Identifying Key Significant Factors Predisposing Building Projects to Risks in Rivers State, Nigeria

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ABSTRACT

It is highly desirable but hardly feasible to embark on building projects without encountering risks. In a bid to reduce projects risk exposure, this study was undertaken with the aim of assessing significant factors that predispose building projects to risk in order to enhance project performance. In this study, survey method was adopted with 284 questionnaires administered on the stakeholders involved on the projects within the study area, comprising the clients, consultants and contractors, in Rivers State, Nigeria. Percentile, Mean item score (MIS) and Kruskal Wallis H test were employed to analyze the data collected on a 5-point likert scale. The construct in the research instrument was subjected to reliability analysis and the alpha value shows 0.868, indicating a high degree reliability of the instrument used in collecting the data. Kruskal Wallis H test confirmed the divergent views of the respondents regarding factors predisposing building projects to risks. Having ascertained the significant factors predisposing building projects to risk, construction stakeholders are enjoined to ensure flexibility in the project schedule yet operational and realistic; administrative bottlenecks in securing approvals should be reduced while client/designers are enjoined to cut the excesses of design and programme variations in its entirety.

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1. INTRODUCTION

1.1 Background to the Study

The construction industry consists of all businesses involved in the construction of houses, office buildings, highways and bridges, as well as those that offers specialized works such as electricians, plumbers and masons, typically involved in the construction of all types of structures (Szymanski, 2008). Construction work covers site acquisition, design, contract, site operation (construction), operations and management. It has a great impact on the economy of all countries (Leibing, 2001). The construction industry and its parties are affiliated with high degree of risk because of the nature of construction business activities, processes, environment and organization (Mahamid, 2013).

Risk is an integral part of all human endeavors, including construction activities, and the risk elements involved are diverse and varied (Odeyinka, 2000). How we deal with risk determines if a venture will be successful or not. When it comes to the subject of risk, the construction industry is no exception (Thompson & Perry, 1992). The construction industry has a high risk tendency in comparison to other industries (Dada & Ojo, 2009). This is because of the complex and time-consuming process of design and construction, as well as the great effort to coordinate multitudes of people from different organisations, with different skills and interests; and also the coordination of many related and none-related operations (Othman, 2008; Rezakhani, 2012).

Risk can arise from the complexity of a project, location of a project, speed of construction, and terms of payment among others. The size of the project can also be one of the major causes of risk (Dada & Ojo, 2009). Having realized this, risk management is indispensable in dealing with potential vulnerabilities to risks by all parties. Risk management is described by Zou, Zhang, and Wang (2006) as a systematic way of looking at areas of risk, and consciously deciding on how each area should be handled. As risk cannot be avoided, but must be recognized, assessed and managed, in order to reduce uncertainty and improve decision-making (Tipili & Ilyasu, 2014); it is therefore pertinent to assess factors that predispose building projects to risks in Rivers State, Nigeria, so as to be able to properly investigate the best risk management approach that will be suitable in managing risk. This will greatly enhance the performance of contraction projects in the region.

2. LITERATURE REVIEW

2.1 Overview of risk and the construction industry

The construction industry consists of all businesses involved in the construction of houses, office buildings, highways and bridges (Adedokun, Akinmusire & Aje, 2016). It covers site acquisition, design, contract, site operation (construction), management and all these make the industry has a great impact on the economy of all countries (Leibing, 2001; Szymanski, 2008). Consequent upon the unique nature of the construction projects, risks can arise from a number of different sources (Oyegoke, 2006; Pheng & Chuan, 2006). This then implies that the construction industry is not excluded when it comes to the issue of risk, (Odeyinka, 2000; Adafin et al., 2016). Some of these risks can arise from the complex and dynamic nature of the industry (Uher & Loosemore, 2004). Risks can also arise from the participants, individuals and organisations, who are actively involved in the construction project, whose interests may positively or negatively be affected by the project execution or project completion (Project Management Institute, (PMI), 2008). These participants also have different experience, skills, expectations and interests (Dey & Ogunlana, 2004), which can naturally create problems and confusion for even the most experienced project managers and contractors (Banaitiene, Banaitis, & Norkus, 2011).

2.2 Susceptibility of construction projects to risks

The variables that could make or mar construction projects objectives are termed risks. These risk factors are inherent in both the design and construction (Adafin et al., 2016). Therefore construction projects are predisposed to variety of risks as a result of materials used, nature of design, methods of construction, locations and layout, physical structure and the use to which building will be put (Ayegba, Ijigah & Agbo, 2014). Kishan, Bhatt and Bhavsar (2014) advanced complex and dynamic environments of construction projects as responsive factors for its high uncertainty and risks exposures. This is not without recourse to the time constraint exhibited and the project types. Several characteristics that are peculiar to construction projects are time limit, specific objects, financial constraints, economic requirements, special and legal conditions, complexity & systematic characteristics (Ayegba, Ijigah & Agbo, 2014). In joint venture projects, the characteristics include project type, location of project, contract value, project duration, shareholding and operating structure (Bing & Tiong, 1999).

2.3 Construction risk management

Traditional construction process can be explained in four stages of conceptual design, construction, operation and maintenance (Odimabo & Oduoza, 2013). Despite these segregations, the passage from one stage to another is not a smooth-sailing adventure but fraught with problems (Odimabo & Oduoza, 2013). This is otherwise known as risks that plagued the construction industry which invariably affect the performance in terms of cost, time and quality (Adafin et al., 2014; 2015; 2016; Adedokun et al., 2016). Odimabo and Oduoza (2013) observe that the cost of risk has never been considered let alone taken into

account by many construction companies. Yet, it is one of the largest expense items that should not be taken with levity (Cavignac, 2009). Risk cannot be ignored (Odimabo & Oduoza, 2013) but can be managed, minimized, shared, transferred or even accepted. Therefore, risk management helps the key project participants: client, consultant and contractor to meet their contractual obligations (Odimabo & Oduoza, 2013). This will minimize considerably the negative impacts on construction performance in relation to cost, time and quality objectives (Banaitiene et al., 2011).

In developing country such as Nigeria, the output of a country enterprise is usually characterized by poor quality work, cost and time overruns (Adafin et al., 2015; Adedokun, et al., 2016). These characteristics originate because a number of risk factors have not been taken into consideration during the project planning and implementation stage (Odimabo & Oduoza, 2013). To combat this challenge, risk management (identification, assessment/ evaluation and response) has become an important part of decision-making process in construction industry (Odimabo & Oduoza, 2013). This determines the success or failure of the construction projects (Abujnah & Eaton, 2010).

3. RESEARCH METHODOLOGY

3.1 Background of the research

This research employed a qualitative research design in the conduct of the study which involved the use of questionnaire survey administered to key construction stakeholders. The population for this work included the professionals in the construction industry, which comprised the Quantity Surveyors, Architects, and Engineers, as well as the representatives of clients and contractors totalling seven hundred and sixty two (762) as indicated in table 1.

Table 1: Total Population of the target respondents

S/N	Respondents	Population	Sample size
1.	Clients/ representatives	51	34
2.	Construction firms/ representatives	156	61
3.	Architects	123	55
4.	Quantity Surveyors	148	60
5.	Engineers	284	74
	Total	**762**	**284**

The adequacy of a sample is assessed by how well such sample represent the whole population of participants from which the sample is drawn (Kothari, 2009). In order to achieve this, the lists of relevant construction professionals as at December, 2014 were collected from their respective professional bodies in Rivers State. The list of registered contractors was sourced from the state ministry of works while the clients are the various ministries, department and agencies as well as higher educational institutions in Rivers state

that had commissioned construction projects within the last 5 years (2010 – 2014). Having ascertained a population of 762, it was reduced scientifically using sample size formula (Yamane, 1967) to sample size of 284 (table 2). The analysis of the collected data was carried out using the following descriptive and analytical scientific methods: percentile, mean item score, and Kruskal-Wallis H test. Also the reliability of the research instrument, for questions posed on a 5-point likert scale, was carried out using Cronbach alpha test.

Table 2: Test of reliability for measuring scale

Scale of measure	Cronbach ∝-value
factors predisposing building projects to risk	0.868

3.2 Tet of reliability for measuring scale

Table 2 shows that the Cronbach's α value for scale of measures of the research instruments is 0.868. The degree of reliability of the instrument is more perfect as the value tends towards 1.0 (Kothari, 2009), it can then be said that the instrument used for this research is significantly reliable.

4. DATA PRESENTATION, ANALYSIS AND RESULTS

4.1 Background information of the respondents

Out of the 284 questionnaires that were administered, 158 were returned and found suitable for the analysis. The analyzed questionnaires represent 55.63% of the total questionnaire sent out which is considered sufficient for the study based on the assertion of Moser and Kalton (1999) that the result of a survey could be considered as biased and of little significance if the return rate was lower than 20-30%. As for the years of working experience possessed by the respondents, it can be seen that 14.6% falls within 1 - 5, 59.5% of the respondents are within 6 – 15 years of experience, while 13.9% falls within 16 - 20. The last category of 21 and above accounted for 12.0%. On the average, the respondents had approximately 11 years of working experience. Information supplied by this category of professionals is considered to be adequate and reliable. These set of respondents have executed 25 construction projects on the average. Analysis according to Table 3 reveals that majority of the respondents are BSc/ BTech holder. Table 3 shows that 24.1% of the respondents are working within client organisation while the remaining 38.6% and 37.3% are from contracting and consulting firms respectively. From Table 3, it can be seen that majority of the respondents in this case are Engineers with 45.6% and was closely followed by 33.5% quota, represented by the Quantity Surveyors and the least was Architects with 20.9%. In terms of the sectors or firms where the respondents are, Table 3 shows that 24.1% of the respondents are working within client organisation while the remaining 38.6% and 37.3% are from contracting and consulting firms respectively.

Table 3: Demographic information of the respondents

Background Information	*Frequency*	*Percentage*	*Cum. Percentage*
Profession of respondents			
Quantity Surveyors	53	33.5	33.5
Architects	33	20.9	54.4
Engineers	72	45.6	100.0
Total	***158***	***100.0***	
Years of experience			
1 – 5	23	14.6	14.6
6 – 10	75	47.5	62.0
11 – 15	19	12.0	74.1
16 – 20	22	13.9	88.0
21 and Above	19	12.0	100.0
Mean		***10.8***	
Total	***158***	***100.0***	
Highest Qualifications			
HND	26	16.5	16.5
BSc/BTech	68	43.0	59.5
PGD	12	7.6	67.1
MSc/MTech	51	32.3	99.4
PhD	1	0.6	100.0
Total	***158***	***100.0***	
Type of firm/ Sector			

Client organization	38		24.1	24.1	
Contracting firm		61	38.6		62.7
Consulting firm		59	37.3		100.0
Total		***158***	***100.0***		
Number of projects executed					
1 – 20	94		59.5	59.5	
21 – 40		33	20.9		80.4
41 – 60		19	12.0		92.4
61 – 80		3	1.9		94.3
81 and Above	9		5.7	100.0	
Mean			***24.6***		
Total		***158***	***100.0***		

Table 4: factors predisposing building projects to risks

Factors	Mean	Rank	F-ratio	Sig. (P-value).
Tight project schedule	3.842	1	1.228	0.296
Excessive approval procedures in government dept/ bureaucracy	3.835	2	3.725	**0.026**
Design variations	3.665	3	10.549	**0.000**
Contractors poor site management and supervision	3.563	4	0.108	0.898
Practice of assigning contract to lowest bidder	3.525	5	0.001	0.999
Price inflation of construction materials	3.392	6	1.072	0.345
Inadequate program scheduling	3.348	7	1.356	0.261

Incomplete or inaccurate cost estimate	3.335	8	4.042	**0.019**
Unsuitable construction programs	3.323	9	0.386	0.680
Variations by the client	3.298	10	2.140	0.121
Variations of construction programs	3.266	11	3.562	**0.031**
Lack of communication among parties	3.266	11	1.523	0.221
Delay in material procurement	3.247	13	3.037	0.051
Inadequate or insufficient site information (soil test and survey report)	3.228	14	2.411	0.093
Environmental conditions	3.218	15	1.729	0.181
Low management competency of subcontractors	3.196	16	1.059	0.349
Inadequate contractors experience	3.177	17	3.681	**0.027**
Unavailability of qualified professionals and project managers	3.146	18	5.340	**0.006**
Delay in decision making (client/contractor)	3.133	19	0.190	0.827
Lack of coordination between project participants	3.089	20	18.080	**0.000**
Change in scope of the project	3.032	21	0.722	0.487
Incomplete approval and other documents	2.949	22	4.248	**0.016**
Occurrence of dispute	2.949	22	1.327	0.268
Unavailability of experienced skilled labour	2.905	24	0.163	0.850
Project complexities	2.867	25	3.183	**0.044**
Serious noise pollution caused by construction	2.791	26	2.106	0.125
Contract conditions/ project structure	2.722	27	0.999	0.371

4.2 Factors predisposing building projects to risks

Table 4 shows the level of occurrence of factors predisposing building projects to risks, ranked in descending order of mean scores. Out of 27 factors listed, 9 were found to be significant factors, the first three being tight project schedule (Mean Score = 3.842), excessive approval procedures in administrative government departments/ bureaucracy (Mean Score = 3.835) and design variations (Mean Score = 3.665) while the least ranked factors based on the analysis of the respondents responses included project complexities, serious noise pollution caused by construction and contract conditions/ project structure with mean score values of 2.867, 2.791 and 2.722 respectively.

Table 5: Significance test on the factors predisposing building projects to risks

	Profession	Group	Mean
Chi-square	8.334	Quantity Surveyors	46.15
Df	2	Architects	28.66
Asymp. Sig	0.016	Engineers	45.23

4.3 Significance test on the factors predisposing building projects to risks

From Table 5, Kruskal Wallis test carried out shows that the p value is < 0.05, being 0.016, then null hypothesis, which says that there is no significant difference in the opinions of the respondents, is rejected and the alternate hypothesis is accepted that there is statistically significant difference in the opinions of the respondents. The implication of this is that the respondents had divergent views as to the factors predisposing building projects to risks

4.4 Factors predisposing building projects to risks

Out of the 27 factors that are predisposing building projects to risks, as reviewed from the extant literature and as presented during the survey, the analysis based on the respondents' ratings indicates that risk the top three include tight project schedule, excessive approval procedures in administrative government departments/ bureaucracy, and design variations among others. These are in consonance with Zou et al. (2006) that tight project schedule, design variations and excessive approval procedures in government departments are some of the 20 key risks that influence project objectives and Oladokun et al. (2010) that changes in work was the most frequently occurring risk in residential projects. While this study considered 27 factors in relation to building projects in Rivers State, Nigeria, the study undertaken by Zou et al. (2006) took into consideration 20 key risk factors yet having similar results in terms of top three risk factors. Having become apparent from the literature that construction projects are predisposed to risks as a result of materials used, nature of design, methods of construction, locations and layout, physical structure and the use to which building will be put (Ayegba, Ijigah & Agbo, 2014). The foregoing analyses carried out reveal that out of 27 factors predisposing building projects to risks, there are differences in the opinions of the respondents on 9. The 9 significant factors include excessive approval procedures in administrative government departments/ bureaucracy, design variations, incomplete or inaccurate cost estimates, variations of construction programs, inadequate contractors experience, unavailability of qualified professionals and project managers, lack of coordination between project participants, incomplete approval and other documents and lastly, project complexities.

5. CONCLUSIONS AND RECOMMENDATIONS

Consequent to the forgoing analysis carried out, it is evident that building projects in Rivers State are culpable of being predisposed to risks just like construction works in other parts of Nigeria and beyond. It is hereby concluded that tight project schedule, excessive approval procedures in government department/ bureaucracy, design variations and variation of construction programmes among others are some of the factors predisposing building projects risks. It hereby recommended that there should be flexibility in the project schedule yet operational and realistic; this will relieve the contractor from being responsible for the delay not connected to contractor's discharge of duties on project. Administrative bottlenecks in securing approvals should also be reduced while client/ designers are enjoined to cut the excesses of design or programme variations; this will not only enhance the speed at which the work will be executed but also reduces the likelihood of cost increase usually occasioned by variations.

REFERENCES

Adafin, J.K., Wilkinson, S., & Rotimi, J. (2014). Risk-Contingency Fund In The Design Stage Elemental Cost Planning Function: A Theoretical Exploration, available at https://www.library.auckland.ac.nz/external/finalproceeding/Files/Papers/46530final00128.pdf, accessed 29th September, 2014.

Adafin, J.K., Wilkinson, S., & Rotimi, J. (2015). Accuracy in Design Stage Elemental Cost Planning: An Analysis of New Zealand Data. Paper presented at Environmental Design and Management International Conference (EDMIC): Responsive Built Environment- Issues, Strategies and Policies in the developing World, 9th – 12th March, 2015 held Conference centre, Obafemi Awolowo University, Ile-Ife, Nigeria. Organized by Faculty of Environmental Design and Management, Obafemi Awolowo, University, Ile-Ife, Nigeria.

Adafin, J.K., Wilkinson, S., Rotimi, J., & Odeyinka (2016). Budgetary Reliability of Design Stage Elemental Cost Plan in Building Procurement. In Ebohan, O.J., Ayeni, D.A., Egbu, C.O., and Omole, F.K. Procs. of the Joint International Conference (JIC) on 21st Century Human Habitat: Issues, Sustainability and Development, 21st – 24th March, 2016, Akure, Nigeria, 884-893.

Adedokun, O.A., Ogunsemi, D.R., Aje, I.O., Awodele, O.A. & Dairo, D.O. (2012). Evaluation of Qualitative Risk Analysis Techniques in Selected Large Construction Companies in Nigeria. *Journal of Facilities Management*, 11(2), 123-134.

Ahmed, S.M., Ahmad, R. & Saram, D.D. (1999) Risk management trends in the Hong Kong construction industry: a comparison of contractors and owners perceptions, engineering. Construction and Architectural Management, 6(3), 225-234.

Dada J.O. & Ojo G.K. (2009). A methodology for probability risk assessment of construction projects. *Journal of Construction*, 3(1), 19-31.

Leibing, R. (2001). The Construction Industry: Process Players. Upper Saddle River, NJ: Prentice Hall.

Mahamid I. (2013) Effects of project's physical characteristics on cost deviation in road construction. Journal of King Saud University – Engineering Sciences 25, 81–88.

Moser, C.A. & Kalton, G. (1999). *Survey Methods in Social Investigation*, (2nd ed.), Aldershot: Gower Publishing Company Ltd.

Odeyinka, H.A. (2000). An evaluation of the use of insurance in managing construction risks. Construction Management and Economics, 18, 519-524.

Odimabo, O.O. & Oduoza, C.F. (2013). Risk Assessment for Building Construction Projects in Developing Countries. *International Journal of Construction Engineering and Management,* 2(5), 143-154; doi:10.5923/j.ijcem.20130205.02

Oladokun M. G., Ikediashi D. I., Adewuyi T. O. & Oladokun, A.A. (2010). *Assessment of risk on residential building projects in Nigeria.* The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors, held at Dauphine Université, Paris.

Othman, A.A.E. (2008). Incorporating Value and Risk Management Concepts in Developing Low Cost Housing Products. *Emirates Journal for Engineering Research*, 13 (1), 45-52.

Rezakhani P. (2012). A review of fuzzy risk assessment models for construction projects. *Slovak Journal of Civil Engineering, **20***(3), 35-40.

Szymanski S. (2008). What is construction industry? An economic fact book. The Harry Van Arsdale Jr. centre for labor studies, Empire State College/SUNY, New York.

Tipili, L.G. & Ilyasu, M.S. (2014). Evaluating the impact of risk factors on construction projects cost in Nigeria. *The International Journal of Engineering and Science*, 3(6), 10-15

Zou, P., Zhang G., Wang J. Y. (2006). Identifying key risks in construction projects: life cycle and stakeholder perspectives. Faculty of Built Environment, University of New South Wales, Sydney.