

Risk Assessment And Management In Construction Industry

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Abstract- Construction Projects are risky and dynamic environments resulting in circumstances of high undetermined and risk, which are compounded by demanding schedule constraints. Construction industry has changed over the past Twenty years.

It is an industry driven especially by private investors, the presence of securitized real estate has increased considerably. It is Hazard to the numerous Internal and External risks that often represent greater exposures than those that are traditional. Thus risk assessment need arises.

Risk assessment is a tool to identify the risks and predicting their consequences 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 questionnaire survey which was collected from the local building contractors, builders of different Firms in Salem Region.

The questionnaire will be prepared for the area of construction risk management in different sizes. For different companies the questionnaires will be given out, of which the response rate will be calculated. This Project seeks to identify and asses the risks and to develop a risk management framework which the investors, contractors can adopt when contracting construction works.

Keywords- Construction Industry, Risk Management, Risk Assessment, questionnaire

I. INTRODUCTION

Risk management is essential to construction activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time and quality.

Risks are commonplace, but it is only the notable ones that require attention In controlling the risks, major risk

is treated by preparing the risk action schedule, moderate risks by specifying the control measures and minor risk can be accepted.

Managing risks in construction projects has been recognized as a very important management process in order to achieve the project in terms of time, cost, quality, safety and environment sustainability

The construction industry is often considered as a risky business due to its complexity and strategic nature. It incurs a numerous project stakeholders, internal and external factors which will lead to enormous risks.

By adopting Risk Management, Savings potentials can be realized in construction projects. For this reason, project managers as well as Real Estate Developers, a Consideration of the Risk Management Process is Worthwhile.

The data collection for the risk allocation is done from contractors and according to the response rate, the allocation is decided. Risks are assessed by Qualitative and Quantitative methods

II. LITERATURE REVIEW

N.B.Chaphalkar and C.A.Shelar(2011) told that consequences and likelihoods can be rated in terms of potential impact and occurrences respectively on a five point descriptive scale, by converting these values to numerical measure, the combined risk measure or risk factors can be calculated using an equation(in terms of the percentage values of impact and occurrence).

DEJAN RISITC(2003) explained a lot of companies need to carry out a risk assessment but most of them do not have the experience to determine the risk in a qualitative way. Therefore organizations use the tools for qualitative or quatitative risk assessment. Qualitatively risk is proportional to the expected losses that can be induced by a certain accident and to the likelihood of a occurrence.

Risk Management can be defined as a general management function with the aim to identify risks, assess and prepare the organization how to best handle the effects.

M.Merritt(2004) The Risk is defined as the possibility that an undesired risk is always outcome or the absence of desired outcome disrupts your project. Possibility is an important word in this definition, because risk is always connected with uncertainty. Risk management is a set of techniques for controlling the uncertainty in a project. An uncertainty could be reflected in project expense growth, schedule slippage, lack of quality in the deliverables, or deliverables that fall short in some other way, such as being too expensive. Apart from project management, risk management is often associated with the insurance industry. In fact, risk management is sometimes a synonym for insurance. This connection provides some valuable insights about project risk management

N.Hamzah (2011) Delay can be defined as time overrun or extension of time to complete the project. Construction delay is something that cannot be avoided especially in government agencies in Malaysia. Therefore delay is a situation when the actual progress of a construction project is slower than the planned schedule or late completion of the projects. The causes of delay are taken from the past literature review. There are two main type of delay: excusable delay and non excusable delay. The literature reviews are summarized and the delay framework is constructed based on the literature review summary in context of public higher learning institution.

V.Carr, JHM Tah(2001) have described the various sources of construction risks as internal and external. The internal sources include the client, consultants, design, cost& construction project management, contractors, subcontractors and suppliers. The external sources include unforeseen circumstances, government/ statutory/ political controls, environmental constraints, health& safety issues and socio-cultural issues.

Padiyar et al (2004) have specified that the essence of risk is characterized by three factors, first the event which is a possible occurrence which could affect the achievement; second is the likelihood which is the chance or probability of the risk event occurring within the time period and third factor includes the impact of the event in terms of financial value of the effect of the risk event.

A. Enshassi& S. Mohamed(2004) have specified that the criterion for a risk to be appropriated to a particular category (owner, contractor, shared, insurance or ignored) was

that it should get at least 60% response rate to achieve the main stream of the rates. Those that failed to get such response rate in favour of any category were listed as undecided.

III. RISK IN CONSTRUCTION INDUSTRY

The construction industry has a high rate of accidents and a poor reputation for coping with problems, with many projects failing to meet deadlines, cost and quality targets. In extreme cases the Risk of time and cost overruns can compromise the economic viability of the project, making a potentially profitable investment untenable.

Compared to many other activities, construction is subject to more Risks due to its unique features, such as long duration, complicated processes, unpredictable environment, financial intensity and dynamic organizational Structures.

To be successful in this environment, where our collective "performance bar" is being raised significantly, the real estate industry will have to dedicate more resources and develop a higher degree of operational sophistication construction industry is vulnerable to the numerous other business risks that often represent greater exposures than those that are traditionally insurable.

For example, there are regulatory and legislative risks, professional, contractual, competitive and human resource/cultural risks, reputational, strategic, customer, operational, political, legal, financial, and technological risks.

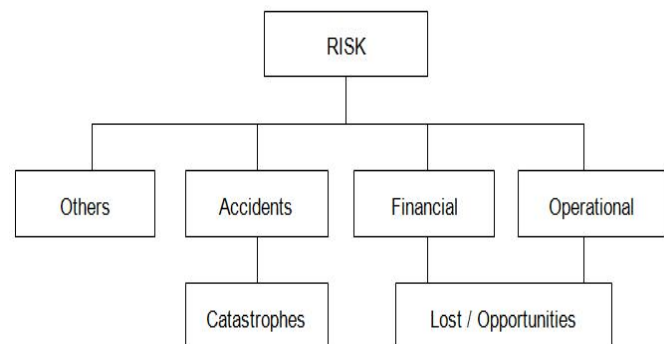


Figure 1. Various Risks in Construction Industries

IV. QUESTIONNAIRE SURVEY

The methodology of the study relies largely on a questionnaire survey mailed or given by hand to the local contractors of different sizes. The questionnaire was designed based on the identified risk factors, the impact of risks and the methods to overcome risks.

The questionnaire developed assesses the perceptions of contractors by giving the relative importance of risk factors and its impacts towards the building construction project. The questionnaire was designed into three sections: Section I; section II; and section III and section IV.

SECTION I: INTRODUCTION

SECTION II: GENERAL INFORMATION/COMPANY PROFILE

Section II Consists about the, Respondent's profile, Company profile, project details and general knowledge about risks

SECTION III: IDENTIFICATION OF LEVEL AND IMPACT OF RISK

This section was to obtain the information on factors that contribute to the risks in building construction projects from the perspective of contractors.

There were nine categories with hundred and twenty six factors of risks constructed into structured questions.

Respondents were asked to review and indicate the likelihood of these risks as rare, unlikely, possible, likely or almost certain and the level of impact on each risk that would result in risk rating as low, medium, high or extreme based on risk matrix. The impact scale represents the following rating:

- I = Insignificant
- II = Minor
- III = Moderate
- IV = Major
- V = Sever

Evaluate Probability and Impact into Five levels: Very Low, Low, Medium, and High, Very High.

SECTION IV: DEVELOP AND IMPLEMENT RISK CONTROL

This section was design to focus on identifying, assessing and implementing measures to control risks. The respondents were asked to tick the risk treatments based on the scale below:

Avoid risk = By not proceeding with the aspect that may suffer the risk event

Reduce likelihood = Where the project or its environment is changed to reduce the probability of a risk occurring.

Reduce impact = where action is taken to minimize the impact of a risk if it occurs. Treatment includes contingency planning that should address significant risk areas where preventive action is either unavailable or the cost of prevention is prohibitive.

V. RISK FACTORS

Risks can be viewed as business, technical, or operational. A technical risk is the inability to build the product that will satisfy requirements. An operational risk is the inability of the customer to work with core team members. Risks are either acceptable or unacceptable.

An acceptable risk is one that negatively affects a task on the non-critical path. An unacceptable risk is one that negatively affects the critical path. Risks are either short or long term. A short-term risk has an immediate impact, such as changing the requirements for a deliverable. A long-term risk has an impact sometime in the distant future, such as releasing a product without adequate testing. Risks are viewed as either manageable or unmanageable.

A manageable risk is one you can live with, such as a minor requirement change. An unmanageable risk is impossible to accommodate, such as a huge turnover of core team members.

Finally, risks are either internal or external. An internal risk is peculiar to a project, such as the inability to get the parts of a product to work. Internal risks start from inside the project.

The project managers are responsible to control and take necessary action to restrict these types of internal risks.

An external risk originates from outside the project. The Project Managers and Stakeholder have no control to avoid the external risks occurrence in the projects.

GENERAL TYPES OF RISK

TECHNOLOGY RISK:

Technical risks include anything that restricts from creating the product that the customer wants. This can include uncertainty of resources and availability of materials, inadequate site investigation, or incomplete design.

- Design Correction
- Changes in Drawings
- Non-availability of Materials
- Demand of materials for a Particular work
- Poor skilled Supervisor
- Unexpected Accidents
- Materials Wastages
- Water supply Problems
- Electricity problems
- Site Located in Rural Areas
- Equipment Problems
- Quality Issues
- Dispute between Contractors and Firm
- Materials Theft at the site

FINANCIAL RISK

Inflation, local taxes, and availability and are a few of the possible financial risks that might incur during a construction project.

The Financial risk is the risk that the firm must have the ability to overcome by this risk through to final successive of the project. This Financial risk factor includes issues related or concerned with the financing of the whole project, including the execution period and operations or equity financing.

MANAGEMENT RISK

- Short Tendering Time
- Failure to construct as scheduled or planned
- Decision made by Senior management people
- Poor team work
- Improper project feasibility study
- Inadequate choice of project partner
- Poor relation and disputes with partner
- Poor communication with clients
- Project priorities regarding by customer
- Poor relation with government departments
- Internal Management

MARKET RISK

- Increase of Labour wages
- Unanticipated changes in GDP growth, Interest rate
- Increase of Material price
- Competition from other firms
- Sudden price increase in materials

- Market conditions
- Increase of Equipment accessories price
- Inadequate defined market
- Tendering problem
- Failure to identify changing needs
- Fail to identify some newly products by competitors

SOCIAL RISK

- Labour Strike
- Labour Discipline
- Unfair support from local people
- Labour walkouts due to certain reason
- Government Regulations in safety or Labour laws

NATURAL RISK

- Impact due to wind
- Impact due to Land slide
- Adverse effect due to fire
- Effect due to other calamities
- Effects due to earthquake

LEGAL RISK

- Improper verification of contract documents
- Lack of knowledge of arbitration
- Uncertainty and unfairness of court justice

PHYSICAL RISK

- Subsurface soil condition
- Ground water condition
- Topography condition

VI. RISK ANALYSIS AND MANAGEMENT

Risk is a multi-facet concept. In the context of construction industry, it could be the likelihood of the occurrence of a definite event/factor or combination of events/factors which occur during the whole process of construction to the detriment of the project a lack of predictability about structure outcome or consequences in a decision or planning situation, the uncertainty associated with estimates of outcomes – there is a chance that results could be better than expected as well as worse than expected etc.

In addition to the different definitions of risk, there are various ways for categorizing risk for different purposes too.

Some categorize risks in construction projects broadly into external risks and internal risks while others classify risk in more detailed categories of political risk, financial risk, market risk, intellectual property risk, social risk, safety risk, etc.

Risk is inherent and difficult to deal with, and this requires a proper management framework both of theoretical and practical meanings Risk management is a formal and orderly process of systematically identifying, analyzing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and/or control.

Significant improvement to construction project management performance may be achieved from adopting the process of risk management.

VII. DETERMINATION OF RISK

There are mainly two methods to determine risk, namely the quantitative and the qualitative approach. The quantitative approach relies on statistical calculation to determine risk, its probability of occurrence, and its impact on a project.

A common example of the quantitative approach is decision tree analysis, applying probabilities to two or more outcomes. Another approach is the Monte Carlo simulation, which generates a value from a probability distribution and other factors.

The qualitative approach relies on judgments, using criteria to determine outcome. A common qualitative approach is a precedence diagramming method, which uses ordinal numbers to determine priorities and outcomes.

An example of a qualitative approach is to list in descending order specific processes of a project, the risk or risks associated with each process, and the control or controls that may or should exist risk.

VIII. RISK FACTORS CALCULATION

The Risk Factor can be calculated by using the following formula,

$$\text{Risk Factor} = (P+D) - (P*D)$$

P= Likelihood of Occurrence (Values assigned between 0 to 1)

D= Values of Impact (Values assigned between 0 to 1)

ANALYSIS OF RESULTS

The Questionnaire survey conducted and data Gathered, analysis is done by Qualitative analysis. The top 10 Risk is Tabulated below.

Table 1. Risk Based upon the High Risk Factor

S.NO	RISK	RISK FACTOR
1	Shortage of Materials	0.98
2	Increase of Material price	0.85
3	Competition from other firms	0.80
4	Water supply Problems	0.76
5	Increase of Labour Wages	0.71
6	Project delay due to various Reasons	0.68
7	Failure to construct as scheduled or planned	0.60
8	Non-Availability of Labours	0.58
9	Chages in Drawing	0.46
10	Conflict between Contractors and Firm.	0.42
11	Effect due to other natural calamities	0.39

Based upon the upon survey it indicated that the high risk factors may affect the construction related tasks.

The Risks like, Material shortage, Material Price increase comes under the Technical Risk, competitions from other firm of Market risk had of high major risks. The most number of risks are subjective and they are related to contract. These types of Risks are deal depend of the past experiences.

IX. CONCLUSION

Risk Assessment is the technique introduced in the construction industries. The Assessment of Risk specifies ways to identify the major project risks, it helps to create a risk profile for the identified risks, In this project Shortage of materials, Increase of material price is the major risks, the Effect of natural calamities is the minor risk. The Water supply risk also a important Risk factor according to the Salem Region construction industries This project helps the contractors or builders for better identifying the various risks and associated outcomes.

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