STUDY ON MANAGEMENT OF TECHNICAL RISKS INCONSTRUCTION PROJECTS

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ABSTRACT

Construction projects are initiated in complex and dynamic environments resulting in circumstances of high uncertainty and risk, which are compounded by demanding time constraints. Construction industry has changed significantly over the past several years. It is an industry driven primarily by private investors; the presence of securitized real estate has increased considerably. It is vulnerable to the numerous technical & business risks that often represent greater exposures than those that are traditional. Thus, risk assessment need arises. Risk assessment is a tool to identify those risks in a project and manage it accordingly with proper treatment. Risk assessment is defined in this study as a technique that aims to identify and estimate risks to personnel and property impacted upon by a project. The general methodology of this study relies largely on the survey questionnaire which was collected from the local building contractors of different sizes by mail or by personnel meeting. A thorough literature review is initially conducted to identify the risk factors that affect the performance of construction industry as a whole. The survey questionnaire is designed to probe the cross-sectional behavioral pattern of construction risks construction industry. The questionnaire prepared for the pilot survey was formulated by seeing the relevant literatures in the area of construction risk management. This research seeks to identify and assess the risks and to develop a risk management framework which the investors/ developers/ contractors can adopt when contracting construction work in India.

INTRODUCTION

Construction projects are characterized as very complex projects, where uncertainty comes from various sources. Construction projects gather together hundreds of stakeholders, which makes it difficult to study it as a whole. But at the same time, these projects offer an ideal

environment for risk management research. Additionally, construction projects are frequently used in management research, and several different tools and techniques have already been developed and especially for this type of project. However, there is a gap between risk management techniques and their practical application by construction contractors. The area of project management has recently received vast attention in the business discipline. One of the major characteristics of projects is their high level of risk [1-3]. This means that too many undesirable events may cause delays, excessive spending, unsatisfactory project results or even total failure. In order to increase the chance of project success, project managers are motivated to reduce risks by implementing better planning and control. Risks must be managed throughout the entire life cycle of the project, starting with the planning phase, when risks must be identified and analyzed. Next, solutions, which may reduce threats, must be developed and a response plan to some of the critical risks should be implemented. Throughout the execution phase of the project, risk monitoring is needed in order to keep track of the identified risks, monitor residual risks, identify new risks andensure the execution of risk plans [4-5].

NEED FOR STUDY

Construction projects involve great deal of time and capital, so effective construction project risk management skills are required if the projects are to becompleted within the established timeline to meet cost limitations and quality requirements. Risk is inherent everywhere especially in construction projects. The activities that are present in the construction industries could result in fatal injuries, financial disasters, disruption and delayed operation, etc. There are many reasons for using risk management, but the main reason is that it can provide significant benefits far in excess of the cost of performing it.

OBJECTIVE

Mostly risks are inherent in construction industry. Risk cannot be ignored but it can be managed. It is of use to understand the significant risks in order to foresee their possible negative effects on projects. Various people, mostly in developed countries, have done research on risk assessment and management. For the developing country, like India it is necessary to be competitive and efficient, so that it is not left far behindin the competitive world in which it is placed in order to return value to stakeholders. In developing countries like India, only few research works have been done in this area. It is important to manage

risks associated with construction projects, in particular in developing countries not only to secure work but also to make profit. Thus this study helps to identify the key risks and possible measures to deal with risks the construction industry is facing. All risks observed in the questionnaire can happen to any construction projects.

METHODOLOGY

The general methodology of this study relies largely on the surveyquestionnaire which will be collected from contractors by mail or by personal meeting. A thorough literature review is conducted to identify the risk factors that affect the performance of construction projects as a whole. Also some interviews with industrial practitioners were conducted to check effectiveness of questionnaire.

Questionnaire Structure: The structured interview questionnaire is shown in annexure 1. The questionnaire is divided into two parts. The first part contains general info such as type of company, experience, value of the project, etc. and the second part consistsof technical risk factors for evaluation.

Questionnaire Design

The survey questionnaire is designed to probe the cross-sectional behavioral pattern of technical risks in construction projects. The questionnaire was formulated based on relevant literatures in area of construction risk.

Risk Rating

A Likert scale of 1-5 was used in the questionnaire. A Likert scale is a type of psychometric response scale often used in questionnaires, and is most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The respondents were required to indicate the relative criticality/effectiveness of each of the risk factors and their impact to the management.

Sample composition

The respondents were all industry practitioners, including public and private developers, project managers, main contractors and subcontractors, senior consultants and engineers, and top management personnel (i.e. managing directorand senior associate). It should be noted that the sample size is relatively small inthis survey. This may be due to two reasons.

Firstly, the questionnaire aimed to explore 51 risk factors related to construction projects, which is time-consuming and may retard respondents from participation. Secondly, the questionnaire content is broad and may not be within the knowledge context of some industry practitioners. The small sample may weaken the effectiveness of the questionnaire survey. However, the handpicked sample pool of industry practitioners and their profound knowledge and ample experience can compensate the aforementioned weakness.

Data analysis method

The survey feedback includes two groups of data, the likelihood of occurrence of each risk and its level of impact on project objectives in terms of cost, time, quality, environment and safety. The risk significant index developed by Shen*et al.* (2001)was used in this research. With respect to the impact on a particular project objective, the significance score for each risk assessed by each respondent can be calculated through Equations (6).

Risk management involves four processes, namely

1. Risk Identification: Determining which risks are likely to affect the projectand documenting the characteristics of each.
2. Risk Quantification: Evaluating risks and risk interactions to assess the rangeof possible project outcomes.
3. Risk Response Development: Defining enhancement steps for opportunitiesand response to threats.
4. Risk Response Control: Responding to changes in risk over the course of theproject.

TECHNICAL RISK ASSESSMENT METHODOLOGY (TRAM)

TRAM is a framework developed by Klein and Cork (1998) to assess the technical risks associated with a proposed system. The framework provides a systematic structure for selecting assessment methods and integrating results of the use of selected methods into a coherent overall assessment of the system [7].

The major principle on which TRAM relies is the principle of decomposition. Under the principle of decomposition, a system is not assessed as a whole during the entire assessment process, but for a substantial part of the process, it is decomposed into subsystems on which a detailed assessment is carried out.

TRAM Framework

TRAM can be characterized as consisting of seven phases. The seven-phase approach is a logical sequence, which is intended to be flexible and iterative, though the systematic nature of the approach should not be compromised.

Structure Phase

In the structure phase, the assessment is structured by successive decompositionof the system to be assessed into a hierarchically organized set of assessment areas. The whole system can be decomposed into areas, with as many lower levels that are required. Detailed assessment is organized by assessment area. Although structuring the assessment is logical, it can be elaborated or revised as required at any subsequent stage. The next five TRAM phases are generally organized in the bound assessment areas, and the final, seventh phase is concerned with integrating assessment results from separate areas [8].

Risk Identification, Assessment Method Identification, and Risk Assessment Phases

In the risk identification phase, the technical risks, which apply in the assessment area, are identified. The assessment method identification phaseinvolves the identification, of the various assessment methods, which can be used for each of the risks [9]. The risk assessment phase involves estimation of particular risks by using particular method.

Method Integration and Risk Integration Phases

The method integration phase combines the results of all one method used, and to obtain an overall view of risk in the assessment area under consideration, assessments are combined as appropriate in the risk integration phase.

Hierarchical Integration Phase

The final phase identified in TRAM is the hierarchical integration phase in which assessments in all areas are systematically integrated from the bottom up into an overall assessment of the system.

CONCLUSION

As far as India is concerned risk management is still a new word in the construction sector and this should be changed as soon as possible. Risk rating system will help the developers to develop projects at a faster pace by taking quick decisions. Each rating agency will have its own methodology to rate projects. The system will help government to develop a strategy to mitigating risk. This will encourage more response from developers and investors for public-private partnerships projects. It could make the bidding projects more competitive. The system will enable bankers to take quick decisions for lending finances, which could lead to the financial closure of theproject at a faster pace. Third party risk rating would certainly raise critical points, which are not normally raised during finalisation of project.

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