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An assessment of factors affecting risk management in the South African Construction Industry

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ABSTRACT

Purpose
The research aims to assess and evaluate the techniques used in managing risks in South African construction projects, the effectiveness of risk management techniques that are currently in use and the factors that influence the use of risk management by contractors in their projects.

Methodology
The data used in this paper were derived from both primary and secondary sources. The primary data was obtained through the use of a structured questionnaire survey. This was distributed to Contractors operating in Gauteng province. One hundred and eight structured questionnaires were used for the survey. Out of the 108 questionnaires sent out, all were received back representing 100% response rate, these formed the basis of the analysis for the paper. The secondary data for the study was derived from the review of literatures.

Findings
The empirical studies have identified that risk management in the South Africa construction is mostly influenced and affected by the size of company, education and experience of construction company and managers. The study also revealed that the majority of South African contractors are aware and make use of the structured process of risk management.

Value
The study contributes to the body of knowledge the use of risk management in the South African construction industry.

Keywords:
Risk, South African, Construction Industry, Construction Risk Management, Construction Projects.

1.1 INTRODUCTION

Construction Risk Management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events (Hubbard, 2009). Risk can potentially have damaging consequences for the construction projects (Mills, 2001). Therefore risk analysis and management continue to be a major feature of the project

management of construction projects in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success. Construction projects are always unique and risks arise from a number of the different sources (Pheng and Chuan, 2006). Construction projects are inherently complex and dynamic, and involve multiple feedback processes (Uher, 2004). Individuals and organisations are actively involved in the construction project, and their interests may be positively or negatively affected as a result of the project execution or project completion (PMBOK, 2013). Different participants with different experience and skills usually have different expectations and interests. This naturally creates problems and confusion for even the most experienced project managers and contractors. Cost of risk is a concept many construction companies have never thought about despite the fact that it is one of the largest expense items (Dey and Ogunlana, 2004).

Risks during construction of most projects are inevitable and different risk management techniques are used to manage these risks. Most of the risks that occur during construction project affect the cost, time and quality of work, which may result in cost overruns, time overruns, low quality of work, disruptions and disputes. In some cases, risks may lead to delay and abandonment of project. The South African construction industry experiences such, as projects are frequently characterized by cost overrun and time overrun which resulted in the delayed project completions. Yet few emphases are placed on risk management practices in South Africa. This paper seeks to evaluate risk management in the South African construction industry.

This paper assesses construction risk management, with the specific aim of identifying the factors that play the dominant role in the use of risk management by contractors. This is because the concept of construction risk management has attracted much attention in recent years and that of researchers and research bodies. The paper discusses the theory of risk management and the barriers to risk management use by construction companies in South Africa.

1.2 THE THEORY OF CONSTRUCTION RISK MANAGEMENT RESEARCH

The development of what is now known as construction risk management emerged in the large engineering projects in the energy sector in the mid-1970s (Chapman & Ward, 2003). The development continued in a diversity of business sectors where large projects were run. In this period from the mid-1980s until early this century, project risk management focused on finding the common structures for all projects and identifying the different approaches that are needed for each project (Chapman & Ward, 2003). The development that is currently taking place in the field of project risk management is focusing on extending the focus to include the wider scope of uncertainty management (Ward & Chapman, 2003: 39) to incorporate the aspects of individual, cultural and the social construction of risk (Stahl et al., 2003).

Valsamakis and Vivian, (1996) defines risk management as the process of determining the maximum acceptable level of overall risk to and from a proposed activity, then using risk assessment techniques to determine the initial level of risk and, if this is excessive, developing a strategy to ameliorate appropriate individual risks until the overall level of

risk is reduced to an acceptable level. Heldman, (2005) also defines risk management as applying skills, knowledge, and risk management tools

and techniques to the project in order to reduce threats to an acceptable level while maximizing opportunities. It can be deduced then that the aim of risk management is to reduce threats that maybe encountered during the execution of projects or undertakings to acceptable levels and at the same time maximizing opportunities or positive outcomes.

Researchers have undertaken studies in the field of risk management in construction industry in the past and conclusive remarks have been made. (Hastak and Shaked, 2000) conducted a study in which they made three broad categories of construction risks; project, market and country level risks. Country risks are associated with macroeconomic stability of the country and are linked with the monetary and fiscal policy of the country and the resistance of the country against economic variability. Market level risks arise from foreign risks, include technical advantage of the firm over local competitors, availability of construction related resources and government support at both local and foreign level towards construction industry. Project level risks are specific to the project activities, and they include improper project design, safety measures for construction site, constraints of logistics, improper control of quality and environmental protection etc. The study by (Wand and Dulami, 2004) identified twenty eight risks related to construction projects in developing countries. They categorized the risks into three levels; country, market and projects. Twenty two risks were deemed as critical or very critical based on a seven degree rating scale. The top eleven critical risks are (in no particular order); termination of joint venture, influence of government on disputes, policies of government, interest and inflation rates, corruption, cost overruns, political instability of the country, credit worthiness of local partner, enforcement of justice, changes in law and permit approval. The three types of risks have precedence in terms of criticality over one another; country risks being most critical, project risk being least critical of the three and market risks lying somewhere in the middle. For identified risks, practical measures of risk mitigation were found to be effective by the respondents, using a seven point rating scale. The respondents suggested that in order to effectively mitigate a task, the measures leading to higher effectiveness should be prioritized in implementation. Since the risks at higher hierarchy level are more critical, risk mitigation measures should also make use of this prioritization and risks at higher level (i.e. country and market level) must be mitigated before moving on to risks at lower level i.e. project risk

In a survey on international construction joint ventures by (Lei Bing, 1999) three main groups were made to identify risk factors; external, internal and project specific. The study examined some cases where risk mitigation measures were used effectively, for risk management, by construction professionals in East Asia. An international survey of contractors revealed that the most critical risk factors existed in the financial aspects of joint ventures, government policies, economic conditions, and project relationships. When a local company enters a foreign construction market by forming a joint venture with a foreign company, risks could be reduced by a careful selection of the partner and by a careful drafting of the contract agreement. The right staff and subcontractors must be chosen, good relationships must be established and fair construction contracts be secured with the clients.

Studies were done in the Australian construction industry where risk management was used in the conceptual phase of project development. They found that although a majority of respondents were familiar with risk management processes and techniques; but despite their willingness to adapt these techniques, they were rarely employed in the conceptual phase of projects.(Ling and Hoi, 2006) investigated the risks

faced by Singapore based architecture, engineering and construction (AEC) firms in India. They also investigated the techniques used for risk response by these firms. Their in-depth interviews with Singaporean experts working on AEC projects in India revealed that the main risks faced by AEC firms were; huge differences of culture between the expatriates and Indians, exchange rate of currency and its fluctuations, high financing cost, political and social risks. The techniques used for responding to risks were to obtain effective insurances and carefully plan and manage all risk response activities.

According to (Akintoye and Macleod,1997) risk analysis and management in construction industry is dependent on three factors; experience, judgement and intuition of team members. Unfortunately, formal activities to analyze and manage risk are rarely used in construction industry. The main reason for this is the ignorance of project teams towards such techniques and the associated myths that these techniques are unsuitable to be used in the construction industry(Uher and Toakely, 1999).

In South Africa many problems are faced by contractors when delivering construction projects. As a result poor contractor performance, as characterized by poor work quality and low productivity, is common in the industry. In a survey conducted among members of the South African Property Owners Association (SAPOA) to investigate the client's perception relative to contractors' performance, Smallwood (Smallwood, 2000) found the predominated problems to be rework and poor productivity and poor quality. Smallwood concluded that the causes of poor contractor performance, as perceived by clients, were a lack of concern for the environment, late information, poor management of the design activities, inadequate or poor planning, poor management and low skills level among the workers. Other writers (Allens, 1994; Henry, 1994; Lobelo, 1996) strongly concur with Smallwood's analysis. Furthermore, they identified problems to be cost over-runs, rework, late completion, and unacceptably high accident rate, insensitivity to environmental considerations, poor work practices and adversarial relationships. A common thread running through all these cases is the failure of many contractors to fully acknowledge the significance of some key construction issues that seriously affects contractor performance, such as integration of the design and construction process, as well as the quality management process.

1.3 RISK MANAGEMENT

Risk management is probably the most difficult aspect of project management. A project manager must be able to recognize and identify the root causes of risks and to trace these causes through the project to their consequences. Furthermore, risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives (PMBOK,2007). The use of risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential (Eskesenand Tengborg, 2004). The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources.

The construction industry is heterogeneous and enormously complex. There are several major classifications of construction that differ markedly from one another: housing, non residential building, heavy, highway, utility, and industrial (Keokiet al., 2008). Construction projects include new construction, renovation, and demolition for both residential

and non residential projects, as well as public works projects, such as streets, roads, highways, utility plants, bridges, tunnels, and overpasses.

The success parameters for any project are in time completion, within specific budget and requisite performance (technical requirement). The main barriers for their achievement are the change in the project environment. The problem multiplies with the size of the project as uncertainties in project outcome increase with size (Dey and Ogunlana, 2002). Large construction projects are exposed to uncertain environment because of such factors as planning, design and construction complexity, presence of various interest groups (owner, consultants, contractors, suppliers, etc.), resources (manpower, materials, equipment, and funds) availability, environmental factors, the economic and political environment and statutory regulations. Construction projects can be unpredictable. Managing risks in construction projects has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability (Zou et al., 2007). Project risk management is an iterative process: the process is beneficial when is implemented in a systematic manner throughout the lifecycle of a construction project, from the planning stage to completion.

There are two methods to determine risks in a project, namely the qualitative and quantitative approach. The quantitative analysis relies on statistics to calculate the probability of occurrence of risk and the impact of the risk on the project. The most common way of employing quantitative analysis is to use decision tree analysis, which involves the application of probabilities to two or more outcomes. Another method is Monte Carlo simulation, which generates value from a probability distribution and other factors. The qualitative approach relies on judgments and it uses criteria to determine outcome. A common qualitative approach is the precedence diagramming method, which uses ordinal numbers to determine priorities and outcomes. Another way of employing qualitative approach is to make alist of the processes of a project in descending order, calculate the risks associated with each process and list the controls that may exist for each risk.

Literature has revealed that the common factors that are affecting and also influencing the use of risk management by companies are:

- History, newer projects are more prone to risks as they are different from the other projects. Older projects are likelihood of success against risks because there are similar projects that have been done before.
- Management Stability, which means the whole management share the same goal or objective for any project. Therefore, it will be beneficial to achieve the project objectives with much ease. If the management is unstable then it can lead to affect the project objectives.
- Staff expertise and experience, if thestaff for any project is sufficiently experienced and with different expertise the likelihood of quality, cost and other objectives can be achieved.
- Team Size, for larger teams of any project there are more chances of occurrence of problem because of miscommunication.
- Resource Availability, if theproject is available with a good amount of resources then the response to the problem will be good. Because if the project is available with greater amount of resources than it can deal with different risks with ease.

- Time Compression, if the project schedule is highly compressed there are more chances of occurrence of risks in projects. When more time is available for the project, then it can be coped up by reducing risk impact on the project.
- Complexity, If the project is highly complex there are more chances for the occurrence of problem in the project.(Patel et al. 2013). Complex projects are inherently vulnerable, they are difficult to control under the best circumstances.
- Dysfunctional behaviour by the parties involved, for example ignoring major risks, "success oriented" planning, poor initial project definition, reluctance to admit problems, excessive pressures, confrontation instead of cooperation often amplifies the vulnerability of such projects to performance problems.

The challenge of risk management in complex projects involves early identification of major risks, systematic analysis of these risks, strategic control of the project's risk exposure, and continual learning. Until recently there has been insufficient systematic analysis of, and learning from, past experience with the problems of complex projects. Managers lacked tools powerful enough to effectively analyse and control such projects. It is not possible or cost effective to immunize a project against all significant risks, but the existence of good contingency plans greatly increase the likelihood that management will act correctly if a seriously disruptive situation were to arise. For example, what should management do if a key subcontractor is hit by a strike? If government safety standards suddenly were to change? Therefore there is always a need for a good contingency plan.

1.4 RESEARCH METHODOLOGY

The data used in this paper were derived from both primary and secondary sources. The primary data was obtained through the use of a structured questionnaire survey. This was distributed to a total of 108 contractors. The contractors were selected from a numerical list of contractors registered with CIDB, 12 contractors were selected from each CIDB grade. Systematic sampling techniques were adopted in the selection. The secondary data was derived from the review of literature and looks at the literatures relating to construction risk management. Out of the 108 questionnaires sent out, all were received back representing 100% response rate. This was considered adequate for the analysis based on the assertion by Moser and Kalton (1971) that the result of a survey could be considered as biased and of little value if the return rate was lower than 30–40%. The data presentation and analysis made use of frequency distributions and percentages of all the respondents. The research was conducted between the months in the month of October 2014 to March, 2015.

1.5 FINDINGS – LESSONS LEARNT

Based on the results, 62.6% of companies use structured risk management and 37.4% use risk avoidance. Structured risk management has three processes i.e. risk identification, risk assessment and risk response.

When the respondents were assessed against each of the structured risk management processes, there was a notable presence of structured risk management system in many of the organisations surveyed during the 108 study. Since the surveyed organisations and individuals are

a representative sample for the construction firms, it can be assumed that the observation is representing the general trend in the industry. There is however a way few construction companies that do not manage risks instead use risk avoidance.

We used Analysis of varience (ANOVA) to determine if the differences between the means of factors against risk management are significant. From the study it was observed that educational qualification is one of the factors that influence risk management. The results of this study suggest that there are significant differences among educational qualifications when looking at respondents risk management techniques. There is less application of risk management techniques amongst Grade 12 and Post Matric respondents than that of respondents with higher qualifications. Respondents with higher educational qualifications exercise and apply risk management differently than those with no or lower educational qualifications.

The results of this study also suggested that higher CIDB grades really do have an effect on application of risk management. Specifically, our results suggest that construction companies with high CIDB grades exercise more risk management techniques than companies with average and low CIDB grading.

The study observations suggested that the age difference have an effect on application of risk management. The results observed that the significant difference is between age groups 31-40 years and 41-50 years. Specifically, the results suggest that respondents between the ages of 31-40 apply risk management differently than respondents between ages 41-50.

From this study it is observed that the company age which resembles the experience of the company, has an effect on application of risk management. The significant difference is between companies with ages 0-5 and companies with ages 11-20, companies with ages 21-30 and 0-5 is also different to companies with ages 31 and above. Specifically, the results suggests that companies that have less than 5 years experience apply risk management techniques differently than those above 10 years of experience. The companies with past experiences compare the current project to the past works and identify some critical risks which they evaluate after their assessment. They have developed some form of risk management system which is tailored for specific projects.

The study suggests that individual experience has an effect on application of risk management. The significant difference is between individuals with experience 0 – 5 years and individuals with experience 11-15 years, 16-20 and 21years and above, the other difference is between ages 6 – 10 years and 11-15 years, 16-20 and 21years and above. The results suggests that individuals that have less than 10 years of experience working in the industry apply risk management differently than those with experience above 10 years.

Furthermore, there were a notable number of factors that were found to be influential when it comes to risk management. From the literature review it is found that the factors that influence risk management are: the history of the project, management stability, staff expertise and experience, resource availability, time compression and complexity of projects. From this study it was observed that the above factors also influence risk

management in the South African construction industry. Staff expertise and experience is the most highly ranked amongst these factors with the mean value of 4.52, followed by resource availability with the mean of 4.48, history of the project has the mean of 4.35, complexity of projects has the mean of 4.32, time compression has the mean of 4.17, and finally the least ranked factor is management stability with the mean of 4.05.

1.6 CONCLUSION

For risk management in the organisation or in projects to succeed, and to have project successful completion, there has to be a structured risk management tool in the form of risk management system or framework that should be utilised to conduct all the risk management issues. In this study it was observed that as much as there is notable presence and use of structured risk management system by contractors, there is a variance in the techniques used. Therefore there is a need to lay down a standardised risk management system for all construction companies to bring about increase in profits and maintenance of good client confidence and satisfaction. The organisations need to involve detailed and concerted communication and training to ensure that the risk management process is understood by all individuals of the organization and not only by the management. The risk management system that should be initially implemented will have to start with the internal environment with the objectives being set, identifying the risk events, assessment of risks, setting up risk responses, information and communication and continuous routine monitoring of the whole process.

Although the study suggests that risk management is practiced by all individuals with different educational qualifications, it also suggests that individuals with higher educational qualifications apply risk management differently than those with lower educational qualifications. The difference in application of risk management as mentioned above is hinged on the need for knowledge in the area of project management and risk management. The gap between the two can be closed by developing a standard effective risk management system that will be implemented throughout by contractors. Training of personnel in the areas of project management and risk management and use of risk management system should be implemented.

Risk management should be an organization wide activity that should span through all the ranks from top management to lower level personnel. With this in mind, small contractors find the process of risk management expensive, therefore sponsorship or support structures for risk management activities would play a major role in the application of risk management by small and developing companies as all personnel are involved and the benefit is not only for the project but for the industry as a whole.

Lastly Individual age, company age and individual experience can all be put under one umbrella which is experience. In order to bridge the gap between individuals and companies that are experience and those that are not experienced in the industry, the experience needs to be spread and shared across the South African construction industry. This can be achieved again by establishing a generic risk management system that is accessible to all South African construction companies in order to standardize risk management activities. The organisations without experience and those with the experience in its infancy will have to involve

detailed and concerted communication and training to ensure that the risk management process is understood by all personnel in their organisations and other stakeholders. The industry is innovative, new challenges and risks will arise, therefore the system that will be in place will need to be updated periodically.

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