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ASSESSMENT OF BARRIERS TO RISK MANAGEMENT (RM) IMPLEMENTATION IN SMALL CONSTRUCTION PROJECTS IN NIGERIA

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Managing project risk in construction is becoming increasingly critical for ensuring that project objectives are met effectively. Due to the innate characteristics of small construction projects, they are prone to more risks as they face more challenges than the large ones. However, previous studies indicated that the Small and Medium Companies (SMCs) mainly contracting small projects did not attach adequate importance to Risk Management (RM) in small projects. This study investigates the implementation of RM in small construction projects in Nigeria in terms of barriers to its implementation and measures for overcoming them. A structured questionnaire was developed and used to collect data from construction managers. The data were analyzed using both descriptive and inferential statistics. The findings revealed that lack of knowledge and experience, tight schedules and cost of project are the major barriers to RM in Nigeria. It was seen that contractors bid for projects without RM implementation which in turn affects their profit margin. More so, the attitude of construction participants is another problem to risk management. Increases in understanding of the concept of RM by managers is viewed as the most effective measure for overcoming lack of implementation of RM in small projects in Nigeria.

Keywords: barrier, construction, implementation, risk management, small projects

INTRODUCTION

The construction industry is a major player in the economic growth of both developing and developed nations. It contributes significantly to GDP and provides the infrastructure for other sectors of the economy to thrive

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(Ibrahim, 2018). The industry however is said to be exposed to more risks than any other sector of the economy (Flanagan and Norman, 1993). This is due to the uniqueness and complexity of projects in the industry. Similarly, involvement of numerous project stakeholders, other internal and external factors also create more risks in the construction industry. Being project-oriented in nature, the construction industry is composed of individual projects, none of which is risk-free (Huemann *et al*., 2007). Each project has a unique design; and is built in a unique location; by a unique group of participants consisting of organizations and employees that rarely meet again in subsequent projects. The projects are also distinct in their objectives, resources, and constraints; and are completed within a unique schedule. These characteristics brought about so many uncertainties that made construction projects to experience more problematic consequences than any other goods and services procured (Davison and Sebastian, 2009).

Osipova (2015) observed that risks are inherent in all construction projects, which may negatively affect project delivery in terms of time, cost, and quality. If risks are not properly managed, the contractors may seriously suffer from cost overruns, delays, or even project failures (Wang *et al*., 2016). Unfortunately, the construction industry globally has been reported to have a poor reputation in risk management (Renuka *et al*., 2014). In the same vein, the Nigeria construction industry has been criticized for poor risk management practices (Ojo, 2010; Windapo *et al*., 2010; Aminu, 2013). This is evident in the poor performance of the industry in recent times. In this regard, Augustine et al. (2013) asserted that efficiency in risk management implementation can positively impact the Nigeria construction industry and the economy at large. Thus, a process to efficiently control risks plays an important role for projects to be successful in maintaining an acceptable level of profit and the industry to be productive (Yoon *et al*., 2014). This emphasizes the importance of risk management for any construction project, irrespective of size and complexity. Risk management (RM) entails a comprehensive and systematic way of identifying, analyzing and responding to uncertain events in order to achieve the project objectives (Banaitiene and Banaitis, 2012).

The concept of risk management is neither widely known, nor effectively implemented in the Nigerian construction industry (Nasir *et al*., 2003). Previous studies in Nigeria found that poor risk management practices have led to time and cost overruns, projects abandonment, and loss of profit in construction projects (Ojo, 2010; Windapo *et al*., 2001; Joshua, 2010; Augustine *et al.,* 2013). The need has therefore been stressed for adoption of formal and holistic application of risk management techniques in order to ameliorate the problems affecting productivity in the Nigerian construction industry (Dada and Jagboro, 2007; Odeyinka, Lowa and Kaka, 2008; Ojo, 2010).

It has been argued that small construction projects need special attention in terms of risk management to avoid cost and time overrun. However, RM has been reported to suffer neglect in small construction projects because of their specific peculiarities (Aminu, 2013). Studies on construction risk

management in Nigeria are limited to the identification of the types of risks that occur in projects, RM practices in the construction industry (Augustine, et al 2013; Aminu, 2013; Nnadi, and Ugwu, 2013) and the impact of risk factors on construction projects (Luka and Muhammad, 2014). There is little or no literature on the extent of RM implementation in small projects.

This study therefore, set to assess the barriers to risk management implementation in small construction projects in Nigeria. Various characteristics have been used in literature to define small construction projects. This study defines small construction projects as those with project cost below one million dollars ($1,000,000). The following objectives were followed to achieve the aim of the study: (1) identification of barriers to risk management implementation, (2) assessment of barriers to implementation, (3) identification and prioritizing the strategies to overcome the barriers. Following the introduction, the second section provides the review of related literature, research methodology results and discussions and finally conclusions and recommendations.

REVIEW OF LITERATURE

Risk Management in small construction projects

Despite the emphasis on the need for risk management in small construction projects, limited studies have been carried out with a view to identify probable barriers to RM implementation in such projects. Most of the works done concluded that lack of knowledge and understanding of the concept of RM are the most significant barriers to the implementation of RM in small projects. More so, lack of time was viewed as a major barrier to RM implementation in small projects, since such projects are usually characterized by limited time.

Table 1: Consistency of barriers to risk management implementation in small project

	Akintoye, MacLeod (1997)	Chilleshe & Kakwasi, (2013)	Lyons, Skitmore, (2004)	Chiburi, & Pretorious (2010)	Hwang et al. (2013	Tang et al. (2007)	Fischer (2015)
Barriers							
Lack of experience	Y	Y	N	N	N	N	N
Lack of government legislation	N	N	N	N	Y	N	Y
Lack of joint RM	N	N	N	N	N	Y	N
Lack of knowledge	Y	Y	Y	Y	Y	N	Y
Lack of potential benefit	Y	Y	N	Y	Y	N	Y
Lack of Time	Y	Y	Y	Y	Y	N	Y
Low profit margin	N	N	N	N	Y	N	Y

Where: (Y) represents presence of the barrier in the work
Where: (N) represents absence of the barrier in the work

Notably, Hwang et al. (2013) conducted a research on RM in small construction projects in Singapore. The study investigated the implementation status, barriers and the impact of RM on project performance. The Risk Management Implementation Index (RMII) was proposed to measure the status quo of RM implementation in a company. The findings implied that half of the companies surveyed had the RMII below 50%, and that the RM implementation of these companies was at a relatively low level.

Table 1 shows some barriers to RM implementation and also compared the number of occurrence of each barrier in previous studies. This provides a clear statement of the consistency of each identified barrier and the level of agreement to which each identified barrier affects the implementation of RM in small projects.

METHODOLOGY

The research variables for this research had already been known and identified and the purpose of the research is to find out to what extent those variables affect or impact the phenomenon. Thus, the quantitative method of research was adopted for this research. The quantitative approach employs the use of mathematical and statistical techniques to identify facts and casual relationship between variables.

Due to the unique nature of the unit of analysis of this research, a purposive sampling technique was used to determine the sample and sample size. This is considering that it allows the researcher to purposely select a sample from the research population. A total 219 questioners were distributed to construction managers across Kaduna, Abuja and Kano state whom were involved in handling small construction projects. However, only 98 (45%) of the administered questionnaires were returned and analyzed from the total questionnaires administered, while 121 (55%) were not returned. The low response rate could be due to the confidentiality and sensitivity of information which respondents were unwilling to divulge.

The instrument for data collection involved a well-structured questionnaire which was divided into four different sections. The reason for selecting this research instrument is because it allows the researcher to specify a measurement procedure in detail in order to define the quantity of a variable. The First section inquired about the respondent's personal information, the second inquired about background of projects while the third section inquired the degree to which the barriers affect implementation of risk management. The last section inquired the respondent's opinion on what strategies could be used to overcome the barriers.

An interrater reliability analysis using the Kappa statistics was performed to determine consistency of rating among respondents. It is an important measure in determining how well an implementation of some coding or measurement system works. A statistical measure of interrater reliability is Cohen's Kappa which ranges generally from 0 to 1.0 (although negative numbers are possible) where large numbers mean better reliability, values

near or less than zero suggest that agreement is attributable to chance alone (Landis & Koch, 1997). Table 2 shows a list of Kappa values used for interpretation as provided by Landis and Koch (1977).

The results of the analysis found Kappa to be 0.770 with 0.754 Cronbach coefficients (Alpha). This measure of agreement is widely convincing as a rule of thumb values agreement level of Kappa ranging from 0.60 to 0.79 as substantial (Landis and Koch, 1997).

Table 2: Kappa Result Interpretation

Kappa Value	Interpretation
< 0	Poor agreement
0.0 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

More so, One-Sample T-test was carried out to determine the significant difference among the mean values of the variables responsible for the lack of implementation of RM techniques in small projects at a 0.05 significance level. The one sample T-test determines whether the sample mean is statistically different from the population mean. It was used to compare the variable means to the specified 3.0 T-value constant.

RESULTS AND DISCUSSIONS

Response rate

A total of 98 (45%) of the administered questionnaires were returned and analyzed from the total questionnaires administered, while 121 (55%) were not returned. The low response rate could be due to the confidentiality and sensitivity of information which respondents were unwilling to divulge. More so, this response rate could be viewed as a better rate when compared to previous researches similar to this research like the Hwang *et al.* (2013) which recorded a response rate of 17% in Singapore.

Background of respondents

Table 3 below shows the professional background of the respondents. Builders and Architects constitute a share percentage of 40.8% and 19.4%, respectively of the returned questionnaires while quantity surveyors constitute 34.6% of the questionnaires returned, while respondents with civil engineering background were 5.2%. This shows that all the respondents have relevant professional background to respond to the questionnaires on RM implementation.

Among the analyzed questioners, a large percentage of the respondents have years of practice of less than five (5) years as shown in table 4 below. These classes of respondents represent 49% of the questionnaires while 13.3% of the

respondents are well experienced in the field of construction with over twenty (20) years of practice.

Table 3: professional background of respondents

S/N	Profession	Frequency	Percentage
1	Architects	19	19.4
2	Builders	40	40.8
3	Quantity Surveyors	34	34.6
4	Civil Engineers	5	5.2
	TOTAL	98	100

This share of percentage between the high and low degree of experience of respondents provides a balance with regards to justification of the results because it consists insight to perspectives of both high and low degree of experience of managers. Respondents with five (5) to ten (10) years of practice as well ten (10) to fifteen (15) years of practice represent 13.3% and 18.1% respectively while 6.3% of the respondents have experience of fifteen (15) to twenty (20) years.

Table 4: Years of experience of respondents

Years of experience	Frequency	Percentage
Less than 5 years	48	49.0
5 – 10 years	13	13.3
10 – 15 years	18	18.1
15 – 20 years	6	6.30
20yrs and above	13	13.3
Total	98	100

Table 5 below shows a total number thirty-seven (37) of the respondents were involved in less than ten (10) small construction projects in the last five (5) years, representing a large share of 75.5% of the respondents. The remaining twelve (12) numbers of the respondents were involved in about ten (10) to fifteen (15) small projects representing 24.5% while neither of the respondents were involved in more than fifteen (15) small projects in the last five years.

Table 5: Number of small projects handled by respondents in the last five years

Number of projects	Frequency	Percentage
Less than 10	74	75.5
10 – 15	24	24.5
15 – 20	0	0.00
20 and above	0	0.00
Total	98	100

Background of the projects

This section of the administered questionnaire inquired about the respondent's choice in the classification of small projects they apply risk management to. Small projects were classified into: type and nature. Table 6 shows that 48.9% of the respondents apply risk management techniques to only private projects as opposed to the 18.4% that apply to only public projects. More so, 32.7% of the respondents apply RM techniques to both public and private projects. The findings of this research are in contrast to the findings of Hwang *et al*. (2013) in Singapore where risk management is mostly implemented in public projects. This might be as a result most of the respondents in this research were involved in a limited number of projects in the last five years and most were private projects.

Table 6 also summarizes the nature of small projects the respondents apply risk management to. The table shows that 32.6% of the respondents apply RM to new construction projects only, 22.4% apply RM to only projects in the nature of Repairs, Maintenance, Addition and Alterations (RMAA) while 45% of the respondents apply RM to both. This result is in line with the results from previous studies probably because newly built projects tend to encounter diverse and complex risks in their life cycle and the greatest degree of uncertainty is usually encountered at the early phase in the project life cycle (Perry and Hayes, 1985).

Table 6: Nature of projects with RM implementation

Classification	Frequency	Percentage
Project Type		
Private	44	48.9
Public	18	18.4
Both	32	32.7
Project Nature		
New	32	32.6
RMAA	22	22.4
Both	44	45.5

Barriers to risk management implementation

A total of 10 probable barriers to RM implementation in small projects were presented and the respondents were requested to rate the negative impact of these barriers on RM implementation in the small projects that they had participated in using a 5-point scale (0=No impact at all and 5=most impactful). As Table 7 indicates, "lack of experience", "lack of joint management mechanism by parties involved", "lack of knowledge on benefits", "poor understanding of RM techniques" as well "lack of time" are the top five impactful barriers to RM implementation in small projects based on their overall mean scores. A one-sample t-test result showed that these five factors significantly hindered RM implementation in small projects at the 0.05 significance level. "Lack of experience" was considered as the most impactful barrier with a mean score of 4.27 and a *P*-value of 0.000 at 0.05

significance level. The lack of time ranked 5th with a mean score of 3.89 and a significance level of 0.023. Actually, "lack of time" could be seen as a common barrier to RM implementation in construction as it was found that this factor was a critical reason for not using RM in the UK, Australia and Singapore, respectively (Akintoye and MacLeod, 1997; Lyons and Skitmore. 2004; Hwang *et al.*, 2013).

Table 7: Barriers to RM Implementation

Barriers to RM implementation	Overall			
	Mean	p-Value	SD	Rank
Lack of experience	4.29	0.004	0.483	1
Lack of joint mgt	4.27	0.000	0.217	2
Lack of knowledge	4.17	0.010	0.568	3
Poor understanding	3.97	0.052	0.790	4
Lack of time	3.89	0.023	0,543	5
Lack of budget	3.66	0.087	0.654	6
Low profit margin	3.33	0.339	0.679	7
Competition among SMCs	3.00	1.000	0.822	8
Complexity of analytical tools	2.84	0.596	0.623	9
Lack of available risk managers	2.72	0.617	1.156	10

The one-sample t-test result was significant at the 0.05 level (test value=3.0).
Reliability Cronbach's alpha = 0.754
One-way random correlation coefficient (kappa) = 0.770

"Lack of budget", "low profit margin", and "competition among SMCs", which were all related to the expense of RM implementation, were the remaining three impactful barriers. These three barriers were also ranked 6th, 7th and 8th respectively. The results implied that the respondents did not believe that RM implementation in small projects was worth the expense involved, and that money spent in RM in small projects would also be disproportionate to project cost. This extended the view point of Griffith and Headley (1998). Although their mean scores were not lower than the test value, the one-sample t-test results revealed that there were not significant differences between their scores and the test value. Thus, the impact levels of these barriers are medium.

Moreover, the remaining two barriers "complexity of analytical tools" and "lack of available risk managers" obtained scores lower than the test value although the one-sample t-test results indicated that there mean scores were not significantly different from the test value. Thus, they were not impactful barriers to RM implementation in small projects to a certain level of significance. The overall ranking of barriers from this research is somewhat in line with previous studies which also indicated that lack of sufficient

knowledge often hinders RM implementation in small projects (Ho and Pike, 1992; Smith and Bohn, 1999), and also that "complexity of analytical tools" is not a significant barrier to risk management implementation in small projects (Hwang *et al.*, 2013).

Measures for overcoming barriers

A matrix was presented to the respondents to provide which of the row listed measures is an effective strategy for overcoming the column listed barriers to the implementation of RM in small construction projects. Fig 1 is a representation of the result from the returned questionnaires.

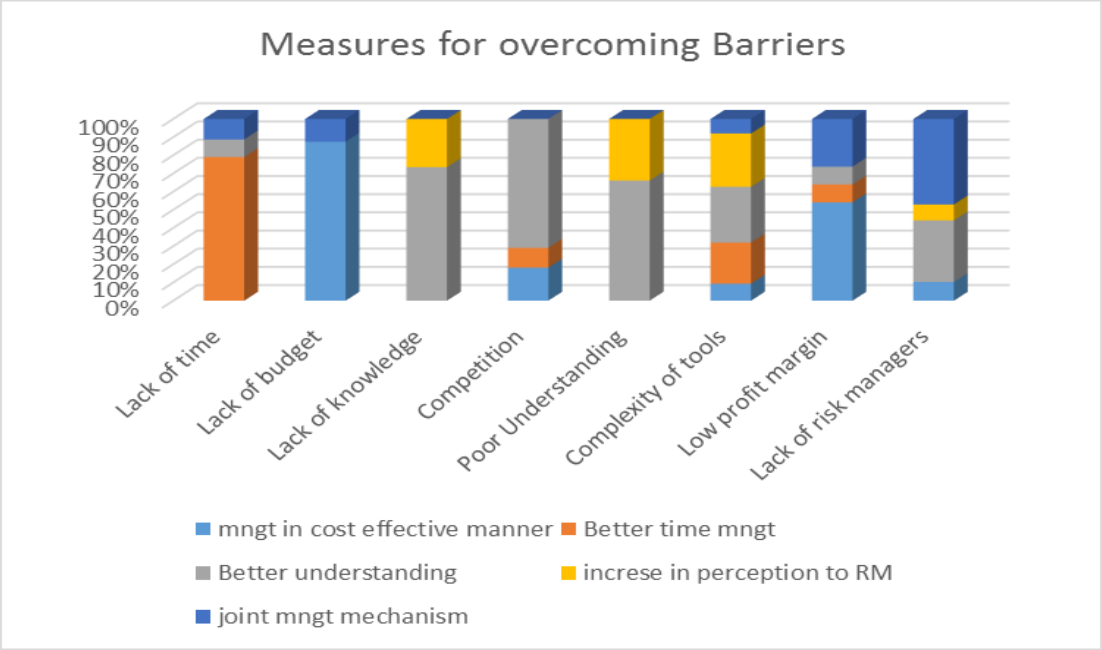

Fig 1: measures for overcoming barriers.
Source; field survey 2016

As indicated in Fig 1, a large share of respondents agree that better time management is an effective measure for overcoming "Lack of time" as a barrier to risk management implementation in small projects. As small projects are restricted by tight schedules (Smith and Bohn, 1999) and the development of a RM framework is tedious and time-consuming (Mubarak, 2010), managers are required to effectively manage project time in order to effectively implement RM processes. Moreover, a fraction of the respondents of this research also view "better understanding of RM techniques by managers" and also "development of a joint management mechanism" between client(s) and manager(s) might also serve as effective measure for overcoming the challenge of lack of time in small projects.

"Lack of budget" and "Low profit margin" were also considered as barriers to RM implementation in small projects. Considering both of these barriers are related to the expense of risk management implementation, managing small projects in a cost effective manner will serve as an effective measure for overcoming these challenges.

"Lack of knowledge", "Competition among SMCs" and also "Poor understanding of RM techniques" as barriers to RM implementation in small projects all boils down to manager's acquaintance to risk management processes. Most managers believe that risk management tends to increase the overall cost of tender. More so, contracts tend to be awarded to the tender with the lowest price (Wong et al., 2000). As thus, managers perceive RM implementation as a challenge to wining contract award due to competition from other SMCs. However, a large percentage of the respondents believe increase in knowledge and perception of risk management by managers and also better understanding of RM techniques can be an effective measure for overcoming these barriers.

The research also found that "Complexity of analytical tools" and "Lack of available risk managers" are not significant barriers to RM implementation in small projects. However, respondents believe better understanding and increase in perception to RM can overcome these barriers. More so, better time management in small projects by managers are significant measures for overcoming "Complexity of analytical tools" as a barrier. Development of joint management mechanism between client and manager as well better understanding of RM techniques by managers are perceived as effective measures for overcoming the challenge of "Lack of available risk managers".

CONCLUSION

The complexity and risk of building projects are increasing by the day as more ideas are emerging. The primary aim of every construction project is to achieve project goals within available cost, with best possible quality and within a specified period of time. This means meeting client's requirement with minimum possible cost, with required quality and within the specified time. Any action or event that may affect the achievement of these goals or objectives is a project risk. This study identified that the main problem of risk management application in Nigeria is knowledge. All the factors that limit the application are caused by lack of knowledge and experience. Analysis showed that these two factors recorded significant mean scores of 4.17 and 4.29 with ranks 3 and 1 respectively. The attitude of construction participants is another problem to risk management. It was seen that contractors bid for projects without RM implementation which in turn affect their profit margin as it was seen in previous researches that clients tend to award contracts to the lowest tender and RM increases the tender price of projects. Also, Lack of time was also found to be a major barrier to RM implementation as small projects are restricted by tight schedules and the development of a RM framework is tedious and time-consuming. This finding is in congruence with the works of Smith and Bohn (1999) and also Mubarak (2010).

As lack of knowledge and experience were found to be the major barriers to RM, development of seminar programs as well as introduction of a course in collages is highly recommended which in turn will make aware of young professionals the knowledge, benefits, and also positive impact of Risk management as well enlighten them on how to effectively apply risk management. More so, both managers and clients need to work together in

project from the beginning to the end in order to tackle project risks that might inevitably occur. This concept of developing a joint management mechanism provides the client the opportunity to be involved in the project which gives him or her clear understanding of the project's complexity and also be involved in the management process. Also, it is recommended that future studies be conducted on RM implementation in small projects and SMCs in other countries and also to compare the RM implementation and impact in small projects with that in larger projects.

REFERENCES

Akintoye, A.S., MacLeod, M.J., (1997). Risk analysis and management in construction. *International Journal of Project Management* 15 (1), 31–38.

Aliyu B.A (2013). Risk Management in Nigerian Construction Industry, MSc thesis, Eastern Mediterranean University Gazimagusa, North Cyprus.

Aminu, A. B. (2013). Risk Management in Nigerian Construction Industry. Unpublished thesis submitted to the Institute of Graduate Studies and Research, Eastern Mediterranean University, Gazimagusa, North Cyprus, in fulfilment of the partial requirements of the Degree of M.Sc. in Civil Engineering, July 2013.

Augustine, J. E., Ajayi, J. R., Ade, B. A. and Edwin, A. A. (2013). Assessment of Risk Management Practices in Nigerian Construction Industry: Toward Establishing Risk Management Index. *International Journal of Pure and Applied Sciences and Technology*, 16(2) 20-31

Banaitiene, N. And Banaitis, A. (2012). Risk management in Construction Projects. Current Issues and Challenges, *International Journal of Project Management* 429-448.

Barkley, B. T. (2004). Project risk management. McGraw-Hill, New York.

Belel, Z. and Mahmood, H. (2012). Risk Management Practices in the Nigerian Construction Industry- A Case Study of Yola. Journal of Engineering Sciences, 7(3), 1-6.

Chihuri, S., Pretorius, L., 2010. Managing risk for success in a South African Engineering and construction project environment. *South African Journal of Industrial Engineering*. 21:63–77.

Chileshe, N., Kikwasi, G., 2013. Perception of barriers to implementing risk assessment and management practices by construction professionals in Tanzania. Presented at the Procs 29th Annual ARCOM Conference, Association of Researchers in Construction Management.

Choudhry, R.M., Iqbal, K., 2013. Identification of Risk Management System in Construction Industry in Pakistan. *Journal of Management in Engineering*. , 7(3), 1-6.

CII, (1991). Manual for Small Special Project Management. Construction Industry Institute, Austin, TX.

CII, (2001). Small Projects Toolkit. Construction Industry Institute, Austin, TX.

Collins, W., Parrish, K., Gibson, G.E., (2017) Development of a Project Scope Definition and Assessment Tool for Small Industrial Construction Projects. *American Society of Civil Engineers.,* 7(3), 1-6.

Construction Industry. An unpublished thesis submitted in partial fulfilment of therequirements for the degree of Master of Philosophy of the University of Wolverhampton. March 2014

Davison, B., andSebastian, R.(2009b). "Therelationship between contract administration problems and contract type." *J. Pub. Procur.*, 9(2), 262–282.

Dunston, P.S., Reed, A.G., (2000). Benefits of small projects team initiative. Journal of Construction Engineering Management 126 (1), 22–28.

Fischer, R. (2015) Barriers to effective risk management on small projects in South Africa. University of Witwatersrand Johannesburg, South Africa.

Flanagan, R., and Norman, G. (1993). Risk management and construction, Blackwell Science, Oxford.

Griffith, A., Headley, J., (1998). Management of small building works. *Construction Management and Economics* 16 (6), 703–709.

Griffith, A., Headley, J.D., (1997). Using a weighted score model as an aid to selecting procurement methods for small building works. *Construction Management & Economics* 15 (4), 341–348.

Ho, S.S.M., Pike, R.H., (1992). Adoption of probabilistic risk analysis in capital budgeting and corporate investment. *Journal of Business Finance and Accounting* 19 (3), 387–405

Holmes, A. (2002). Risk management. Capstone Publishing, Oxford.

Huemann, M., Keegan, A., and Turner,J.R.(2007)."Human Resource Management in the Project-Oriented Company: A review." *Int. J. Project Managent.*,25(3),315–323.

Hwang, B.G., Low, L.K., (2013). Construction project change management in Singapore: status, importance and impact. *International Journal of Project Management* 30 (7), 817–826

Joshua O.D., (2010). On strategies for mitigating risk in construction projects, The 40th Annual General Meeting/ Conference of the Nigeria Institute of Building (NIOB), Asaba, Delta State,

Kremljak, Z. (2010). Risk Management. Proceedings of the 21st International DAAAM Symposium, 7(3), 1-6.

Landis, J. R., Koch, G. G. (1977). The measurement of observer agreement for categorical data. Biometrics 33:159-174.

Laryea S, Hughes W (2008). How contractors in Ghana include risk in their bid prices, School of construction management and engineering, University of Reading.

Latham S M, (1994). Joint review of procurement and contractual arrangements in the United Kingdom construction industry, *constructing the team*. 155-198.

Liang, L., (2005). Small Project Benchmarking. Ph.D Thesis, the University of Texas at Austin, Austin, TX.

Luka GT, Muhammad SI. 2014. Evaluating the impact of risk factors on construction projects in Nigeria. Int J Eng Sci.3:10–15

Lyons, T., Skitmore, M., (2004). Project risk management in the Queensland engineering construction industry: a survey. *International Journal of Project Management* 22 (1), 51–61.

Mubarak,S., 2010.Construction Project Schedulingand Control. John Wiley& Sons, New York, NY.

Nasir D., B. McCabe and Hartono, (2003). On evaluating risk in construction schedule model (ERICS) construction schedule risk model, *Construction Engineering and Management*, 125(5) 518-527.

Nnadi, E.O.E and Ugwu, O.O. (2013). An Appraisal of Risk Management in Nigeria Construction Industry, *International Journal of Research and Advancement in Engineering Science*, 3 (2), 41 –50.

Odeyinka H.A., (2000). On an evaluation of the use of insurance in managing construction risks, *Journal Construction Management and Economics*, 18519-524.

Odeyinka H.A., J.G. Lowa and A. Kaka, (2008). On an evaluation of risks factors impacting construction cash flow forecast, *Journal of Financial Management of Property and Construction*, 125 (2), 101–109

Odimabo, O. O. and Oduoza, C. F. (2013). Risk Assessment Framework for Building Construction Projects' in Developing Countries. *International Journal of Construction Engineering and Management* 2013, 2(5): 143-154.

Ogunbayo, O.M. (2014). Assessment of Risk Analysis Processes in the Nigerian Construction Industry. Contractors and Project Managers' Perspective. *New International Journal of Advancement in Research and Technology*. 3(11). Pp 36-42

Ojo G.K., (2010). On an assessment of the construction site risk-related factors, The 40th Annual General Meeting/ Conference of the Nigeria Institute of Building (NIOB), Asaba, Delta State.

Osipova, E. (2015). "Establishing cooperative relationships and joint risk management in construction projects: Agency theory perspective." *Journal Construction Management and Economics*10.1061/(ASCE)ME.1943-5479.0000346, 05014026.

Perrenoud, A., Lines, B.C., Savicky, J., Sullivan, K.T (2017) Using Best-Value Procurement to Measure the Impact of Initial Risk-Management Capability on Qualitative Construction Performance. *American Society of Civil Engineers*

Perry, J.G., Hayes, R.W., (1985). Risk and its management in construction projects. Proceedings of the Institution of Civil Engineers Part 1, 499–521.

PMI, (2008). A Guide to the Project Management Body of Knowledge. Project Management Institute, Newtown Square, PA.

Renuka, S.M., Umaarani, C. and Kamal, S. (2014). A Review on Critical Risk Factors in the Life Cycle of Construction Projects. *Journal of Civil Engineering Research*, 49(2A) Pp. 31-36.

Smith, G.R., Bohn, C.M., (1999). Small to medium contractor contingency and assumption of risk. *Journal of Construction Engineering Management* 125 (2), 101–109

Stephenson, J., Thurman, C., (2007). Ultimate Small Business Marketing Guide. Entrepreneur Press.

Tang, W., Qiang, M., Duffield, C., Young, D., Lu, Y., (2007). Risk Management in the Chinese Construction Industry. *Journal of Construction Engineering and Management*. 2(5): 143-154

Wang, T., Tang, W., Du, L., Duffield, C. F., Wei Y. (2016) Relationships among Risk Management, Partnering, and Contractor Capability in International EPC Project Delivery. *American Society of Civil Engineers.*

Windapo, A.O. Omeife, C. and Wahap, L.A. (2010). Stakeholders perception of key risks in oil and gas construction projects, 40th Annual General Meeting/Conference of the Nigeria Institute of Building (NIOB), Asaba, Delta State, July 7-11

Wong, C.H., Holt, G.D., Cooper, P.A., (2000). Lowest price or value? Investigation ofUKconstructionclients'tenderselectionprocess.*ConstructionManagement and Economics* 18 (7), 767–774.

Yoon, Y., Tamer, Z., Hastak, M. (2014) Protocol to Enhance Profitability by Managing
Risks in Construction Projects. *American Society of Civil Engineers.*

Zhao, X., Hwang, B.G., Yu, G.S., (2012). Identifying the critical risks in underground rail international construction joint ventures: case study of Singapore. *International Journal of Project Management* (http://dx.doi.org/10.1016/j. ijproman.2012.10.014).

Zhao, Z.Y., Lv, Q.L., Zuo, J., Zillante, G., (2010). Prediction system for change management in construction project. *Journal of Construction Engineering Management* 136 (6), 659–669.

Zou, P., Chen, Y., and Chan, T. (2010). "Understanding and improving your risk management capability: Assessment model for construction organizations." *International Journal of Project Management.,* 22 (1), 51–61.