STUDY OF RISK MANAGEMENT IN CONSTRUCTION PROJECTS

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ABSTRACT

Risk management (RM) is a concept which is used in all industries, from IT related business, automobile or pharmaceutical industry, to the construction sector. One concept which is widely used within the field of RM is called a risk management process (RMP) and consists of four main steps: identification, assessment, taking action and monitoring the risks (Cooper et al., 2005). The overall aim is to let everyone know what risk management is. Realize the procedure of risk management in the construction project and have a deeper study on the application of risk management in the construction industry during the entire phase of construction from the Estimate to the execution state. The topics studied are application of risk management techniques, barriers to risk management, data cost management.

Key Words: Risk Management, Construction Industry, RM Techniques, RM Barriers

I. INTRODUCTION

Concept of Risk management (RM) is used in all industries, from IT related business, automobile or pharmaceutical business, to the construction sector. Every business/industry has developed their own RM standards; however the overall concepts or the idea usually stay the same regardless of the sector. According to the Project Management Institute (PMI) (2004), Project risk management is one of the nine most crucial elements of project authorisation. This indicates a strong relationship between managing risks and project success. While RM is delineate because the most troublesome space inside construction management (Winch, 2002; Potts 2008) its
application is promoted in all projects in order to avoid negative consequences (Potts, 2008). One idea which is widely used within the field of RM is called a risk management process (RMP) and consists of four main steps: identification, assessment, taking action and monitoring the risks (Cooper et al., 2005). In every step, there are a number of strategies and techniques that facilitate handling the risks.

II. THE NEED FOR RISK MANAGEMENT

Recent decades have been characterised by a vast proliferation of risk management. There are a number of potential explanations for the increased interest in this subject. They are many and varied and include:

- Increases in technology;
- Tighter financial constraints;
- Location of the project;
- More consequential risks;
- Projects growing larger and more complex;
- More public interest to decrease risk and improve safety;
- Familiarity with the type of work;
- Environmental factors and;

Project management is the application of skills, knowledge, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Risk management in Project includes the processes concerned with risk identification, its analysis, and responding to project risk. The process also includes maximizing the results of positive events and minimizing the consequences of adverse events. Generally, risk is a choice in an environment rather than fate.

III. OBJECTIVES OF THE STUDY

The overall aim of this study is to let everyone know what risk is management. Realize the course of action of risk management in the construction project and have a deeper study on the application of risk management in the construction industry during the entire phase of construction from the Estimate to the execution state. The other objectives of the research are as follows:

- To assess and understand the most common and major risk which may cause delay, accident, or any other major loss in the process of construction.
- To recognize and evaluate current risks and uncertainties in the construction industry
- To investigate the nature of risk and uncertainty in a construction company arising from the projects it undertakes.
- To investigate the link between project and company risk
- To assess the efficiency of current methods, and techniques employed to manage those risks.

IV. THE FIVE CHARACTERISTICS OF RESEARCH ARE:

- **Systematic** problem solving which identifies variables and tests relationships between them
- **Logical**, so procedures can be duplicated or understood by others
- **Empirical**, so decisions are based on data collected
- **Reductive**, so it investigates a small sample which can be generalized to a larger population
- **Replicable**, so others may rest the findings by repeating it.
V. THE PURPOSE OF RESEARCH

Each of the following objectives has an important role in research and science.

- Exploration is especially important in the early stages of research to generate concepts and theories that can be further tested later. It gets research started; it gives researchers the direction.
- Description is carried out, to some degree, in every study; it provides needed information and helps understand precisely what one is looking at.
- Explanation is important because it studies causes and effects, and it involves testing and improving theories (i.e., our explanations).
- Prediction is common in the mature sciences, and helps us to get better at our world by predicting what will happen. Predictions can be followed with interventions to help prevent the pessimistic outcomes. For optimistic predictions, one wants to do whatever leads to the positive predictions.
- Influence is the ultimate goal of research as we strive for social betterment and improvement of our world; in education, influence comes about through the implementation of demonstration programs to show what works and then later through changes in educational policies to have a broader social impact.

VI. RESEARCH PLAN

It is necessary to design a suitable methodology for understanding systematic and scientific study. The study is exploratory, descriptive as well as casual.

VII. DATA COLLECTION

Data is collected through Primary Data Sources and Secondary Data Sources. Primary Data Sources are collected specifically for the purpose of the research study, which is to be done, and secondary data source are already collected data, with some other objective.

VIII. QUESTIONNAIRE

A formal list of Questions is formulated and ask the questions from the people who are having the related information. Here the Questionnaire is Structured and Non Disguised Type. Close end Questionnaire with Dichotomous and Multiple Choice Questions. Research design depends on the type of research studies that we are going to make. Both Descriptive and exploratory research were used in compiling this study.

IX. MANAGEMENT OF PRICING RISKS

In terms of management of pricing risks that were perceived to have the top overall level of risk including 'site related issues,' 'project complexity,' 'change in scope of work' and 'insufficient and incomplete design information.'

X. SURVEY RESULTS AND ANALYSIS

Respondents were asked to list the possible risks identified in the business, on a scale of 1–5, where 1 represented negligible risk and 5 extreme risks. ANOVA was performed to test the perceptions of client, contractor, superintendent, designer, management organization, and planner.
The one-way ANOVA is used to test whether several means are equal (SPSS). The perceptions of the groups are different on the “premature facility failure” (mean=3.6, ANOVA p=0.043) and “safety” (mean=3.54, ANOVA p=0.013), which were given much lower ratings 2.57 and 2.33, respectively by planners. This can be because planners are only involved in project initiation at an early stage. Different perceptions exist on “claims and disputes” (mean=3.9, ANOVA p=0.020), which is given an apparent low rating (2.47) by clients. There are different perceptions on “insufficient technology” (mean=2.94, ANOVA p=0.006), which was given a much high rating (3.5) by designers who need sufficient technology to fulfill their designs. There are also different perceptions on “poor coordination” (mean=2.88, ANOVA p=0.013) and “organizational interface” (mean=2.57, ANOVA p=0.017), showing the groups have different concerns on these factors. Despite the different perceptions on the above risks, all groups have a common view on the severities of most project risks.

XI. APPLICATION OF TECHNIQUES OF RISK MANAGEMENT

Respondents were asked to respond on a scale of 1–5, where 1=never used, 2=seldom used; 3=sometimes used; 4=often used, and 5=always used. ANOVA was performed to test the perceptions of all groups on the use of the risk management techniques listed. All computed results of ANOVA are with the significance level higher than 0.05, which shows that all groups have no significant differences in the ratings of the techniques. This suggests the extent to which all groups use risk management techniques is similar.

XII. BARRIERS TO RISK MANAGEMENT

To understand the barriers to risk management, some possible factors that may affect risk management were further investigated. Respondents were asked to identify from their experience the most important barriers to risk management. To do this they were asked whether they agreed with a number of suggested barriers. To test how well the different groups agree on the ranks of the barriers to risk management, the Spearman rank correlation coefficient was calculated as shown in Table.

The Spearman rank correlation coefficients among clients, contractors, superintendents, designers, and management organizations are all at the significance level of higher than 0.05, suggesting that these five groups have no significant agreement on the ranks of the barriers to risk management. Only planners have an agreement with designers and management organizations at the significance level of 0.05. Clients ranked “ineffective implementation of risk control strategies” as the first, whereas contractors ranked “shortage of knowledge/techniques on risk management” and “inappropriate risk allocation” as the first tie, showing clients are more concerned with effectiveness of risk management strategies and the contractors intend to improve risk management knowledge and to have fair risk allocation. This situation shows that the extents to which the barriers affect the risk management for the main project participants are different from each other.

XIII. DATA COST MANAGEMENT

Questions were asked regarding data cost including how many cost items are currently available in the respondent’s database, level of detail of the existing data cost, sources of data cost and its frequency of usage and reliability and purposes of data cost usage.

Respondents commented that the many items quoted vary, for example, RCC work to be carried out is quoted in Rs./m³(Cubic Meter), this prices includes the cost of shuttering, chemical, etc complete. in the same way for reinforcement steel the rate is quoted in Rs/Kg. which includes the
cost of binding wire, fixing, laying, bending etc., complete. In the same way, many such items are quoted in which all its associated work required are to be considered for quoting a particular job.

XIV. SOURCES OF COST DATA

The most frequently used cost data amongst residential construction respondents were the ‘subcontractors’ / suppliers’ quote.’ It also received highest ranking in terms of reliability. However, the most reliable source of cost data amongst the respondents was the ‘in-house rate build-ups’ which received the highest ranking in terms of frequency of usage. Overall, ‘in-house rate build-ups’ received the highest overall score, followed by ‘subcontractors’ / suppliers’ quote,’ ‘colleagues’ and ‘manufacturer catalogue.’

The result of the interviews showed that ‘priced schedule of quantity from past project’ only has a fifth overall ranking (out of a total of 8) in terms of frequency of usage and reliability. In fact, only one respondent indicated that they rely on historical information heavily for their estimate.

The fact that the ‘priced schedule of quantities from past project’ did not receive high ranking compared to the literature may be due to several reasons. First, as indicated by one of the respondents that ‘priced schedule of quantities from past project’ is based on a different specification which may affect several other cost items in the estimate and therefore it is difficult to analyse and apply to new projects. Another reason might be that as another respondent indicated “the whole process from the first estimate to project completion is 9+ months, so if I rely on the estimate we did right at the beginning for a job we did after we completed it, its 10 months minimum. There is a good chance that prices have increased” and, therefore, historical prices are “brilliant as a guide but dangerous to price a whole project base on that.”

Therefore, when compared with other sources of cost data such as ‘subcontractors’ / suppliers’ quote and ‘in-house rate build-ups,’ Published Price Book, Manufactures Catalogue and Government Literature’ these sources of cost data are more ‘current,’ more specific and relevant to the current project and specification were given directly by the subcontractors and suppliers and, therefore, more reliable and were used more frequently. In fact, one respondent noted the importance of in-house rate build-ups by commenting “the only thing you can rely on, is build up rates.”

Other sources of cost data were considered by the respondents as a backup or a tool for checking the estimate. The respondents felt that there is nothing wrong with other sources of cost data but caution must be taken to understand the background information that these prices were based on and its intended purpose.
Interview question was also asked in regards to why some sources of cost data that were considered to have low reliability but are used often and vice versa. Sources that were identified to have high reliability but low frequency of usage by the respondents include ‘manufacturer catalogue,’ ‘Government literature’ and ‘colleagues.’

‘Manufacturer catalogue’ was identified because the reasons discussed previously. In fact, the construction companies often buy their products through their suppliers instead of direct from the manufacturer. Therefore, different companies will have different trade prices and discount applied to the product depending on their relationship and quantities ordered, these prices in manufacturer catalogue is, therefore, not often used by the respondents.

**XV. PURPOSES OF COST DATA USAGE**

The most frequent use of cost data is to ‘forecast future construction projects,’ followed by ‘monitoring/controlling construction cost’ and ‘negotiate rates with suppliers & subcontractors.’ However, it is rarely used for ‘preparation of valuation for insurance’ and ‘cost comparison of different construction types.’

<table>
<thead>
<tr>
<th>Purpose of cost data</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasting future construction projects</td>
<td>3.65</td>
</tr>
<tr>
<td>Negotiate rates with suppliers</td>
<td>3.32</td>
</tr>
<tr>
<td>Monitoring / controlling construction cost</td>
<td>3.55</td>
</tr>
<tr>
<td>Cost comparison of different construction types</td>
<td>2.82</td>
</tr>
<tr>
<td>Design cost planning</td>
<td>3.12</td>
</tr>
<tr>
<td>Preparation of valuation for insurance</td>
<td>2.25</td>
</tr>
</tbody>
</table>

**Graph 2 : Use of Cost Data**

**XVI. DIFFICULTIES IN COLLECTING AND APPLYING COST DATA**

Respondents noted that managing cost data is a big task, and the biggest difficulty of collecting cost data is actually ‘getting it in.’ They also commented that coding and linking the system to the cost data provided by the suppliers and subcontractors is “a nightmare” because “no one is going to give the cost data to you the way you want it” and everyone uses different estimating system which causes interface issues. Therefore, everything has to be setup to a usable format (i.e.
rate) to improve the estimate. In terms of applying cost data, the biggest difficulty experienced by the same respondent is keeping the cost data up to date.

The most common difficulty, as pointed out by several respondents, happens while collecting cost data from the suppliers and subcontractors. This is mainly due to delays in getting quotes back from the suppliers and subcontractors; subcontractors charge other prices that they fail to disclose to the respondent while the discussion (for example additional items applied to the trade), and subcontractors deliberately tag things in their quote so if the respondent did not factor this in their estimate and exclude from the contract, potential overrun can occur as a result.

XVII. CONCLUSION

The focal point of this study is to explore the key risk factors and identify these factors that could be faced in the construction industry. Analysis of these risk factors was carried out to measure their effects on building projects and to assign each risk factor on the individual who is in the best position to handle such situations.

Contractors and owners still depend on traditional approaches to managing risk factors and their results; the use of direct judgment to control risk factors was the most applied method used to control risk events.

Risk management should be considered a primary tool to assess the project. From the survey, it is understood that risk management practices are not practiced in all the companies, and where it is practiced it is not carried out systematically. Immediate mitigation measures are not in place if a risk event happens.

XVIII. REFERENCE

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