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Contrators Risk Exposure in Public Educational Institution Projects in Nigeria

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Abstract: The study investigated the various risks a contractor is exposed to while working on public institution projects in the Southern part of Nigeria. The study is aimed at determining the frequently occurring risks. In all, 75 questionnaires were administered to contractors by the means of one-to-one/face-to-face technique having identified the institutions to visit in the area. Data obtained for the study were analyzed using simple percentages and the mean score statistical tool. Based on the analysis of data from the field, the followings were the conclusions made from the study: Contractual risk comes first among the risk types which adversely affect contractors' performance. Next to this is political risk which affects also the project cost and delay completion time in most cases. The study recommends that contingency fund for projects should be high to accommodate all types of risk on projects and that a known and documented process of awarding contract is adhered to.

Key words: Contractual, risk, contingency, due process, Nigeria

INTRODUCTION

The need for proper planning, organization and coordination of building projects to facilitate the achievement of the primary objective of profit maximization or, at least, loss immunization is of great importance. Cost and time overruns in many constructions project. Getting a project from the initials investment appraisal stage through to completion and into use involves a complex and time consuming design and construction processes. It involves a lot of human beings with different attitudinal backgrounds, from different organizations different skill and a great deal of effort is required to coordinate the wide range of activities that are undertaken. A variety of unexpected events may occur during the process of building procurement and these are called risks.

De Meyer *et al*. (2002) define risk as an uncertain factor positive or negative that can significantly affect achievable performances. The extent of these risks and uncertainty depends on the size, complexity, modesty and technical situation of the project. Risk as unwanted negative consequences of an event can be identified, predicted and quantified.

The consequences of risk, not being accommodated/ plan for, at the pre-design complexity and a multitude of people with different skills and expertise coupled with interest in consonance with coordination of a wide range of separate yet interrelated activities are grave.

Such complexity is further compounded by the unique features of a project and many other external uncertainties. It is not uncommon to find construction project have cost overrun, time delays, conflict and dispute and poor quality caused by various risks.

Risk exposure in lay terms, in the context of this paper, explains the types of Risk a Contractor is prone to experience while executing a contract.

The study identify the types of risk contractors are prone to while carrying out construction works, a ranking of these risk in other of effect on project and the management strategy commonly used in the management or risks on projects.

Previous studies: Risks are menace on projects. Hardly will a project be executed without at least a form of risk encounter. The most important thing at the occurrence of a risk is the management of it.

In the study of Taylor on, Congruence between Risk Management Theory and practice in Hong Kong Vendor Driven IT Projects. The results showed that risk management is carried out at three different staged of Construction: Pre-Projects risks management, Risk management practice during the course of the project, at this stage, all the projects managers relied heavily on development and monitoring of a detailed work breakdown structure to control the progress of their projects, while this practice does not explicitly address specific risks and Risk management practice after project completion. His study came outwit a conclusion that

many writers. Barki *et al.* (2001), Davis (1982) and Mcfarlan (1981) advanced the use of a contingency approach where the type and level of risk management approach is matched to the level of risk exposure identified in the project. Studies by Jahren and Ashe (1990) and Elinwa and Buba (1993) found these variables as the most influencing factors of project cost overruns, they are political among others and the risk factor associated with political instability includes: fluctuation in currency, corruption, interest rates and materials availability and are considered the main causes of additional costs in private infrastructure projects in developing countries. Kangari and Lucas (1996) said that all government funded projects in developing countries are subject to political risk which invariability leads to bribery and corruption hence poor quality job. The paper discuses type of risk, risk management which is further divided into: Risk identification, risk quantification/ analysis, risk controlling and risk management support system.

Types of risks: There is no building project that is free of risks. Kwakwe (1997) declared that all building activities expose contracting parties to risk. The following are types of risks common to building projects listed by Flanagan and Norman (1993), Raftery (1994), Kwakwe (1997), Miller and Lesser (2001) and Odeyinka and Iyagba (2002). Fundamental Physical, Contractual, Business, Pure, Speculative, Financial, Political, Economic, Technical, External Relations, Management, Design, Environmental and Performance risk.

Risk management: Kwakwe (1997) reported that when risk has been identified, proper care should be taken to quantify this identified risk for effective management. Risk management is nowadays a critical factor to successful project management. Methodologies for dealing with risk and uncertainty have become known as risk management (Lewis *et al*., 1992). Risks are inherent in building project development. There is a direct relationship between effective risk management and project success since risks are assessed by their potential effects on the objective of the project. Risk management involves the identification of the particular significant risks which may impair the performance of a specific project. It requires the assessment of the effect of these risks on the project and the establishment of policies for dealing with them. Some of the earliest contributors to risk management process are: Hertz and Thomas (1983) proposed a step-wise procedure of risk identification, measurement evaluation and re-evaluation.

Hayes *et al.* (1986), Flanagan and Norman (1993), Raftery (1994) and Edwards (1995) proposed reference frameworks comprising of risk identification, risk analysis, response planning, continuous monitoring, feedback for risk learning and action planning. According to Dikmen *et al.* (2006) several institutions provided procedural, task-based guides for construction risk management. Riskman endorsed by European Community (Carter *et al*., 1994); Project Risk Analysis and Management Methodology (PRAM) introduced by Association of Project Managers (Chapman, 1997), Risk Analysis and Management for Project Methodology (RAMP) promoted by Institution of Civil Engineers (1998) and PMBOK guide of Project Management Institute (2000), all attempts to eliminate informality of risk management activities and integrate risk management with other project management functions to deliver project with acceptable success. Acceptable with respect of cost, time and quality.

Risk identification: Risk identification is a diagnostic process in which all the potential risks that could affect a construction project are identified and investigated. Revealing the potential risk sources at the early stages of the project. The advantage of this is to allow all participants to contract concentrate on strategies for the control and allocation of risk. The most common methods of risk identification include brainstorming, tree diagrams and influence diagrams (Flanagan and Norman, 1997).

Risk quantification/analysis: Risk analysis involves the qualification of the effects of the identified risks on the project. Several techniques, of varying degrees of sophistication, are available for this purpose. They include: Sensitivity analysis, it is mathematically, straightforward and focuses management attention on the important risks and probability analysis, a random selection is made from each distribution (set of data) to determine a level of each risk. The impact of each risk variable on one of the performance parameters is then assessed. The effect of each risk can then be summed to produce one possible total outcome for the parameter.

Several researchers have produced specific software for probabilistic risk analysis of construction projects, CASPAR (Hayes *et al*., 1986) and construction project simulator are two such programs. Other techniques include the decision trees and Delphi analysis.

Risk response/control, etc. the control to identified and quantified risks can take many varied forms. Depending on the type of risk occurrence on a project, different responses may be adopted to each risk identified. Two basic things must be kept in the mind when deciding between alternative forms of response to risk: Whether to avoid or reduce risk and whether to retain or transfer risk. In the extreme, complete avoidance of risk may mean the abandonment of a project.

Controlling/management risk: Risk can be controlled in a number of ways including:

- It can be assumed i.e. risk taking
- It can be priced i.e. built into a tender price
- It can be laid off-back to back conditions in contracts.
- It can be refused, i.e. declining a job
- It can be shared i.e. by contract, by partnering arrangement.

It must be understood that, risk cannot be ignored. Also, Kwakwe (1997) suggested a range of options for risks management and this include:

- Acceptance of the risk
- Transfer risk to insurers
- Allocating the risk to third party.
- Reduction of the risk and
- Removal of the risk.

Furthermore, risk on managerial strategies to cope with risk he listed:

- Shape and mitigate
- Shift and allocate
- Influence and transform institution
- Diversity through portfolio

Risk management support system: Dikmen *et al.* (2006) proposed a risk management support system called Integrated Risk Management System (IRMS). It is a decision support tool, developed which is mainly designed to facilitate cost estimation of International Construction Projects at the bidding stage. The strengths of IRMS are integration of all phases of RM and its ability to incorporate different risk perceptions of project participants by its multi-user option. The Borland Delphi 7.0 was developed upon; used to code IRMS based on the object-oriented approach. The features of IRMS are:

- Identify its risk and creasing a common language between project participants by using the built-in risk breakdown structure and the risk coding option, respectively.
- Assess risk systematically and monitoring the impacts of different response strategies as well as risk allocation scenarios on project cost by using a procedure called as "risk carding process".
- Development of a work breakdown structure to build a cost model and carry out Monte Carlo Simulation to monitor variability of project cost as a result of thousands of risk scenarios.
- Storing risk and project related information (such risk rating from previous projects, estimated-realized costs, contract conditions, project information, etc.), retrieve and use them in the forthcoming projects. A case-based Reasoning Module is designed to predict costs by referring to previous risk-cost relationships.
- Production of various types of reports (probability-impact ratings, risk allocation reports, etc.), charts and risk maps to summarize risk information.
- Defining new risks, strategies and revise risk ratings based on the suggestions of other participants. IRMS creates a platform for risk information sharing and rating by its multi-user option.

MATERIALS AND METHODS

Extensive literature review provided the background knowledge on the concepts risk exposure of contractors while executing a project. Based on this, a well structured questionnaire was developed to gather data on the study. The various types of risk were first identified and contractors were asked to indicate the level of awareness and frequency of occurrence of these risks on projects handled. The management strategy most effective in the management various risks types were assessed. Mainly, contractors on on-going projects and projects (public) already completed were the target for the study. One hundred questionnaires were administered to contractors but 75 were retrieved, representing 75%. The southern part of the country was the area of the study, comprising the major towns and state capitals of high construction activities having and institutions. Having identified on-going and recently completed buildings, the one-to-one technique for questionnaire administration was employed in the administration of questionnaire. Medium size firms employing between one and eighteen staffs and projects between one million naira and hundred million naira were those used for this study.

The percentages and mean score of the sum of central tendency statistical tool (the mean score and simple percentage) were employed in the analysis of data obtained from the field.

RESULTS AND DISCUSSION

The awareness level of respondents to the listed risk types was assessed. Generally all risks types were known to the respondents but at varying degree. The first five common types are: political risk, contractual risk, economic risk, technical risk and external relation risk in decreasing order. The least identified risk is environmental risk followed by legal risk (Table 1).

The research indicates frequency of occurrence of risk to contractor while executing project. The most encountered risk is contractual risk with a mean ranking of 0.1084 (Table 2). Contracts are mostly breached in respect of parties not fulfilling the terms of the contract, thereby resulting in project duration extension or otherwise. Following closely is technical risk with a mean of 0.0943. it is certain that the entire capability of workers cannot be ascertained at the point of interview. Contractors are exposed to technical skill risk of employees. This could be injurious to the execution of project. The consequences are: poor quality of work, repetition of work, material wastage time and money loss. Next to this is political risk change in government. Government of most developing countries change often, this normally affects the smooth execution of projects. Projects are normally abandoned or revisited with laps in time resulting in inflation i.e. increased price of materials and extension of project duration.

Least of the frequency encountered risk by contractor is business risk with 0.0264 mean value. Enough profit margin has been allowed and except with bad planning gain is normally made on investment. Next to this risk type are legal and design risks having the same mean value of 0.0323. For legal risk, which is pertaining to taking liability for the acts of others, changes in government laws and regulation is normally borne by the client and not the contract. Inadequacies in design in likewise are the liability of the consultants which may impair on the project in respect of time and cost adversely.

An investigation was carried out to ascertain which of these risk types has adverse effect on the time and cost of the project. Table 3 reveals that contractual risk with a mean of 0.1064 has the greatest effect on time and cost. This is so, because the actions of parties to contract in responding to duties dictate the speed of its execution and eventual completion. Following this is political risk with a mean score value of 0.0926. As indicated earlier the consequences of change in government are abandonment and inflation. Depending on the level of these consequences abandonment temporarily causes inflation, hence price rise on materials due to passage of time which may result in project duration elongation. Technical risk comes third in position in respect of impact of risk type on time and cost. Condemning work and redoing work takes time, material and money loss. The effect which could be summarize as adverse on time and cost.

Least of these risk effect on time and cost is business and legal risk with mean values of 0.0292 and 0.0311, respectively

On management strategies adopted in managing risk encounter on site, Table 4 shows that of all the 5 risk managements strategies listed, contingency sum has the highest percentage of 28.73% which indicates that it is the most commonly used management strategy in the managing of risk encounter during project execution. The likely reason for the use of this strategy is that most risk

Table 1: Level of awareness of risk types

S/No	Types of risk	No. of respondents	(%)	Position
1	Fundamental	8	1.41	14
2	Contractual	70	12.35	2
3	Performance	12	2.12	11
4	Business	10	1.76	13
5	Pure	12	2.12	11
6	Speculative	13	2.29	10
7	Financial	40	7.03	6
8	Political	75	13.2	1
9	Economic	68	12	3
10	Technical	60	10.58	4
11	External relation	55	9.8	5
12	Management	30	5.29	8
13	Design	40	7.03	6
14	Environmental	40	1.04	16
15	Legal	6	1.06	15
16	Operational	28	4.94	9

Source: Fieldwork, 2006

Table 2: Frequency of risk exposure of constructor on public institutions

		Ranking order								
S/No	Types of risk	5	4	3	2	1	Ranking order Freq.	Mean ranking	% Mean ranking	Position
1	Fundamental risk	0	5	5	15	50	115	0.0353	3.53	12
2	Contractual risk	58	12	5	0	0	353	0.1084	10.84	1
3	Performance risk	0	15	10	20	30	160	0.0492	4.92	10
4	Business risk	0	0	2	10	60	86	0.0264	2.64	16
5	Pure risk	0	5	10	15	45	125	0.0384	3.84	11
6	Speculative risk	27	7	23	10	8	260	0.0799	7.99	6
7	Financial risk	20	18	10	3	24	232	0.0713	7.13	7
8	Political risk	36	10	8	6	5	301	0.0925	9.25	3
9	Economic risk	31	4	6	12	8	277	0.0851	8.51	4
10	Technical risk	40	18	17	8	0	307	0.0943	9.43	2
11	External relation risk	36	10	12	14	9	269	0.0826	8.26	5
12	Management risk	5	4	30	12	10	221	0.0679	6.79	9
13	Design risk	0	18	5	20	50	105	0.0323	3.23	14
14	Environmental risk	12	0	18	12	14	228	0.07	7.00	8
15	Legal risk	0	19	5	20	50	105	0.0323	3.23	14
16	Operational risk	0	0	13	10	52	11	0.034	3.4	13
							3.255	1	100	

Table 3: Type of risk that has acute impact on time and cost

S/N	Risk	Ranking order 5	4	3	2	1	Ranking order Freq.	Mean ranking	% Mean ranking	Position
1	Fundamental	0	4	15	15	50	114	0.0344	3.44	12
2	Contractual	58	12	0	0	0	353	0.1064	10.64	1
3	Performance	0	18	23	23	27	166	0.0500	5.00	10
4	Business	0	2	10	10	60	76	0.0292	2.92	16
5	Pure	0	5	18	18	45	122	0.0368	3.64	11
6	Speculative	27	10	12	12	8	261	0.0767	7.87	7
7	Financial	20	25	12	12	0	278	0.0838	8.38	4
8	Political	40	10	17	8	0	307	0.0926	9.26	2
9	Economic	31	18	6	12	8	277	0.0835	8.35	5
10	Technical	36	20	8	6	5	301	0.0907	9.07	3
11	External relation	36	4	12	14	9	267	0.0811	8.11	6
12	Management risk	5	18	30	12	10	221	0.0666	6.66	9
13	Design	0	0	8	18	49	109	0.0329	3.29	14
14	Environmental	12	19	18	12	11	228	0.0687	6.87	8
15	Legal	0	0	3	22	50	103	0.0311	3.11	15
16	Operational	0	0	13	10	51	111	0.0335	3.35	13
	Total						3.317	1	100	

Table 4: Management strategies adopted in managing risk

S/No	Type of management strategies	Respondent	% of respondents
1	Shape and mitigate	40	15.33
2	Shift and allocate	39	14.94
3	Influence and transform	44	16.86
4	Diversity through portfolios sun	63	24.14
5	Contingency sun	75	28.73
	Total	261	100

Source: Field work, 2006

Table 5: Effectiveness of risk management techniques

S/No	Risk management technique	Ranking order 5	4	3	2	1	Ranking order Freq.	Mean ranking	% Mean ranking	Position
1	Shape and mitigate	5	7	18	15	30	167	0.1235	12.35	5
2	Shift and allocate	15	20	32	5	3	246	0.1953	19.53	4
3	Influence and transform	25	30	15	4	1	299	0.1212	22.12	3
4	Diversity through portfolios sun	30	23	20	1	1	305	0.2256	22.56	2
5	Contingency sun	35	26	10	4	0	317	0.2345	23.45	1

are taken away by the provision of money either to redo work or to make for the difference in price level of materials. Least used strategy is shift and allocate with 14.94%. This may be so as contracts are not going to be revoked and given to another contractor for execution rather the originally awarded contractor manages the risk.

An assessment was made of the five risk management techniques to determine their effectiveness on the management of risk type. Each risk type was not identified to determine the most effective strategy to manage it. But a general view was assessed. The result is displayed in Table 5 and the most effective of the five strategies is contingency sum with 23.45% followed by diversity through portfolios with 22.56%. The reason for contingency sum could be the same as explain earlier while portfolios diversity is deploying more capable human resources to head various units to energize and bring new initiatives to solving problems in the various units (department). The least effective techniques is shape and mitigate. This involves investing above redoing work and allowing the passage of time. This could be the reason for its low usage/effectiveness.

COMPARISON OF RESEARCH FINDINGS WITH PREVIOUS

This study found out that political and contractual risk type which contractors are exposed to while executing a contract agrees with the findings of Jahren and Ashe (1990) and Elinwa and Buba (1993) that pointed out that projects are affected by political risk and the risk factor associated with it are fluctuation in currency, corruption, interest rates (increase) and materials availability.

The commonly used management strategy to arrest or absorb these risks is the contingency.

RECOMMENDATIONS

The following recommendations are hereby made based on the finding of the research:

- A well defined contractual arrangement must be put in place in awarding public institution project to contractor, this will ensure awarding contract to competent contractor and all parties to a contract perform their duties/obligation.
- Contingency for project must be high to accommodate all types of risk envisaged.
- Law should be promulgated to ensure that institutional projects are not subject to political influences.
- Contractors' should use highly skilled labour in their projects.
- The use of risk management strategies in managing risk of contractors is advocated.

CONCLUSION

The study discusses the risk contractors are exposed to in public institution projects in Nigeria. The development of infrastructure and the asset base of a nation are measured on the success it records in the construction industry. Therefore, the delivery of projects lies on the freedom it enjoys of dispute and conflicts, quality of product stemming from the amount of risk influence on projects. Therefore, the ascertaining of risk and risk sources will help concentrate on efforts to eliminate or minimize them, hence having a healthy industry.

REFERENCES

Barki, H., S. Rivards and J. Talbot, 2001. An integrative Contingency Model of software project Risk Management. J. Manag. Inform. Sys., 17: 37-69.

Carter, B., T. Hancock, J. Morin and N. Robin, 1994. Introducing RISKMAN: The European Project Risk Management Methodology. UK: NCC Blackwell Limited.

Champman, C., 1997. Project Risk Analysis and Management: PRAM the generic process. Int. J. Project Manag., 15: 273-281.

Edwards, L., 1995. Practical Risk Management in the Construction Industry. London: Thomas Telford Publications.

Elinwa, A. and S. Buba 1993. Construction Costs Factors in Nigeria. J. Construc. Eng. Manag., 1194: 698-713.

Davis, G.B., 1982. Strategies for Information Requirements Determination. IBM. Sys. J., 21: 4-30.

De Meyer, A., C.H. Loch and M.T. Pich, 2002. Managing Project Uncertainty: From Variation to Chaos. Marsachusetts Institute of Technology, Sloan Management Review. Winter, pp: 60-67.

Dikmen, I., M.T. Birgonul and A.E. Arikan, 2006. Application of An Integrated Risk Management System (IRMS) to An International Construction Project. Proc. 22nd Ann. ARCOM. Conf. Birmingham, UK., pp: 153-163.

Flanagan, R. and G. Norman, 1993. Risk Management and Construction. Oxford: Blackwell Scientific Publications.

Hayes, R.W., J.G. Perry, P.A. Thompson and G. Willmer, 1986. Risk Management in Engineering Construction. London: Thomas Telford Ltd.

Hertz, D.B. and H. Thomas, 1983. Risk Analysis and its Application. Chrieehster: John Wiley and Sons.

Institution of Civil Engineers (IEE) Faculty and Institute of Actuaries 1998. RAMP: Risk Analysis and Management for Projects, London: Thomas Telford.

Jahren, C. and A. Ashe 1990. Predictors of Cost-Overrun Rates. J. Construc. Eng. Manag., 116: 548-51.

Kangari, R. and C.L. Lucas, 1996. Managing International Operations: A Guide for Engineers, Architects and Construction Managers. ASCE Press, New York.

Kwakwe, A.A., 1997. Constructed Project Administration in Practice. Nig. Quantity Surveyor, 11: 20-22.

Lewis, J., D.W. Cheatham and D.J. Carter, 1992. Avoiding Conflict by Risk Management. The Role of the Clients Project Manager. In: Construction Conflict Management and Resolution, (Eds.), Fenn, P and Gameson, R. London: E and EN Spon.

Lockyer, K. and Y. Gordon, 1996. Project Management on a Project Network. (6th Edn.), Vikas Publishing House Ltd.

McFarlan, F.W., 1981. Portfolio Approach to Information Systems. Harvard Business Rev., 59: 142-50.

Miller, R. and D. Lessard, 2001. The Strategies Management of large Engineering Project. J. Federation of Building and Civil Eng. Contractors in Nig., 9: 10-15.

Odeyinka, H.A. and R.T. Iyagba, 2002. Risk Management in Construction to Avoid Cost Overrun. J. Nig. Inst. Quantity Surveyors, 15: 14-21.

Perry, J.G. and R.W. Hayes, 1985. Decision and Risk Analysis for Construction Management Engineer, 32: 42-45.

Project Management Institute (PMI), 2000. A guide to the Project Management Body of knowledge (PMBoK Guide), Newton Square: Project Management Institute.

Raftery, J., 1994. Risk Analysis in Project Management. London: E and EN Spon.

Thompson, P. and S. Perry, 1992. Engineering Construction Risk a Guide to Project Risk Analysis and Assessment Implications for Client and Project Manager. (2nd Edn.), Telford Publisher, UK.