ISSN (Online) : 2455 - 3662
SJIF Impact Factor :4.924

EPRA International Journal of

Multidisciplinary Research

Monthly Peer Reviewed & Indexed
International Online Journal

Volume: 4 Issue:6 June 2018

Published By :
EPRA Journals

Volume: 4 | Issue: 6 | June 2018 SJIF Impact Factor: 4.924 ISSN (Online): 2455-3662

EPRA International Journal of
Multidisciplinary Research (IJMR)

APPLICATION OF RISK MANAGEMENT: A MODEL FOR ACHIEVING EXCELLENCE IN CONSTRUCTION PROJECTS

Mu'azu Umar[1]
[1]Department of Quantity Surveying, Federal Polytechnic, Nasarawa, Nigeria

Moohammad Yaqoob Adinoyi[2]
[2]Department of Quantity Surveying, Federal Polytechnic, Nasarawa, Nigeria

ABSTRACT

Construction Risk management is an important field/aspect of the construction industry. Projects are characterized by lot of uncertainties and face a number of risks which have negative effects on projects performance parameters - cost, time and quality. The industry itself is prone to high level of risks and uncertainties due to its complex nature and enormous resources involved. As such, projects are likely to experience danger of risks and uncertainties if proper precautions and measures are not taken into consideration in its management. In the context of this study risk is conceived as recognizing (identifying) causes of uncertainty and what can go wrong in the project and deciding on the ways to minimize their effects. The study attempts to look at effective risk management processes as a means of achieving excellence in construction projects and demonstrates construction project risk identification, project risk appraisal based on RIBA PoW 2013 stages and a risk register suitable for implementation at stage 5 of RIBA PoW (Construction stage). The study recommends the RIBA PoW 2013 Model as a viable platform for construction risk management study for achieving construction excellence and client's value for money (VfM).

KEYWORDS: *Risk,Risk Management, RIBA PoW 2013, construction excellence, VfM.*

1.0 INTRODUCTION

Risk exists as a consequence of uncertainty (APM, 2000) while risk management describes the process of mortgaging incidences of risks and uncertainties and their effects. The construction industry is prone to high level of risks and uncertainties due to its complex natureof activitiesfrom initial investment appraisal to the completion of projects. The Industry is likely to experience the danger of risks if proper measures and precautions are not put into consideration in managing its projects. In order to achieve success in the set objectives of the project, the project stakeholders must ensure that the risks to a project are identified and reviewed prior to design making. Hence, to achieve the desired goals in construction projects, proper and good risk management at all levels are critical.

Construction industry and its clients are widely associated with high degree of risks due to the nature of micro-, meso- and macro-environments particular to construction (Zavadskas *et al.* 2010); however, construction industry has poor reputation in coping with risks as many projects failed to meet deadlines and cost targets (Shevchenko *et al.* 2008). Clients, contractors, the public and others have suffered as a result (Zavadskas*et al.* 2012, 2010). Thus, construction business is related to high risk, which affects each of its participants; while effective analysis and management of construction associated risks remain a big challenge to practitioners of the industry (Kaplinski 2009). Risk analysis and management are therefore important part of the decision-making process in construction industry.

A project risk is defined as "*the implications of the existence of significant uncertainty about the level of project performance available* (Chapman and Ward, 2002). Risk management, on the other hand, is defined as "*the systematic process of identifying, analyzing and responding to project risks, including maximizing the occurrence and consequences of positive events and minimizing the occurrence of negative events to the project objectives*" (PMI, 2000).

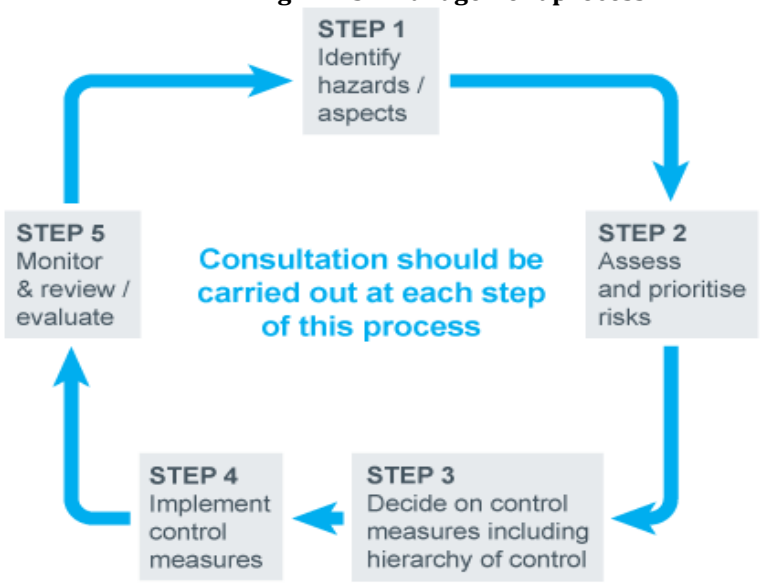
Risk management is aimed at ensuring that project risks are identified at inception, their potential impacts allowed for and where possible the minimizing of the possible risks and their impacts (OGC, 2003) and to improve the performance of the project through risk identification, appraisal and management of such projects risks (Chapman and Ward, 1997).

2.0 The RIBA PoW Stages 0,1 and 5-based Risk management process.

The RIBA PoW Stages 0, 1 and 5-based Risk management model considers risk management planning, risk identification, risk analysis, risk response, risk monitoring and control as vital processes for effective realization of construction projects.

The first stage in this model is the risk identification by the project stakeholders to determine what forms of risk are involved within the project. At this level, workshop study should be organized to evaluate all possible associated risks that might be involved in this project, to identify their origin as well as impacts on the project.The figure below illustrates a risk management process.

Fig 1: Risk management process



***Source**: Dallas 2006.*

According to (Oladokun et al, 2010), it is desirable to understand and identify the risks at the earliest possible time, in order to come up with mitigation measures for reducing the negative impacts they are likely to have on the project. And the method that will be used will involve interview, questionnaires, collection of historical data's, checklist, brainstorming process.To achieve this effectively, it is advisable to involve as many people as possible at this stage of the study in order to identify as many risks as possible.

However, the risk analysis level will sasses the various identified risks with the view to understanding their probability of occurrences as well as their impacts on the project when they occur. According to (Raftery, 1994) risk response includes reducing, eliminating, avoiding and transferring the risk to the party responsible for mitigating it.

The last stage is the monitoring and controlling, and it comprises the general overview for the entire process, which includes keeping of information obtained from the process within a risk document (risk register) with regular re-evaluations of the process in an effective period.

In construction projects generally, the factors that are liable to risks and uncertainties are cost, quality and time. It is necessary in construction projects to undertake a study so as to make allowances for such risks because construction projects sometimes fail to meet the agreed time and exceeds the budget. Risks in terms of cost, quality and time are unforeseen and also preventable. The study is done so that they do not have an adverse effect or impact on the project (Smith et.al, 2006).

According to OGC (2003), risks management involves the following steps;

- Risk identification
- Estimating and maintaining risk register
- Managing and maintaining risk procedures from initiation to completion
- Controlling risks
- Responsibility allocation for the management of risk to the party responsible for

managing it (Risk).

3.0 PROJECT RISK APPRAISAL

The implementation of risk management can be done at any stage of the project. The study of risk management should include the following stages of the construction project (OGC, 2003).

- RIBA PoW stage 0 – Business case (Business justification)
- RIBA PoW stage 1 – Procurement route selection
- RIBA PoW stage 2 - Concept design
- RIBA PoW stage 3 – Developed design
- RIBA PoW stage 4 – Technical design
- RIBA PoWstage 5 – Construction stage.

Business justification Stage (RIBA PoW stage o)

Risk assessment should be undertaken or carried out at the business case (business

justification) stage of any project. The idea here is to identify the overall potential risks of the project. The major potential risks can be avoided at this stage and therefore it is of utmost importance to undertake such assessment.At this stage, the risks include environmental, political and regulatory factors. Hence the risk associated has to be evaluated. Land contamination and pollution are associated with the environmental factor because of buildings that are adjoining or adjacent to the proposed site for the project and may cause contamination of land to the neighbourhoods. Existing buildings/structures must be protected from pollution during the process of construction and the day to day operation of the facility or project when completed. Statutory regulatory authorities (bodies) will have an interest in the development because there are numerous buildings adjacent or surrounding the new construction site which must be protected and preserved during the construction process. The initial risk register will be formed from these risks.

At this stage (Business justification), the risk study should also involve the client (Employer), the representative of the statutory regulatory authority and the representative of the local community.

Procurement Route (RIBA PoW Stage 1)

A study on risk management should be undertaken at the procurement route stage of the project in order to identify the risks associated with the various options of procurement and the cost of managing the risks through risk avoidance and methods of design and acceptance. The procurement route adopted for the project in this study is the construction management route. In construction management procurement route, the risks associated include the changes in the design and construction (the construction management and its appointed team members). Hence the construction manager and the client must make sure that the team possesses a high level of skill required in executing and completing the project and reviewing the design and co-ordination of the construction process. A high level of managerial expertise should also be maintained throughout the duration of the project. If there arises a change in the process, such change should be made clear to both the construction manager and the client, who should in turn implement or adhere to the change process.

At this stage, the client and the construction manager should be involved in the risk study.

Design and construction (RIBA PoW Stage 2,3,4 and 5)

In the design and construction stage, the risks associated are regulatory factors such as nuisance to the public, safety and method of construction and organizational factors such as the experience of the client and contract documentation.

The construction phase is associated with public nuisance such as noise pollution arising from the site works. It also includes potential traffic caused by heavy construction plants and equipment (haulage vehicles) on the access road to the site.

Another risk that needs to be considered here is the safety of the site. This is because accident on construction site may have serious impact on the project value due to inadequate publicity. In order to manage risk more easily on construction site, the project parties should implement the known construction methods. The use of innovative techniques in construction accounts for risks at the early risk management study/activities. During the documentation stage, poor briefing documentation can create uncertainty within the design team as they may not be able to have a clear understanding of the client desire. If an inexperienced client is involved, it can lead to inadequate support to the design team and the contractor, and may lead to project delay (completion).

At this stage, the client, the design team, the construction manager and the contractor should be involved in the risk study.

3.1 Construction Risk Register.

A risk register is a risk management tool used in accessing project risks. It is used to assist the construction manager in identifying the source(s) of risks (possible sources) and their impacts on project. The following commonly identified risks should be registered on the initial risk register.

Client controlled risks

- Late decision making
- Delays
- Late handing over of site

Contractor's risks

- Poor coordination of subcontractors
- Failure to meet the work programme
- Changes in price under certain contracts
- Claims and dispute
- Site accident and injury which client retains responsibility

Design team risks

- Errors in the design, drawings and contract documents

- Inadequate estimating
- Failure in meeting the time scale
- Inaccurate interpretation of the terms of reference

Site specific risks

- Conditions of the site (ground conditions)
- Variability of soil and types
- Climate and weather conditions
- Access limitations/restrictions
- Land that is contaminated
- Restrictions on working hour
- Security

Environmental risks

- Political change
- Legislation of the government

Third party risks

- Environmental Impact Assessment (EIA)
- Planning permission/approval

Key risks to construction project at stage 5 of RIBA PoW 2013 (Construction stage).

The stage 5 of RIBA PoW 2013 is the construction stage and the key risks at this stage of the project are identified and grouped into four as below.

1. Services maintenance due to close proximity to adjoining/adjacent buildings.
2. Introduction of diversions during site operation (works)
3. Land contamination due to industrial operation.
4. Construction plants and equipment (e.g., tower cranes) – Several cranes are expected to operate at once on site.

In accordance to the selected procurement route (Construction management), the client is responsible for all the risks. However, the (client) may share or allocate a responsibility to other parties to deal with the risk and the client should make sure that the party deals with the identified risk appropriately.The four groups of key risks at the construction stage of a construction project identified above are explained below.

Risk 1

This includes the disruption of underground services caused as a result of site operation. This is because adjacent to the site are existing buildings and or structures. Services include water main pipes and underground electric power cables. During excavation for foundation and other site operation (works), it is very important to make sure that the services are not disconnected or disrupted. This risk is usually caused by poor planning as the contractor may not be aware of where such services are located on site and their damages may cause services disruption.

The contractor is the owner of the risk and it is his (contractor) responsibility to investigate existing services and their locations on site in order to ensure that they are not affected.

Risk 2

The risk here covers the implication of traffic caused by the progress of work during the construction phase. During the stage of construction of the project, heavy construction plants and vehicles delivering construction materials will need to access the site. This is a source of congestion as the vehicles are likely to increase the traffic flow. Proper and sufficient planning must be undertaken to provide diversions for other vehicular movement in order to avoid delays.

The contractor is the owner of this risk because he is responsible to plan access to the site effectively and efficiently.

Risk 3

The risk here covers the contamination due to some industrial site uses. It is vital to eliminate waste in order to save construction workers, the local community (neighbourhoods) and the end users of the facility from harmful substances. It may be necessary to hire sub-contractors to eliminate the effects of the contamination on the neighbourhoods before works commences by the contractor.

The sub-contractor is the owner of the risk as they are employed to remove the contaminants specially.

Risk 4

It is necessary to use tower cranes and other heavy construction plants and equipment on site in order to allow the construction of upper floors and associated works on higher platform. Several cranes may be in operation at the same time and it is important to plan and coordinate the movement of cranes on site. This will prevent delays in unscheduled movements which may prevent other construction plants from operation to execute their tasks on the same site.

The contractor is the owner of this risk. It is his responsibility to plan construction plants and equipment movement on site.

Risk Register suitable for implementation at Stage 5 of RIBA PoW 2013

No	*Identified Risk*	*Description*	*Impact*	*Risk owner*
01	Site safety	Improper coordination of construction plants on site may results to accidents.	High	Contractor
02	Weather	Adverse weather conditions such as unexpected rainfall and extreme temperatures that will hinder workers to suspend work on site.	Minimal	Client
03	Legal factor	Factors the authority will enforce concerning the site development which must be fulfilled before construction commences.	Low	Client
04	Political factors	These are range of politically motivated events that adversely affects construction such as the constraints on the availability of employment and effective staff.	Low	Client
05	Access road	High level of traffic during the site operations due to heavy construction plants and equipment.	Low	Contractor
06	Site location	The contractor must ensure that he make all the necessary provision in getting access to the site.	Low	Contractor
07	Environmental factors	Soil bearing capacity (Contours and mining area).	Minimal	Contractor
08	Subcontracted works	The risk involves late delivery of work by the subcontractor within the scheduled time.	Minimal	Contractor and sub-contractor
09	Security	Provision of security for materials and works.	Low	Contractor
10	Technical risks	These are risks associated with incomplete design, inadequate site investigation, and uncertainty over the source and availability of materials.	High	Contractor
11	Financial risk	Issues concerned with inflation, delay in payment and local taxes.	Minimal	Client

4.0 RECOMMENDATION

To achieve a holistic project risk management, the paper recommends that risk study processes should follow the RIBA PoW 2013 Model. This is in view of the fact that the Model have attempted to capture a new stage in which a project is strategically appraised and defined before a detailed brief is created (i.e., in Stage 0).Risk study at this stage is particularly relevant in the context of sustainability, when a refurbishment or extension, or indeed a rationalised space plan may be more appropriate and attract greater attention than the proposed building. In addition, the Model attempts to include Post-occupancy Evaluation and review of Project as well Performance as duties that can be undertaken during the use period of a building.

5.0 CONCLUSION

The aim or purpose of Risk management study is to identify potential risks and their effects and determine how it can be mortgaged in order to achieve construction operations excellence and achieve better client's value for money (VfM). Successful risk management must therefore, in addition to identifying the risks and their effects associated with construction projects, allocate the risks to identified person (stakeholder) responsible for monitoring the identified risk using the RIBA PoW 2013 model.

REFERENCES

1. *Association of Project Management APM (2003), Project Management Body of Knowledge.4th Edition*
2. *Bon-Gang, H.; Xianbo, Z.; Ping, T. L. 2014. Risk management in small construction projects in Singapore: status, barriers and impact, International Journal of Project Management 32(1): 116–124.*

3. *Chapman C. and Ward, S. (1997), Project Risk Management – Processes, Technologies and Insight; John Wiley and sons.*
4. *Chapman C. and Ward, S. (2002), Project Risk Management; Processes, Technologies and Insight; John Wiley and sons.*
5. *Dallas, Michael F. (2006) Value and Risk Management: A Guide to Best Practice, Oxford: Blackwell Publishing*
6. *Choudhry, R.,Iqbal, K. 2013. Identification of risk management system in construction industry in Pakistan, Journal of Management in Engineering 29(1): 42–49.*
7. *El-Sayegh, S. M. 2007, Risk assessment and allocation in UAE construction industry, International Journal of Project Management 26(4): 431–438.*
8. *Kaplinski,O. 2009, Information technology in the development of the Polish construction industry, Technological and Economic Development of Economy 15(3): 437–452.*
9. *Langdon,D.(2006).Procurement:Construction Management. [ONLINE] Available at:http://www.building.co.uk/procurement constructtion-management/3072705.article [Accessed 28 October 2014]*
10. *Office of Government Commerce (OGC), 2003, Risk and value Management. Achieving Excellence in Construction: Procurement Guide, [Online].04.Available at: http://www.rdec.gov.tw/public/Data/851414523371.pdf [Accessed 14 October 2014]*
11. *Project Management Institute, PMI (2000) A guide to Project Management Body of Knowledge, PMBOK guide, 2nd Edition, Project Management Institute Inc.*
12. *Shevchenko, G.,Ustinovichius, L.; Andruskevicius, A. 2008, Multi-attribute analysis of investments risk alternatives in construction, Technological and Economic Development of Economy 14(3): 428–443.*
13. *Smith N.J., Merna T., and Jobling P., (2006) Managing Risk in Construction Projects 2nd Edition, Blackwell Science Ltd.*
14. *Zavadskas, E. K.; Turskis, Z.; Tamošaitienė, J. 2010. Risk assessment of construction projects, Journal of Civil Engineering and Management 16(1): 33–46.*
15. *Zavadskas, E. K.; Vilutiene, T.; Turskis, Z.; Tamosaitiene, J. 2010b. Contractor selection for construction works by applying SAW-G and TOPSIS grey techniques, Journal of Business Economics and Management 11(1): 34–55.*