Appraising Risk Mitigating Measures For Building Projects In Rivers State, Nigeria

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Keywords: Building projects; Nigeria; performance; risk factors; risk mitigating measures.

SUMMARY

Risk is inevitable on any construction projects and its ripples negatively affect the performance of construction industry, in terms of meeting its objectives or goal, thereby leading to time and cost overruns. This study assessed the risk mitigating measures adopted in building projects with a view to enhancing projects performance in the study area. In achieving the aim, primary data were collected through administration of questionnaires on 284 key construction stakeholders comprising the clients, consultants and contractors that worked on completed public building projects. Out of the 284 questionnaires that were administered, 158 were returned and found suitable for the analysis. Percentile was used for analyzing the demographics of the respondents while mean item score was used for ranking the identified mitigating measures. Kruskal Wallis H test was adopted for examining the differences in the sample means of different groups of respondents. The study revealed that the most utilized risk mitigating measures in building projects were thorough detailing of the design coupled with the involvement of professionals and owners at the initial, planning and design stage of the projects. The study therefore recommended that thorough design detailing, involvement of professionals at various stages of the project and commitment towards company-citizen social responsibility should be accorded high priority consequent upon the effectiveness of these measures.

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1.0 INTRODUCTION

The construction industry, more than other industries, is subject to more risks due to the unique features of construction activities, such as extended period, complicated processes, abominable environment, financial intensity and dynamic organization structures (Awodele, 2012; Awodele et al. 2007). Therefore, construction industry is not immune when it comes to the issue of risk (Odeyinka, 2000; Adafin et al., 2016). Risk mitigation prior to the occurrence of risks, during any construction projects, ensures the performance expectations in terms of cost, time, quality and sustainability without surprises.

The uniqueness of construction projects makes it more predisposed and vulnerable to risks. These risks can emanate from a number of different sources (Oyegoke, 2006; Pheng & Chuan, 2006) out of which complex and dynamic nature of the industry cannot be overemphasized (Uher & Loosemore, 2004). Risks can also arise from the many 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, 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, 2012).

In order to guard against problems or the negative consequences of cost and time overruns as occasioned by the risks inherent in construction projects, there is a need to properly understand the risk mitigating measures employed to cushion or safeguard the construction projects from being predisposed to risks in building projects 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 and the aim is to assess the stakeholders understanding of the subject matter not only in terms of the level of utilization of the risk mitigating measures but also the effectiveness in the study area.

2.0 LITERATURE REVIEW

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). Risks can be treated by way of responding to it or by mitigation. While risk response serves as corrective measures when risk factors surface on construction projects, risk mitigating measures is a preventive measure of safeguarding the projects from experiencing risks. Yet, risk mitigating measures are preferred.

2.1 Risk mitigation:

Risk mitigation reduces the probability and impact of an adverse risk event to an acceptable threshold. Taking prompt action is often more effective to repair, than trying to repair the damage after the risk has occurred. Gabel (2010) cited examples of mitigation strategies to include: adopting less complex processes, conducting more tests and/or field investigations, developing a prototype; also stated that measures taken to address the impact includes targeting linkages that determine the severity, such as designing redundancy into a subsystem, stating that this may reduce the impact from a failure of the original component (Project Management Institute, 2004). Gabel (2010) opined mitigation or acceptance as the strategies most often used since the numbers of threats that can be addressed by avoidance or transfer are limited. Gabel (2010) also opined that preventive responses are better than curative responses, because preventive responses are more pro-active and if successful can lead to risk avoidance. Gabel (2010) asserted that preventive responses tackle the causes of the risk and proposed that in a situation where it is impossible to reduce probability, a mitigation response should be employed to address the adverse impact of risk, by targeting the drivers that determine the extent of the severity.

2.2 Risk response techniques:

Odimabo and Oduoza (2013) opined 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).

2.2.1 Risk avoidance:

This is sometimes referred to as risk elimination. Risk avoidance in construction is not generally recognized to be practical as it may lead to projects not going ahead. The practical examples of risk avoidance are a situation whereby a contractor is not placing a bid or the owner not proceeding with project funding. There are other number of ways through risks can be avoided, tendering a very high bid; placing conditions on the bid; pre-contract negotiations as to which party takes certain risks; and not bidding on the high-risk portion of the contract.

2.2.2 Risk transfer:

This involves finding another party who is willing to take responsibility for its management, and who will bear the liability of the risk should it occur. The essence is to ensure that the risk is owned and managed by the party who is able to deal with it effectively. Risk transfer usually involves payment of a premium, and the cost effectiveness of this must be considered when deciding whether to adopt a transfer strategy. This is essentially trying to transfer the risk to another party. For a construction, an insurance premium would not relieve all risks, but it gives some benefits as a potential loss is fixed costs. Risk transfer can be achieved in such a way that the property or activity responsible for the risk may be transferred, i.e. hire a subcontractor to work on a hazardous process; and the property or activity may be retained, but the financial risk transferred, i.e. by methods such as insurance and surety.

2.2.3 Acceptance:

This is the action in which risks that remain after response actions and/or for which response is not cost effective are accepted; this action also depicts the acceptance of risks that are uncontrollable, for which no response actions are practical (Gabel, 2010). Project Management Institute (2004) identified two types of acceptance, the passive and the active acceptance. The passive acceptance was described as the action taken to document threats that cannot be eliminated or opportunities that cannot be exploited, to provide awareness that these exist and have been identified. The active acceptance was described as the action that involves establishing a contingency reserve to deal with the aggregate residual risk that has been accepted. Other risk response techniques are sharing, enhance, exploit and host of others.

3.0 RESEARCH METHODS

The study adopted the use of questionnaire survey administered on key construction stakeholders. The population for this study included the professionals in the construction industry within the study area, which comprised the clients, consultants and the contractors totalling seven hundred and sixty-two (762) as shown in Table 1.

Table 1: Population of the target respondents

S/N	Respondents	Population	Sample size
1.	Client's representatives	51	34
2.	Contractors	156	61
3.	Consultants	555	189
	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 using Yamane's 1967 to sample size of 284 (Table 1). 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. The reliability of the research instrument, for questions posed on a 5-point Likert scale, was also carried out using Cronbach alpha test.

3.1 Reliability analysis for the constructs

Prior to the ranking of the risk mitigating measures, reliability analysis was undertaken in order to ascertain the validity and reliability of the data collected. Yang and Wei (2010) opine that the essence of reliability test is to prove or confirm that the factors stated are relevant and can be used for subsequent or further analysis. Reliability test was carried out by evaluating Cronbach alpha through Statistical Package for Social Sciences (SPSS) software. Reliability test was done for the group of risk mitigating factors under two different levels of utilization and effectiveness. The results according to Table 2 indicate that the Cronbach's α value for scale of measure of the research instruments ranges between 0.831 – 0.878.. These values are considered high when compared with the cut-off value of 0.7 according to Yang and Wei (2010). The research instrument is reliable the more the Cronbach's-value tends towards 1.0 (Kothari, 2009; Bell, 2005, Creswell, 2012). The reliability of the research instrument, questionnaire, adopted in this study is guaranteed and the questionnaire data are valid and reliable consequent upon the values.

Table 2: Reliability analysis for the constructs

Scale of measures	Cronbach Alpha Value
Utilization of risk mitigating measures	0.878
Effectiveness of risk mitigating measures	0.831

4.0 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%. 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. Regarding the years of working experience possessed by the respondents, it can be seen that 14.6% falls within 1 – 5 years, 59.5% of the respondents are within 6 – 15 years of experience, while 13.9% falls within 16 – 20 years. The last category of 21 years 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 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/ B.Tech holder. It is evident 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: Demographics 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***	
Membership grade (Professional body)			
Graduate	55	34.8	34.8
Corporate/ Associate	97	61.4	96.2
Fellow	6	3.8	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***	

4.2 Risk mitigating measures

Table 4 shows that the level of utilization of risk mitigating measures is high in "thorough detailing of design", "involvement of professionals at the initial stage of project" and "owner's involvement at the planning and design stage" (Mean Scores = 4.057, 4.057 and 3.899 respectively). Though all the measures are significant based on mean values, yet the least utilized measures are restricted pre-qualification system for awarding project (Mean Score = 3.323), involvement of contractor at planning and scheduling stage (Mean Score = 3.108), and avoidance of the use of open tendering (Mean Score = 2.949). Despite the significant level of these measures the most highly effective ones are thorough detailing of design, involvement of professionals at the initial stage of project and commitment towards company-citizen social responsibility in order to reduce to minimum the likelihood of occurrence of risk factors in building projects.

Table 4: Risk mitigating measures

Measures	Utilization		Effectiveness	
	Mean	Rank	Mean	Rank
Thorough detailing of design	4.057	1	4.278	1
Involvement of professionals at the initial stage of project	4.057	1	4.222	2
Owner's involvement at the planning and design stage	3.899	3	3.595	10
Clear and thorough project brief	3.892	4	3.937	4
Granting mobilization advance to contractors	3.696	5	3.639	8
Commitment towards company-citizen social responsibility	3.671	6	4.120	3
Comprehensive site investigation	3.658	7	3.671	7
Use of project scheduling/ management techniques	3.595	8	3.816	5
Prompt payment for executed works to ensure sufficient cashflow to the contractors	3.589	9	3.570	11
Having knowledge-base of previous projects	3.538	10	3.810	6
Strict compliance with statutory regulations	3.475	11	3.631	9

Review of contract document	3.323	12	3.462	13
Restricted pre-qualification system for awarding project	3.323	13	3.329	14
Involvement of contractor at planning and scheduling stage	3.108	14	3.557	12
Avoidance of the use of open tendering	2.949	15	3.026	15

4.3 Significance test on the utilization of risk mitigating measures

From Table 5, Kruskal Wallis test carried out shows that the p value is > 0.05, being 0.153, then null hypothesis, which says that there is no significant difference in the opinions of the respondents, is accepted and the alternate hypothesis is rejected. Therefore, there is statistically significant agreement in the opinions of the respondents on the level of utilization of risk mitigating measures. Based on the aforementioned, it is evident that the respondents have convergent opinions in relation to their utilization of risk mitigating measures in building projects.

Table 5: Significance test on the utilization of risk mitigating measures

	Profession	Group	Mean
Chi-square	3.761	Quantity Surveyors	28.29
Df	2	Architects	17.88
Asymp. Sig	0.153	Engineers	21.57

4.4 Significance test on the effectiveness of risk mitigating measures

From Table 6, Kruskal Wallis test carried out shows that the p value is > 0.05, being 0.333, then null hypothesis, which says that there is no significant difference in the opinions of the respondents, is accepted and the alternate hypothesis is rejected. Therefore, there is statistically significant agreement in the opinions of the respondents on the level of effectiveness of risk mitigating measures. Sequel to this, it is evident that the respondents have convergent opinions in relation to the level of effectiveness of risk mitigating measures in building projects.

Table 6: Significance test on the effectiveness of risk mitigating measures

	Profession	Group	Mean
Chi-square	2.202	Quantity Surveyors	26.82
Df	2	Architects	18.50
Asymp. Sig	0.333	Engineers	22.24

4.6 DISCUSSION OF FINDINGS

4.6.1 Risk mitigating measures

The level of utilization of risk mitigating measures is high in thorough detailing of design, involvement of professionals at the initial stage of project and owner's involvement at the planning and design stage. The most highly effective ones are thorough detailing of design, involvement of professionals at the initial stage of project. These favorably support Aje and Adedokun (2015), and Dairo (2015) that in managing the inherent risks associated with construction changes, there must be involvement of professionals at the initial stage of the project coupled with thorough detailing of the design by the consultants. Also, commitment towards company-citizen social responsibility can as well reduce the likelihood of occurrence of risk factors in building projects.

5.0 CONCLUSION 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 the most utilized risk mitigating measures in building projects are thorough detailing of the design coupled with the involvement of professionals and owners at the initial, planning and design stage respectively. Therefore, bearing in mind the magnitude of funds committed into the construction projects, the following recommendations are proposed for stakeholders in the construction industry in order to achieve hitch free construction process that ensures value for money that there should be thorough detailing of design, involvement of professionals at the initial stage of the project and commitment towards company-citizen social responsibility consequent upon the effectiveness of these measures.

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BIOGRAPHICAL NOTES

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AGBOOLA, O.J. is a seasoned and practicing Quantity Surveyor (QS) with bias for both consulting and contracting services. As QS to be reckoned with, he has vast experience of construction works within and outside the shores of Nigeria. He has a Fellow membership status with the Nigerian Institute of Quantity Surveyors (NIQS). QS Agboola is also a registered member with the Quantity Surveyors Registration Board of Nigeria (QSRBN). He has a strong passion towards a cutting edge research and development. He has rendered services as a consultant Quantity Surveyor, not only on governments initiated projects but also for private and corporate bodies, on a number of construction projects.

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