A Study of Risk Management Practice of Highway Projects in Nigeria

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Abstract

Construction Risk Management must be given adequate attention in order to ensure a successful project that meets the expectation of project goals and objectives thus risk management practice in Nigeria with respect to highway projects is explored in this study. Questionnaire survey was adopted for a population of 82 professionals (highway engineers, quantity surveyors and land surveyors) in clients, consultants and contracting organisations, using stratified random sampling techniques. The data collected were analysed by determination of the mean of the responses from the respondents and one way Analysis of Variance (ANOVA). Result of the analysis showed that; lack of accepted industry model for analysis of risk is rated as the most influencing factor in the implementation of risk management practice in Nigeria, followed by human/ organizational resistance. There is no significant difference at 5% level of significance between the responses of the clients, consultants and contractors on risk identification tools usage and risks response tools usage, risks analysis techniques usage of all the respondents except algorithms and Monte Carlo simulation. The result further showed that risk management practice is low in Nigeria, as all the respondents agreed that the use of rule of thumbs in managing construction risks associated with highways is prevalent as against modern techniques that are widely in use in developed countries. The study recommended adequate training for all stakeholders in highway construction sector to improve management of risks thus meeting project goals of time, approved budgets, and quality, imbibing the health and safety culture, and in an environmentally acceptable manner.

Keywords: Development, Highways, Risk management,

1. Introduction

The construction industry still suffers from poor project performance due to risks, despite attracting a lot of attention in the literature, in recent years, intensive research and development has been done in the area of project risk management (Klemetti, 2006). Voetsch, Cioffi and Anbari (2004) found a statistically significant relationship between management support for risk management processes and a reported project success. Risk in construction has been the object of attention because of time and cost overruns associated with construction projects. Bufaied (1987) described risk in relation to construction as a variable in the process of a construction project whose variation results in uncertainty as to the final cost, duration and quality of the project.

A systematic process of risk management has been divided into risk classification, risk identification, risk analysis and risk response, where risk response has been further divided into four actions, i.e. retention, reduction, transfer and avoidance (Berkeley et al, 1991; Flanagan and Norman, 1993). An effective risk management method can help to understand not only what kinds of risks are faced, but also but also how to manage these risks in different phases of a project. Owing to its increasing importance, risk management has been recognized as a necessity in most industries today, and a set of techniques have been developed to control the influences brought by potential risks (Schuler, 2001; Baker and Reid, 2005).

Compared with many other industries, the construction industry is subject to more risks due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures (Flanagan and Norman, 1993; Akintoye and Macleod, 1997; Smith, 2003; Zou, Zhan and Wang, 2006). Hence, taking effective risk management techniques to manage risk associated with variable construction activities has ever been more important for the successful delivery of a project.

Several researches have been carried out in the past which focused on examining the impacts of risks on one aspect of project strategies with respect to time (Shen, 1997), cost Chen, et al 2000 and Safety (Tam, et al 2004). Some researchers investigated risk management for construction projects in the context of a particular project phase, such as conceptual/feasibility phase (Uher and Toakley, 1999), design phase (Chapman, 2001), construction phase (Abdou, 1996) rather than looking at it from inception to completion. Early identification of risks inherent in projects (of significant magnitude) with appropriate risk analysis method and consequently

appropriate risk response will not only bring about meeting project objectives (cost, time, quality, safety and environment) but reduce adversial relationship among the stakeholder in the construction industry.

2. Risk Management in the Construction Industry

Zaghoul and Hertman (2003) described risk in construction projects as significant element by the total project cost and thus their allocation has a major effect on project budget. Baloi and Price (2003) described construction project as an open system rather than a closed system, which add to variability and riskiness of the project. Klemetti (2006) stated that risk management in the construction industry still rely heavily on contract and the industry has the bad reputation of involvement in numerous dispute and claims. Floricel and Miller (2001) stated that various studies have shown that contractual structures are the main sources of the lack of flexibility and they have a significant negative effect on actors' relationship. Risk management should be implemented; contracting risks to other parties does not mean they are managed since nothing is done to deal with these risks; rather there will be increase in the cost of contract.

Hertman (2000) stated that contract clauses are estimated to raise project lost by 8-20% of the total cost. This according Klemetti (2006) supports and motivates effort to find alternatives methods in managing risks. Baloi and Price (2003) further started that studies show that construction risks are mainly handled with experience, assumption and human judgment. Skitmore and Lyons (2004) noted that usage of risk management varies in the construction industry. They further noted that brainstorming and team analysis for identifying risks are the most frequently risks techniques, computer aided methods are rarely used. Risks management according to Mills (2001) is restricted only to the identification phase, event can be known in advance but their extent is not quantified. Klemetti (2006) however asserted that the biggest barrier in construction project risks management are a drive for cost effectiveness; risk management is seen only to consume resources and benefit are difficult to measure in financial terms. Lack of risk management resources and know how restricts the use of risk management techniques. Several studies have shown that there are not enough capable personnel to conduct the risk management process and risk management is only in the hands of a few key people. Fabi and Awolesi (2013) carried out a research comparing risk management practice between indigenous and expatriate contractors in Nigeria and found out that there is no significant difference in the way they manage risk. Hence, this study has the following objectives:

1.   To assess factors affecting implementation of risk management practices of highway projects in Nigeria

2.   To assess if there is any difference in the way stakeholders management risks associated with highway projects in Nigeria.

3. Method

Data Collection.

 The data collection instrument used in this study is the questionnaire. Hundred (200) questionnaires were distributed to professionals in client and consultant organization (highway engineers, land surveyors and quantity surveyors) in Lagos, using stratified random sampling technique. Lagos is chosen for the study because it is the commercial nerve centre of Nigeria and the concentration of construction activities in the area. Seventy (82) hard copies of questionnaires were retrieved in person, yielding a response rate of 41%.   Section A of the questionnaire contains the following respondent particulars: Age, Gender, Educational qualification, Professional qualification, Working Experiences in the construction industry and the type of organization the respondents work. Section B of the questionnaire contains questions to elicit data on factors militating against risk management practice in Nigeria and to explore risk management practice of highway projects in Nigeria. A 4-point Likert scale was used, the scale is: 1-Strongly Disagree, 2-Disagree, 3-Agree and 4- Strongly Agree and 1-not useful, 2-rarely useful, 3-somewhat useful, 4-useful and 5-very useful as applicable.

Data Analysis

The Statistical Package for Social Sciences (SPSS) was used to carry out the analysis. The demographic details of the respondent were produced and the mean rank of the identified factors in the objectives were used for the ranking in the analysis

4. Results

The analysis was carried out manually both for the descriptive and inferential statistics.

The demographic details of the respondents were produced and the mean rank of the identified factors in the objectives were used for the ranking in the analysis. Also, the test of difference between the major stakeholders was evaluated at 5% level of significance.

Table 1: Demographic details of the Respondents

Variables	Frequency	Percentages
(I) Educational qualifications (N= 82)		
HND	26	32
BSC	28	34
MSC	22	27
Others	06	07
(II) Number Of Years Of Experience in the Construction Industry (N=82)		
1–10 years	28	34
11–20 years	26	32
21-30 years	22	27
31-40 years	06	07
(Mean = 16)		
(III) Number of Projects handled (N=82)	32	39
1-10	24	29
11-20	22	27
21-30	04	05
31-40		
(Mean = 15)	22	27
(IV)Professional qualifications (N=82)	28	34
NIS	32	39
NIQS	26	32
NSE/ASCE	28	34
(V) Type of Organisation (N=82)	28	34
Clients		
Consultants		
Contractors		

Sources: Field Survey, 2015.

Table 1 shows the demographic details of the respondents. 32% are HND holders, 34% holds BSc degree, 27% while 7% have other qualifications. The respondents have put an average of 16 years in the industry and have handled an average of 15 projects. All the respondents are registered members of their respective professional bodies. They belong to clients, consultants and contracting organisations. This shows that the information provided by the respondents is reliable.

TABLE 2: Factors affecting implementation of risk management

Factors		Mean			ANOVA	
	Clients	Consultants	Contractors	Total	F-value	Sig. value
1. Lack of accepted industry model for analysis	4.60	4.46	4.50	4.52	1.564	0.924
2. Human/organisation resistance	4.20	4.25	4.12	4.19	1.742	0.248
3. Lack of dedicated resources	4.16	4.00	4.08	4.08	1.328	0.412
4. Difficulty in seeing the benefits	3.96	3.86	3.80	3.87	0.875	0.678
5. Lack of formality with the techniques	3.78	3.62	3.73	3.71	0.684	0.182
6. Lack of time	3.40	3.25	3.42	3.36	0.356	0.256
7. Lack of information	3.28	3.20	3.32	3.27	0.476	0.200
8. Cost effectiveness	3.20	3.10	3.12	3.14	0.204	0.328

Sources: Field Survey, 2015

In table 2, all the respondents agreed that lack accepted industry model for analysis is rated as the most influencing factor in the implement of risk management practice in Nigeria, followed by human/ organizational resistance while cost effectiveness is the least rated factor. However, the response on the factors affecting implementation of construction risk management indicates that there is no difference in opinion of respondents at a 5% level of significance.

Risk Management Techniques.

Tables 3 – 6 present the results of the analysis. The tables show the F-statistics which tests the null hypothesis that all groups have the same mean while the significance level indicates the probability of rejecting the null hypothesis of no difference between the mean values between groups. Lower probability values (i.e. below 0.05) indicate that the null hypothesis can be rejected, suggesting that there is difference of opinion between groups. A probability value (significance level) below 0.05 suggests that the differences can be considered significant (not arising simply by chance) at the selected 0.05 probability criterion - there is a 95% chance that the difference is real and not spurious between the groups on the risk management techniques as agreed by the respondents.

Table 3: Risk identification tool usage.

Tools		Mean			ANOVA	
	Client	Consultants	Contractors	Total	F-value	Sig. level
1. Questionnaire	3.40	3.36	3.34	3.37	1.684	0.200
2. Brainstorming	3.20	3.24	3.18	3.21	1.445	0.105
3. Flow chart	2.70	2.68	2.74	2.71	0.865	0.310
4. Checklists	2.66	2.56	2.62	2.61	0.652	0.462
5. Case based approach	2.40	2.42	2.44	2.42	0.324	0.280
6. HAZOP	2.10	2.16	2.18	2.15	0.288	0.086

Sources: Field Survey, 2015

Table 3 shows the response of risk identification tool usage which indicates that there is no difference in opinion of respondents at a 5% level of significance.

Table 4: Risk Analysis Techniques Usage

	Techniques	Mean				ANOVA	
		Clients	Consultants	Contractors	Total	F-value	Sig. level
1.	Intuition/Judgment/Experience	3.60	3.72	3.88	3.73	1.378	0.856
2.	Risk Premium	3.50	3.46	3.62	3.53	1.205	1.036
3.	Sensitivity Analysis	3.40	3.62	3.28	3.43	0.864	0.608
4.	Expected Monetary Value	2.90	3.10	3.18	3.06	0.644	0.318
5.	Decision Trees	2.76	2.82	2.91	2.83	0.456	0.184
6.	Risk Impact Assessment	2.70	2.83	2.91	2.81	0.186	0.096
7.	Decision Analysis	2.60	2.68	2.58	2.62	0.243	0.126
8.	Subjective Probability	2.50	2.44	2.42	2.45	0.765	0.583
9.	Risk Adjusted Discount Rate	2.50	2.46	2.32	2.43	0.674	0.452
10.	Algorithms	2.46	2.06	1.86	2.13	0.362	0.039
11.	Monte Carlo Simulation	2.35	2.10	1.62	2.02	0.348	0.042

Sources: Field Survey, 2015

In table 4, the risk analysis technique mostly used by respondents in intuition/judgment /experience followed by risk premium. This is contrary to what is obtained in developed economies where sophisticated techniques are adopted in analyzing risk. However, the response on the risk analysis techniques indicates that there is no difference in opinion of respondents at a 5% level of significance except for Algorithms and Monte Carlo simulation.

Table 5: Risk Response Method Usage

	Risk Response Methods	Rank	Mean				ANOVA	
			Clients	Consultants	Contractors	Total	F-value	Sig. value
1.	Risk Transfer		3.60	3.58	3.49	3.56	1.462	0.452
2.	Risk Reduction		3.52	3.60	3.22	3.34	1.387	0.185
3.	Risk Retention		3.00	3.12	2.98	3.03	0.764	0.065
4.	Risk Elimination		2.96	2.36	2.34	2.55	0.664	0.043

Sources: Field Survey, 2015

In table 5, the risk response method mostly used by respondents is risk transfer, followed closely by risk reduction. However, there is no difference in opinion of respondents at a 5% level of significance except for risk elimination

Table 6: Risk Response Techniques Usage

	Risk Response Techniques	Mean				ANOVA	
		Clients	Consultants	Contractors	Total	F-value	Sig. level
1.	Insurance	4.30	4.32	4.28	4.30	1.566	0.358
2.	Contingencies	4.10	4.12	4.06	4.09	1.145	0.235
3.	Contractual Transfer	3.95	3.98	3.94	3.96	0.905	0.246

Sources: Field Survey, 2015

In table 6, the risk response technique mostly used by respondents is the insurance, followed by contingencies. However, there is no difference in opinion of respondents on risk response techniques usage at a 5% level of significance.

5.0 Discussion of Findings

Table 1 shows the demographic details of the respondents. 32% are HND holders, 34% holds BSc degree, 27% while 7% have other qualifications. 34% have used 1-10 years, 32% have used 11-20 years, and 27% have used 21-30 years. 39% have handled 1-10 projects, 29% have handled 11-20 projects while 27% have handled 21-30 projects. All the respondents are registered members of their respective professional bodies. They belong to clients, consultants and contracting organisations. This shows that the information provided by the respondents are reliable.

In table 2, all the respondents agreed that lack of accepted industry model for analysis is rated as the most influencing factor in the implementation of risk management practice in Nigeria, followed by human/ organizational resistance while cost effectiveness is the least rated factor. However, the response on the factors affecting implementation of construction risk management indicates that there is no difference in opinion of all categories of respondents at a 5% level of significance.

Table 3 which shows the response of risk identification tools usage which indicates that there is no difference in opinion of all respondents at a 5% level of significance. In table 4, the risk analysis technique mostly used by respondents in intuition/judgment /experience followed by risk premium. This is contrary to what is obtained in developed economies where sophisticated techniques are adopted in analyzing risk. However, the response on the risk analysis techniques indicates that there is no difference in opinion of all respondents at a 5% level of significance except for Algorithms and Monte Carlo simulation. In table 5, the risk response method mostly used by respondents is risk transfer, followed closely by risk reduction. However, there is no difference in opinion of respondents at a 5% level of significance except for risk elimination.

In table 6, the risk response technique mostly used by respondents is the insurance, followed by contingencies. However, there is no difference in opinion of respondents on risk response techniques usage at a 5% level of significance. The results of this study is in agreement with previous researches of Chapman (1997), Raz (2001), Bakers and Reid (2005), Zou et al (2006), Fabi (2013), Fabi et al (2012) and Fabi et al (2013).

6.0 Conclusion

The study has been able to establish factors affecting implementation of risk management practice in Nigeria. From the analysis of the investigation carried out, lack accepted industry model for analysis is rated as the most influencing factor in the implement of risk management practice in Nigeria, followed by human/ organizational resistance. There is no significant difference at 5% level of significance between the responses of the clients, consultants and contractors on risk identification tools usage and risks response tools usage. There is no significant difference at 5 % level of significance in risks analysis techniques usage of all the respondents except algorithms and Monte Carlo simulation. The result further showed that risk management practice is low in Nigeria, all the respondents agreed that the use of rule of thumbs in managing construction risks associated with highways is prevalent as against modern techniques that are widely in use in developed countries. The facts stated in the literature review correspond with the results of the test which shows uniformity.

7.0 Recommendation

Considering the results of the study, it is appropriate to recommend that government should enact appropriate legislation to make risk management practice a must, and that adequate training be giving to all stakeholders in highway construction sector to improve management of risks so that projects are delivered on time, within approved budgets, to the right quality, imbibing the health and safety culture, and in an environmentally acceptable manner.

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