INVESTIGATION INTO THE SEVERITY OF FACTORS PREDISPOSING CONSTRUCTION PROJECTS TO RISKS IN NIGERIA

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ABSTRACT
Factors predisposing construction projects to risks have received extensive attention in the literature at the detriment of the level of severity. This study aims at assessing the severity of these factors in Rivers State, Nigeria, with recourse to the perceptions of construction stakeholders. In achieving the aim; primary data were collected through questionnaires survey administered on284respondentsout of which 158 received formed the basis of analysis. The respondents were directly involved in the completed projects. Cronbach alpha test with a value of 0.902 attested to the high degree reliability of instrument used in collecting the data. Kruskal Wallis H test confirmed the convergent views of the respondents. The highly rated factors found predisposing construction projects to risks included excessive approval procedures in administrative government department/bureaucracy, inadequate contractors experience, contractor's poor site management and supervision, inadequate programme scheduling and incomplete or inaccurate cost estimate among others. Having ascertained the significant severe factors predisposing construction projects to risk, administrative bottlenecks in securing approvals should be reduced coupled with allowance for adequate time to cater for approval formalities in government department. Also, experience of the contractor should also be given utmost priority as part of the criteria for selection to be fulfilled because it will not only enhance the project but also guide against poor site management and supervision. Lastly, there should be flexibility in the program schedule without affecting the overall project program while adequate attention should be accorded the cost estimates to ensure correctness.

Keywords: Construction projects; project performance; risk factors; severity; Nigeria.

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INTRODUCTION
When it comes to the issue of risk, the construction industry cannot be excluded (Odeyinka, 2000; Adafin*et al*., 2016). This is not unconnected to the revelations from the extant construction management literature that certain factors are subjecting construction projects to risks (Awodele, 2012).Understanding the corresponding level of severity will determine the performance of construction project to expectations in terms of iron triangle of cost, time and quality. Awodele (2012) opines that long period, complicated processes, abominable environment, financial intensity and dynamic organization structures are the unique features of construction activities. With these features, construction industry has a high tendency of risks than any other industries (Awodele *et al*., 2007; 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 organizations, with different skills and interests; and also the coordination of many related and non-related operations (Othman, 2008; Rezakhani, 2012). Consequent upon the unique nature of the construction projects, risks can arise from a number of different sources (Oyegoke, 2006; Pheng and Chuan, 2006). Some of these risks can arise from the complex and dynamic nature of the industry (Uher and Loosemore, 2004). Risks can also arise from the many participants who are actively involved in the construction project (Project Management Institute, 2008). These participants also have different experience, skills, expectations and interests (Dey and Ogunlana, 2004), which can naturally create problems and confusion for even the most experienced project managers and contractors (Banaitiene and Banaitis, 2012).

To guide against problems or the negative consequences of non-performance as occasioned by the risks inherent in construction projects, it is of essence to understand the extent of severity of factors predisposing construction projects to risks which is the thrust behind this study. Therefore, the

importance of the construction industry, as well as its significant exposure to risks occasioned this study. The aim is to assess the stakeholders understanding of the subject matter in terms of the severity of factors predisposing projects to risks in the study area. This will assist in properly deciphering the best risk management approach that will be suitable in mitigating/managing risk in a bid to enhance the performance of contraction projects.

LITERATURE REVIEW

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 and systematic characteristics (Ayegba et al., 2014). The aforementioned characteristics are as a result of the initiation of construction project in a complex and dynamic environments resulting in circumstances of high uncertainty and risks (Kishan et al., 2014).In joint venture projects, the characteristics include project type, location of project, contract value, project duration, shareholding and operating structure (Bing &Tiong, 1999).

Effects of risks on construction projects

The occurrence of a risk in a project will have an effect on the achievement of one or more project objectives (cost, time, scope and quality), and the effect on project objectives could either be negative or positive (Association for Project Management (APM), 2006 and Project Management Institute (PMI), 2008). Lee and Azlan (2012) proposed that in order to measure the performance of construction projects, it is essential to identify the performance indicators. Rasli and Mohd (2008) opine that measurement of the performance of construction projects is a tough and thorny undertaking due to the dynamic nature of construction projects. Lee and Azlan (2012) stated cost, time and quality as the basic elements of project success, emphasizing that this criteria are suitable to measure the success of project management only, that is, during the delivery of construction. Hence cost, time and quality are therefore also suitable in assessing the effect that risk has on construction projects.

Cost - the yardstick for measuring the effects of risks on construction projects

Meeampol and Ogunlana (2006) opine that cost performance is an essential criterion of project performance because it is a proof of the soundness of construction contract, profitability and productivity of contractors. Memon, Rahman, Abdullah and Azis (2010) assert that construction cost is one of the most crucial measures of project success throughout the lifecycle of the project, and it is of high concern to those who are involved in the construction industry. Baloi and Price (2003) defined cost growth as the dependent variables of cost performance. It is the difference between planned budget and actual cost (Jin and Yean, 2006). According to Lee and Azlan (2012), the cost performance of a project is considered successful when there is a little difference between the planned cost and actual cost. Chimwaso (2001) discovered that more cases of cost overruns exist in comparison to projects completed within budget. Putting measures to deal with identified significant factors, which may influence construction cost overruns, in place will result in significant decrease in the occurrence of cost overruns and improve cost performance of projects (Chimwaso, 2001). This must be done from the inception of the project.

Time – the yardstick for measuring the effects of risks on construction projects

One of the biggest problems that the various risk factors can result to on construction project sites is delay. Delay is the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery (Assaf and Al-Hejji, 2006). Delays can incite negative effects such as increased costs, loss of productivity and revenue; lawsuits between owners and contractors; and contract termination etc. (Owolabi et al., 2014). Delay in construction projects according to Lee and Azlan (2012), usually results in extra cost and further reduce the profitability of company. This can be ascribed to the fact that time performance is as essential as cost performance, and both are strongly interrelated (Meeampol and Ogunlana, 2006). Time performance can be described as the difference between planned project duration and actual duration (Ahsan and

Gunawan, 2010). Odeyinka and Yusif (1997) observed that seven out of ten projects surveyed in Nigeria suffered delays in execution. According to Mansfield, Ugwu, and Doran (1994), the major factors causing delay in Nigeria includes financing and payment for completed works, poor contract management, changes in site conditions, shortage of material, and improper planning. The project is considered successful if the construction progress followed the planned schedule (Lee and Azlan, 2012).

Quality – the yardstick for measuring the effects of risks on construction projects

Quality is described by Jha and Iyer (2006) as the required goals or the initial project objectives. Chan and Chan (2004) regard quality as the entire features a product must possess to meet the desired need and fit for purpose. Jha and Iyer (2006) also described quality as: 'meeting the customer's expectations,' or 'compliance with customer's specification. However, the expectations on the end product of construction projects vary from one individual to another (Bryde, 2003). Different parameters are used by clients, contractors, architects and building users to measure the quality of a project, although the measurement is against the same end product. According to Jha and Iyer (2006), quality to a user is the satisfaction with the appearance, performances, and reliability of the project for a given price range. Moreover, poor quality performance to have both short term and long term consequences (Jha and Iyer, 2006). In the short term, poor quality performance can result to loss in productivity, additional expenditures by way of rework and repair, re-inspection and retest. While in the long term, poor quality performance can hurt reputation of the construction company, and if the company fails to improve on its quality performance, it may end up closing its doors for lack of new projects. Furthermore, if in a country, most of the construction companies start disregarding the quality aspects in their projects, this can start affecting the reputation of the country negatively.

Chua et al. (1999) opines that the quality performance of a project is influenced by project characteristics, contractual arrangements, project participants, and interactive processes. Arditi and Gunaydin (1998) assert that quality matters at the corporate level is enhanced by the management commitment to continuous quality improvement, management leadership in promoting high process quality; quality training of all personnel; efficient teamwork, while process quality is enhanced by effective cooperation between parties taking part in the project. Furthermore, Bubshait and Al-Atiq (1999) asserted that a contractor's quality assurance system is crucial in preventing problems and the reoccurrence of problems. Abdel-Razek (1998) views the improvement of employee satisfaction as the most important area in contributing to quality improvement in Egypt. Jha and Iyer (2006) developed a quality performance management system and is of the opinion that it is useful in promoting awareness and improving the understanding of the quality process. In addition to facilitating communication, reducing the overall cost of quality, and directing the management to the areas where quality improvements could be made (Jha and Iyer, 2006). According to Lee and Azlan (2012), the specification of the quality requirements of a project should be clearly and explicitly stated in design and contract documents in order to ensure the effectiveness and conformity of quality performance. Furthermore, in ensuring the successful performance of a project either in terms of cost, time and quality, project risk management is indispensable.

RESEARCH METHODOLOGY

This study adopted the use of questionnaire survey administered on 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: Population and sample size of the 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 contractors registered in category A to C 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 to a sample size of 284 (table 1) according to Yamane (1967). 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
Severity of factors predisposing projects to risks	0.902

Test of reliability for measuring scale

The research instrument is reliable the more the value tends towards 1.0 (Kothari, 2009; Bell, 2005, Creswell, 2012). Following Table 2, the Cronbach's α value for scale of measure of the research instruments is 0.902. Consequent upon this pedestal, the instrument used for this study is significantly reliable.

DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

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 and this 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, 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 organization while the remaining 38.6% and 37.3% are from contracting and consulting firms respectively. From Table 3, 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%. The professional membership status of the respondents shows that 55 are graduate members, 97 are corporate/ associate members while 6 of them are fellow of their respective professional bodies with 34.8%, 61.4% and 3.8% respectively. In terms of the sectors or firms where the respondents are, Table 3 shows that 24.1% of the respondents are working within client organization while the remaining 38.6% and 37.3% are from contracting and consulting firms respectively.

Table 3: Demographics of the respondents

Information	Frequency	Percentage
Profession of respondents		
Quantity Surveyors	53	33.5
Architects	33	20.9
Engineers	72	45.6
Total	***158***	***100.0***
Years of experience		
1 – 5	23	14.6
6 – 10	75	47.5
11 – 15	19	12.0
16 – 20	22	13.9
21 and Above	19	12.0
Mean	***10.8***	
Total	***158***	***100.0***
Highest Qualifications		
HND	26	16.5
BSc/BTech	68	43.0
PGD	12	7.6
MSc/MTech	51	32.3
PhD	1	0.6
Total	***158***	***100.0***
Type of firm/ Sector		
Client organization	38	24.1
Contracting firm	61	38.6
Consulting firm	59	37.3
Total	***158***	***100.0***
Membership grade		
Graduate	55	34.8
Corporate/ Associate	97	61.4
Fellow	6	3.8
Total	***158***	***100.0***
Number of projects executed		
1 – 20	94	59.5
21 – 40	33	20.9
41 – 60	19	12.0
61 – 80	3	1.9
81 and Above	9	5.7
Mean	***24.6***	
Total	***158***	***100.0***

Table 4: severity of factors predisposing projects to risks

Factors	Mean	Std. Deviation	Rank	F	Sig.
Excessive approval procedures in admin government department/ bureaucracy	3.87	1.004	1	2.329	0.101
Inadequate contractors experience	3.87	1.182	2	0.69	0.503
Contractors poor site management and supervision	3.82	1.218	3	1.13	0.326
Inadequate program scheduling	3.8	1.137	4	4.337	0.015
Incomplete or inaccurate cost estimate	3.8	1.276	5	3.028	0.051
Delay in decision making (client/contractor)	3.77	1.211	6	0.414	0.662
Lack of coordination between project participants	3.77	1.286	7	1.603	0.205
Tight project schedule	3.72	1.002	8	4.081	0.009
Design variations	3.68	1.190	9	5.869	0.003
Practice of assigning contract to lowest bidder	3.68	1.262	10	0.327	0.721
Unsuitable construction programs	3.66	1.234	11	3.857	0.023
Price inflation of construction materials	3.65	1.100	12	0.555	0.575
Inadequate or insufficient site information (soil test and survey report)	3.63	1.186	13	0.927	0.398
Unavailability of qualified professionals and project managers	3.63	1.375	14	2.345	0.099
Variations of construction programs	3.6	1.094	15	5.116	0.007
Variations by the client	3.52	1.166	16	3.065	0.049
Unavailability of experienced skilled labour	3.47	1.300	17	6.055	0.003
Incomplete approval and other documents	3.45	1.304	18	3.604	0.03
Low management competency of subcontractors	3.42	1.268	19	6.113	0.003
Change in scope of the project	3.39	1.245	20	0.788	0.457
Lack of communication among parties	3.38	1.074	21	0.92	0.401
Environmental conditions	3.35	1.101	22	4.408	0.014
Delay in material procurement	3.34	1.092	23	0.528	0.591
Occurrence of dispute	3.26	1.130	24	0.099	0.906
Project complexities	3.21	1.093	25	1.396	0.251
Contract conditions/ project structure	3.03	1.162	26	2.696	0.071
Serious noise pollution caused by construction	3.01	1.264	27	1.963	0.144

Severity of factors predisposing construction projects to risks

Table 4 shows the level of severity of factors, which are predisposing projects to risks, ranked in descending order of mean scores (M.S).Standard deviation (S.D) is also adopted to determine the order in case of factors that tied, and choice is based on the factor with lower standard deviation. Among the 27 factors listed, excessive approval procedures in administrative government department/bureaucracy (M.S = 3.87; S.D = 1.004), inadequate contractors experience (M.S = 3.87; S.D = 1.182), contractors poor site management and supervision (M.S = 3.82), inadequate programme scheduling (M.S = 3.80; S.D = 1.137) and incomplete or inaccurate cost estimate (M.S = 3.80; S.D = 1.276) are the most severe top five factors predisposing projects to risks. The least ranked severe factors predisposing projects to risks in Rivers State are project complexities, contract conditions/project structure and serious noise pollution caused by construction with mean scores in the order of 3.21, 3.03 and 3.01 respectively.

Based on the organization where the respondents were working (contracting, consulting and client), analysis of variance of the factors predisposing projects are also computed to determine the existence of significant difference or otherwise among the factors. Table 4 reveals that out of the 27 factors, there is significant difference between the perceptions of the respondents on the severity of 9 factors (P-value < 0.05). It is evident that there are convergent views on the remaining 18 factors since there is no significant difference between the perceptions of the respondents on the severity of factors predisposing building (FPB) projects to risks (P-value > 0.05).

Table 5: Significance test on the severity of FPB projects to risks

	Profession	Group	Mean
Chi-square	4.233	Quantity Surveyors	45.88
Df	2	Architects	32.41
Asymp. Sig	0.120	Engineers	43.06

Significance test on severity of FPB projects to risks

Table 5 shows the overall test of significance on the severity of factors predisposing projects to risks. Kruskal Wallis test carried out shows that the p value is > 0.05, being 0.120; therefore, there is no significant difference between the perceptions of the respondents on the factors predisposing construction projects to risks. Based on the foregoing, there is statistically significant agreement in the opinions of the respondents. The implication of this is that the respondents have convergent views as to the level of severity of factors predisposing projects to risks. This is not surprising as the resultant effect of risk on construction projects tends towards budget and schedule overruns in the study area.

DISCUSSION OF FINDINGS

This discussion is based on the results from the analyzed data from distributed questionnaire and literature. Relationships are drawn between the observed information through the analysis and past studies similar to the research work so as to examine the agreement or otherwise of the studies while contributing to the body of knowledge.

This study reveals the highly rated factors that are found predisposing construction projects to risks are excessive approval procedures in administrative government department/bureaucracy, inadequate contractors experience, contractor's poor site management and supervision, inadequate programme scheduling and incomplete or inaccurate cost estimate. The aforementioned factors are at variance with Ayegba et al., (2014) that advanced materials used, nature of design, methods of construction, locations and layout, physical structure and the use to which building will be put. The findings from this study is also at discord with Kishan et al. (2014) that put forward advanced complex and dynamic environments of construction projects as responsive factors for building project's high uncertainty and risks exposures. The reasons for the deviations are not farfetched in that the present study assessed the level of severity of the factors predisposing construction projects to risk as against the level of occurrence as common with previous studies. coupled with the fact that assessments of risk factors is location based, therefore factors that trigger risk exposures vary from one locations to another. Despite the variability between this study and other previous studies, the respondents have convergent views as to the level of severity of factors predisposing projects to risks in the study undertaken. This is not surprising as the resultant effect of risk on construction projects tends towards budget and schedule overruns in the study area.

CONCLUSION AND RECOMMENDATIONS

Consequent to the forgoing analysis carried out, it is hereby concluded that the top five (most severe) factors predisposing construction projects to risks are; government related factor by the virtue of excessive approval procedures in administration/bureaucracy in government department. Contractor's related factors emanating from inadequate experience and poor site management and supervision and lastly, the hitch borne by the consultants' related factors as evidenced in inadequate program scheduling and incomplete or inaccurate cost estimate. In order to achieve construction project that ensures cost and time performance, the following recommendations are hereby proposed that; administrative bottlenecks in securing approvals should be reduced by the government while adequate time should also be allowed to cater for approval formalities in government departments. Asides the criteria being used to select the contractors to undertake building projects, experience should also be given a priority as it will not only enhance the project but also guide against poor site management and supervision. There should be flexibility in the program schedule without affecting the overall project program while adequate attention should be placed on the cost estimates to ensure correctness.

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