially on the project cost, schedule, or quality". In addition, according to Risk Analysis Management of Project (RAMP, UK, 1998); risk is the likelihood of variation in the occurrence of an event, which may have either positive or negative consequences. Risk management is the process of identifying, assessing, and controlling threats to an organization's capital and earnings (Ben, 2010).

Risk management is a comprehensive and systematic way of identifying, analyzing, and responding to risks to achieve project objectives (Banaitiene and Banaitis, 2016). It is also defined as a planned form of identifying and evaluating risk and selecting, establishing, and applying options for the handling of the risk (Kremljak,2014). It is the recognition, prioritization, and appraisal of risk followed by an organized resource application economically to reduce, monitor, and manage the possibility of unfortunate events or to maximize production or outcome (Ehsan, Mirza, Alam, and Ishague, 2010). Each industry has developed its risk management standards, but the general ideas of the concept usually remain the same regardless of the sector. According to the Project Management Institute (PMI, 2004), project risk management is

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one of the nine most critical parts of project commissioning. This indicates a strong relationship between managing risks and a project's success. While risk management is described as the most difficult area within construction management (Winch,2002; Potts, 2008) its application is promoted in all projects to avoid negative consequences.

Risk Management techniques are recognized as an important exercise that enhances the value of construction projects and improves project outcomes. Time, cost, and quality are the primary measures of a project's outcome in the building construction industry. The success and failure of any construction project can be monitored through the attainment of these primary parameters. The need for incorporating risk management process techniques throughout the phases of construction projects cannot be overemphasized.Effective risk management techniques positively influence project outcomes in building construction projects in Kwara State, Nigeria (Abdulkadir, Oluwole, & Adeyemi, 2020).

The relationship between risk management techniques and project outcomes is moderated by project context and project size. The positive relationship between risk management techniques and project outcomes is stronger in projects with higher complexity, larger scope, and greater size (Geraldi & Lechter, 2012).

The construction industry operates in a very uncertain environment where conditions can change due to the complexity of each project (Sanvido, Groble, Perfitt, and Coyle, 1992). Each organization aims to be successful and risk management practices can facilitate the achievement of success. However, it should be underlined that risk management is not a tool, which ensures success, but rather a tool that helps to increase the probability of achieving project success. Risk management is therefore a proactive rather than a reactive concept.

Many previous studies such as Klemetti, (2006); Lyons and Skitmore, (2002); Zou, Zhang, and Wang, (2006) have been conducted within the field of risk management but each presents a different approach to this concept. This research focuses on the impact of risk management technique, and its impact on building construction project outcome in the study area.

II. REVIEW OF RELATED LITERATURE

Impact of Risk Management Techniques on Building Construction Project

Risk Management techniques are recognized as an important exercise that enhances the value of construction projects and improves project outcomes. Time, cost, and quality are the primary measures of a project's outcome in the building construction industry. The success and failure of any construction project can be monitored through the attainment of these primary parameters. The need for incorporating risk management process techniques throughout the phases of construction projects cannot be overemphasized.

Haitham, Basem, and Mohammad (2013) carried out research to study “The impact of risk management on construction projects success from the employee's perspective”, adopting a questionnaire survey approach, the obtained data was analyzed using SPSS. The outcome revealed that; there is an impact that exists between both risk identification and risk assessment on project success, scheduled time, planned budget, and the ability to comply with technical specifications. At the same time, there is no impact between risk assessment and avoiding lawsuits or claims. Also, the study indicates that there is an impact of risk response on project success, meeting the scope of work, scheduled time, and achieving quality standards.

Moses, Ugwu, Temidayo, and Clinton (2019), carried out a research titled “Evaluation of risk management practices in the Nigeria construction industry”, using a quantitative research approach with a descriptive method. Collected data were analyzed using SPSS v23 adopting the exploratory factor analysis method and findings showed that; Nigeria's construction industry adopts the best practice of risk management in construction projects. These are; risk identification, assessment, response, and control. The exploratory factor analysis revealed that under risk identification the practice adopted by the construction professionals is divided into information sourcing and history of the project. Concerning risk assessment, the practice comprises event analysis and creating a picture of the project and the approach for risk response includes generating a risk reduction methodology, establishing a risk management backup plan, and shifting the risk to a third party. Moses et al. (2019) while for risk control, the practice consists of enhancing construction project quality and improving the program plan of the construction project. This implies that Nigeria's construction industry is not lagging in handling construction risk.

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Griffin (2013), in a paper titled "Effect of Project Management on the Performance of Construction Firm in Nigeria", uses a survey design approach with judgmental sampling techniques. The collected data were analyzed using descriptive statistics and chi-square statistical analysis. The study outcome showed that; project quality management has a significant relationship with business success; project quality has a substantial relationship with technical success and consequently recommended among others that measures should be taken to ensure that project management skills and strategies are adequately considered in the planning and execution stages of construction projects.

Nasser and Norhayatizakuan (2021), carried out a study on a topic titled "The impact of risk management techniques on the performance of construction projects". Adopting empirical evidence, to explain the relationship between risk management and project performance with the quantitative method. The obtained data was analysed with (Statistical Package for Social Science) SPSS and the result revealed that; practicing risk management improves the performance of construction projects significantly. Therefore, based on this result, it is essential to hire qualified project managers who have sufficient knowledge of risk management and its application in construction projects.

Chilumo, Odiembo, Aloo, Ruwa, Mwakwi, Kithome, and Kyalo (2020), researched a paper titled "Risk Management Practices on Performance of Building Construction Projects", using a literature review of empirical journal articles, which served as a source of primary data. The obtained outcome of the study revealed that; practicing risk management in the construction industry increased the probability of positive project performance and risk management practices positively influence the performance of building construction projects.

Mariusz, Adnan, and Isaiah (2019), carried out a research titled "The moderating role of risk management in project planning and project success: Evidence from construction business of Pakistan and the UK", using a questionnaire survey approach for data collection. Data was analyzed using quantitative analysis, partial least square structural equation modeling technique. The outcome revealed that project planning had a significant impact on project success. Furthermore, risk management significantly moderated the relationship between project planning and project success in construction projects despite being in two different economies.

Roque and Marley (2013), researched a topic titled "Understanding the impact of project risk management on project performance: an empirical study", using a questionnaire survey methodological approach. The collected data was analysed using statistical evaluation techniques and the outcome revealed that; adopting risk management practices has a significant positive impact on project success. Also, the presence of a risk manager on the project had a positive impact on the project's success.

Additionally, Lawrence (2015), in a research project titled "Effect of Risk Management at Project Planning Phase on the Performance of Construction Project in Rwanda," used both qualitative and quantitative methods of data collection, and the collected data was analyzed using SPSS with correlation analysis. The outcome of the result showed that; risk management practices at the planning stage had a great effect on building construction project performance.

John and Mary (2020), carried out a study titled "Promoting performance of the building construction industry through risk identification: A case of Exchequer funded building construction project in Machakos County, Kenya," using descriptive survey research design and the collected data were analyzed using descriptive and inferential statistics, frequencies, percentages, means and standard deviation method. The result inferred that there is a significant positive relationship between risk identification that led to the performance of -exchequer-funded building construction Projects.

Chilumo, Odiembo, Aloo, Ruwa, Mwakwi, Kithome, and Kyalo (2020), in a study titled "Risk Management Practices on Performance of building construction projects". This showed that; risk management practices influence the performance of building construction projects. This was exemplified by the data gathered from empirical journal articles that were analyzed.

Momanyi and Lucy (2018), carried out a study to investigate the "Influence of contractors' management practice on performance of housing construction projects in Kisii County, Kenya", using a questionnaire survey approach. The obtained data was analyzed using descriptive and inferential statistics tools. The outcome of the analysis revealed that; housing construction projects are affected by contractors' management practices, which include planning practices, conformance to industry standards, implementation of designs, and financial management practices

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respectively that were found to have a positive influence on projects performance. It further stressed that there is a strong positive relationship between risk management practices and building construction performance.

Muhammad (2015), researched a project work titled "Relationship between risk management practices and financial performance of construction and construction related firm in Pakistan", using a survey method approach to collect industry-specific information and the collected data analyzed. The outcome showed that; there is a significant positive relationship between risk management practices and the financial performance of construction and Construction-related industry firms.

Ali and Oduoza (2016), in a paper titled "Key Risk in Construction Project in Italy: contractors' Perspective", adopted qualitative research methods with semi-structured interviews for data collection. The outcome of the analyzed data showed that; implementation and practice of risk management improve the competitiveness of organizations in three main areas: awareness; productivity; and profitability. Small and Medium Enterprises (SMEs) specified that the use of risk management made a valuable contribution to the efficiency of their organizations by protecting available resources. Those contributions promoted continuous improvement and supported the effective use of resources that primarily enhanced the productivity and profitability of the organizations.

III. METHODOLOGY

The study used descriptive survey design and inferential statistics. The population of this study was one hundred and Seventy-five (175) respondents consisting of fifty-four (54) Registered Architects, fifteen (15) Registered Builders, and Seventy-six (76) Registered Civil Engineers ongoing and already completed approved construction sites within the study. Data for the study were collected through a questionnaire distributed to the selected samples from the five local governments of two senatorial districts of Kwara State.

A sample size of 174 was determined from the entire population using Taro Yamane's (1967) formula. The calculation is as shown below:

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

Where n = Sample Size
N = Population
e = level of precision (assumed 5%)

Therefore, equal $= \frac{310}{1+(310 \times 0.05^2)}$ = 174.

This implies a sample population of 174 was drawn out of the target population. The instrument for data collection was a structured questionnaire titled "Impact of Risk Management Techniques on Building Construction Project". One hundred and seventy-four (174) copies of the questionnaire were distributed through research assistants. Out of the one hundred and seventy-four (174) copies of the questionnaire administered to the respondents, one hundred and thirty-six (136) copies were filled and returned representing a 78% rate of return.

IV. RESULTS AND DISCUSSION

Table 1 shows the analysis of the respondents' ratings on the Impact of Risk Management Techniques on Building Construction Projects.

Table 1: Impact of risk management techniques on building construction project in Kwara State

S/N	Impact	$\bar{X}$	SD	Ranking
1.	impacts positively on building construction project cost	4.45	.697	1
2.	enhance construction project quality	4.39	.771	2
3.	improve program plan (time)of the construction project	4.32	.757	3
4.	influences the performance of building construction project	4.32	.674	3
5.	Enables avoidance of risk	4.06	.664	5
6.	enhances the relationship between risk management and financial performance	3.99	.615	6
7.	impacts on building construction project success	3.94	.748	7
8.	improves the competitiveness of the	3.94	.748	7

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	organization in the main area			
9.	improves the probability of positive project outcome	3.93	.658	9
10	Improves the financial status of the construction industry	3.88	.911	10
11	impacts on project planning	3.28	1.009	11
	Average MIS	**4.05**		

Source: Researcher's field survey

Table 1 shows that risk management practices have the highest impact on cost, (MIS = 4.45, SD = 0.697), followed by the program plan (time) of a construction project (MIS = 4.39, SD = 0.771), followed by construction project quality (MIS = 4.32, SD = 0.757), while financial status and project planning with (MIS = 3.88, SD = 0.911) and (MIS = 3.28, SD = (1.009) respectively were two least impacted by risk management practices. The average MIS for all the performance measures was 4.05. Performance measures with MIS greater than the average MIS were: improved cost, improvement in program plan (time) of construction project, and construction project quality. Influences the performance of building construction projects, avoidance of risk, etc. The result suggests that risk management techniquessignificantly impact building construction projects in terms of these measures. The findings further showed that the above-underlined impacts were being influenced by risk management practicesin one way or the other.

The outcome of the analysis from Table 1 showed the impact of risk management techniques on the outcome of building construction projects which are ranked by respondents as; Impacts positively on building construction project cost, improves program plan (time) of construction project, and enhances construction project quality. This implies that the three variables cost, time, and quality are major parameters in building construction projects that determine building project outcomes. Therefore, adoption of risk management techniques has greatly impacted the positive yield of the three key variable cost, time and quality.

Test for Hypothesis

In this part, the hypotheses were tested at a 0.05 level of significance

HO_1: There is no significant impact of risk management techniques onbuilding construction projects in the study area.

H_1: There is significant impact of risk management techniques on building construction projects in the study.

Table 3: ANOVA - test result of building professionals (Architects, Builder, Civil Engineer and Quantity Surveyors) on the impact of risk management techniques on building construction projects in Kwara state.

		improve program time plan of construction project				
		Low	High	very high	Total	Symmetric value
risk reduction technique	very low	8	0	0		
	Low	0	8	0		
	average	0	35	0		
	high	0	16	44		
	very high	0	0	25		
Total		8	59	69	136	.787
		Influences outcome of Building construction project				
		8	High	very high	Total	Symmetric value
risk reduction technique	35	8	0	0	8	
	16	8	8	0	8	

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	0	0	35	0	35	
	59	0	26	34	60	
	very high	0	0	25	25	
Total		16	61	59	136	.775
		Impacts on project planning				
		Low	High	very high	Total	Symmetric value
risk reduction technique	very low	8	0	0	8	
	Low	8	0	0	8	
	average	1	43	0	35	
	high	0	17	0	60	
	very high	0	0	4	25	
Total		17	51	4	136	.782
		Impacts on building construction project success				
		Average	High	very high	Total	Symmetric value
risk reduction technique	very low	8	0	0	8	
	Low	8	0	0	8	
	Average	26	9	0	35	
	High	0	51	0	60	
	very high	0	0	4	25	
Total		42	60	4	136	.761
		Enhances building construction cost				
		Low	High	very high	Total	Symmetric value
risk reduction technique	very low	8	0	0	8	
	Low	8	0	0	8	
	Average	10	25	0	35	
	High	0	60	0	60	
	very high	0	0	25	25	
Total		26	85	25	136	.788
		enhances construction project quality				
		Low	High	very high	Total	Symmetric value
risk reduction technique	very low	8	0	0	8	
	Low	0	8	0	8	
	Average	0	35	0	35	
	High	0	16	44	60	
	very high	0	0	25	25	
Total		8	59	69	136	.788

Since the P value is less than alpha which is 0.05% simply means non-hypothesis is rejected.

Therefore, all the identified risk reduction techniques have significant impacts on building construction projects in the study area although with various degrees of effect.

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Discussion

According to the respondents, when risk techniques are put in place, all identified risks are properly accounted for to achieve the project objectives within the budgeted sum, the project's duration, and the expected high quality of the project. In other words, the adopted risk management technique impacts positively on the outcome of a building project in terms of cost, time, and quality. This agrees with the findings of Akinbile, Ofuyatano, Oni, and Agboola (2018) that risk management practices in building construction projects impact positively building construction project in terms of cost, time, and quality, however, the major variables, cost, time, and quality are vulnerable to risk whenever risk management techniques are not put in place. Moses, et al.'s (2019) research is also in agreement with the outcome of this research that, risk management technique on performance of building construction, generates risk reduction methodology, risk management back up, enhancing construction project quality and improving program plan of the construction project towards achieving project objectives. Chilumo et. al (2021) work corroborated the outcome of this research work that, risk management practices improve the probability of positive project performance and building projects.

V. CONCLUSION AND RECOMMENDATIONS

It is important to approach the identified risk as peculiar to the study area with the right risk management techniques to get the expected outcome of the project. The study affirms that; Impacts positively on building construction project cost, improves program plan (time) of construction project, and enhances construction project quality. This implies that, the three variable; cost, time and quality are major parameter in building construction project that impact on building project outcome. According to the respondents, when risk techniques are put in place, all identified risks are properly accounted for to achieve the project objectives within the budgeted sum, project's duration and the expected quality of the project. In other words, adopted risk management technique in the study area impacts positively on the outcome of building project in term of cost, time and quality. This was discovered that the building contractors took necessary precautions by ensuring the entire process to minimize any negative consequences in the course of the construction process. The study concludes that risk management techniques have great positive impacts on the outcome of projects in terms of cost, time, and quality. It is therefore, recommended that, there is need to properly study and identify the risk management technique with the peculiarity to the study area in order to make positive impact on the building project.

REFERENCE

[1]. Akinbile B. F, Ofuyatano M., Oni O., Z and Agboola O.,D (2018). Risk management and its influence on construction projects in Nigeria. ANNALS of Faculty of Engineering Hunedoara- International Journal of Engineering Tome XVI [2018] Fascicule 4 [november].

[2]. Nasser A. and Norhayatizakuan N. (2021). The Impact of Risk Management Practices on the Performance of Construction Projects. Studies of Applied Economics. 39.10.25115/eea.v39i4.4164.

[3]. Banaitiene, N. AndBanaitis, A. (2016). Risk management in Construction Projects. Current Issues and Challenges doi:10.5772/51460, 429-448.

[4]. Chilumo J., Odiembo S., Aloo Z., Ruwa A. H., Mwakwi S., Kithome O. M and Kyalo D N. (2021). Risk Management Practices on Performance of Building Construction Projects. Journal of Entrepreneurship & Project Management, 4(6), 38-57.

[5]. Gould, F.E, and Joyce, N.E, (2002). Construction project management. Upper Saddle River: Prentice Hall

[6]. Haitham H. A, Basem M. L and Mohammad A. H (2013). The impact of risk management on construction project success from the employee's perspective.Interdisciplinary Journal of Contemporary Research in Businesscopyright © 2013 Institute of Interdisciplinary Business Research13 August 2013, 5,

[7]. John and Mary (2020). Promoting performance of the building construction industry through risk identification: A case of Exchequer funded building construction project in Machakos County, Kenya. EJBMR, European Journal of Business and Management Research (5).

[8]. Kremljak, Z. (2004). Decision Making Under Risk. DAAAM International, Vienna.

[9]. Lawrence M.G, (2015). Effect of risk management at project planning phase on performance of construction project in

Rwanda. Department of Entrepreneurship,Technology, Leadership and Management in the School of Entrepreneurship, Procurement and Management.

[10]. Mariusz U., Adnan U.H and Isaiah O. (2019). The moderating role of risk management in project planning and project success: Evidence from construction business of Pakistan and the UK. Engineering Management in Production and Services, 1 (11) 23-35.

[11]. Mohammad T., Muhammad A. H and Farahani S.K (2015): Risk analysis in the management of urban construction project from the perspective of the employer and the contractor. International Journal of Organizational Leadership 4(2015) 356-373

[12]. Momanyi N., T. and Lucy N. (2018). Influence of contractors' management practice on performance of housing construction projects in Kisii County, Kenya.

[13]. Moses C., U., Temidayo O., O., and Clinton O., A., (2019). Evaluation of Risk Management Practice in the Nigeria Construction Industry. 1SARCHhI in Sustainable Construction Management and Leadership in the Built Environment, Faculty of Engineering and the Built Environment. University of Johannesburg, South Africa Corresponding author's e-mail:osunsanmidayo@gmail.com

[14]. Owie, I. (2006). Eating disorders and personality profile of female secondary school students in Benin Metropolis, Nigeria. Journal of Instructional Psychology, 33(3), 162-170.

[15]. Pandey and Verma,(2008). "Existence-uniqueness results for a class of singular boundary value problems arising in physiology." Nonlinear Analysis: Real World Applications 9.1 (2008): 40-52.

[16]. Patel K, Rajiv B. and Bhavsar J J (2014). A study of risk factors affecting building construction projects.International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181 IJERTV3IS120480 www.ijert.org , 3 (12), December-2014

[17]. Project Management Institute (2004). Project risk analysis & management (PRAM) guide (2nd ed.). High Wycombe, Bucks, UK: APM Publishing.

[18]. Project Management Institute, (2013). A guide to the project management body of knowledge: PMBOK. 3rd edition. Pennsylvania: Project Management Institute, Inc.

[19]. Risk Analysis Management of Project (RAMP1998). UK, web site cira 1998, Source: What is a Risk? 10 definitions from different industries and standardshttps://www.stakeholdermap.com/risk-definition.html#ris

[20]. Roque, R. J and Marley M., C (2013). Understanding the impact of project risk management on project performance: an empirical study. Journal of technology management and innovation, (8).

[21]. Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M., and Coyle, M., (1992). Critical Success Factors for Construction Projects. Journal of Construction Engineering and Management, Vol. 118, No. 1, pp. 94-111.

[22]. Smith. N.J., Merna, T. and Jobbling P., (2006). Managing Risk in Construction Projects. 2nd edition Oxford: Blackwell Publishing

[23]. Winch, G.,(2002). Managing construction projects, an information processing approach Oxford: Blackwell Publishing.

[24]. Yamane T. (1967), statistics. An Introductory Analysis, 2nd Edition. New York: Harper and Row

[25]. Zou, P., Zhang G., Wang J-Y., (2006). Identifying Key Risks in Construction Projects: Life Cycle and Stakeholder Perspectives. Sydney: Faculty of Built Environment, University of New South Wales.

[26]. Cooper, D., Grey, S., Raymond, G., and Walker, P., 2005. Project Risk Management Guidelines: Managing Risk in Large Projects and Complex Procurements. Chichester: John Wiley & Sons, Ltd.