DISSERTATION FULL SAMPLE 5

TITLE: TO BENCHMARK THE CURRENT PRACTICES OF RISK MANAGEMENT IN CONSTRUCTION INDUSTRY IN USA AND EVALUATE WHICH OF THESE PRACTICES CAN BE USED IN INDIA.

SUBJECT: RISK MANAGEMENT | BUSINESS AND MANGEMENT

TYPE OF WORK: DISSERTATION FULL

FILE NAME: GR59_RISK MANAGEMENT_FULL DISSERTATION

To benchmark the current practices of risk management in construction industry in USA and evaluate which of these practices can be used in India.

Introduction

Risk Management in Construction industry is a key management process to achieve the objective of project completion meeting all the essential requirements in terms of cost, time, quality, safety and environmental sustainability. Risk can be defined in different ways. Risk can be defined as an uncertain event or condition. It is state of uncertainty where some of the possibilities involve a loss, catastrophe, or other undesirable outcome. According to Barrie, D et al 1992 and Healy J.R, 1982 risk can be expressed as an exposure to economic gain or loss arising from involvement in the construction process.

Risk as a probability of occurrence of some unpredictable, uncertain or undesirable events that will change the prospects for the profitability on a given investment (Salihudi et al, 2009). Risk is something rather nebulous that, if it happens, will be undesirable. Project risk can be defined as an uncertain event or condition that, if it occurs, has a positive or a negative effect on at least one project objective. A risk may have one or more causes and, if it occurs, it may have one or more impacts (Boothroyd, C et al 1998, Bufaied, A.S., 1987).Risk can be measured as a set of possibilities each with quantified probabilities and quantified losses. Salihudi.H et al,

2009 summarizes risk as: Failure to keep within cost projected, failure to achieve within the desired date and failure to achieve the desired quality and operational requirements.

Risk management is a systematic approach in identifying and treating the risks. According to Uher, 2003, risk management is a tool that helps in identifying sources of risks and uncertainty, assessing the impact and developing appropriate management responses. According to a research carried out by Dr.Patrik etal , there are six major construction risks that are associated with the construction industries. Out of which four are environmental related risks and two are related to safety. The six risks mentioned by Dr.Patrik and team are: Low management competency of subcontractors, high performance or quality expectations, unavailability of sufficient and skilled labor, unavailability of sufficient managers and professionals, inadequate program scheduling ad noise pollution caused by construction. The survey also categorized the risks into various categories.

Risks related to clients are a risk category which comprises of the risks like tight schedule, variations in expectations as well as high expectations and incomplete approvals. Risks related to designers include frequent design changes, inadequate scheduling, inaccurate estimate and insufficient information. Further there is a category of risks related to the contactors. This category includes unsuitable construction planning, variation in planning, lack of coordination, unavailability if skilled labor and disputes. The risks related to subcontractors were identified as low management competency. Excessive approval procedures in government administrative departments are also identified as risk in construction industry. Along with the mentioned risks price inflation of construction materials is also considered as a key risk in construction.

Background of the study

According to Raz & Michel 2001, risk management in projects is one of the key in project management. Management of the construction risk depends on the objectives of the construction project. According to Barrie, D 1992 risk management involves systematic identification of risk, analyzing and assessing the same, which will help significantly in success of the project. But analyzing various risks will consume more time and hence may delay the managerial strategy. The primary objective should be in identifying the vital, critical risk in the project (Salihudin H et al, 2009). As a result only that factor can be analyzed further and determined. The risk management process is jointly done by the project manager, project sponsor, and project team members. The process helps them to develop a written plan that helps in identifying, assessing and quantifying a response to monitor and control project risks. Management of risk should be integrated at strategic, programmed and operational levels. As a result the activity of each level will support the process of risk management (Mary, 2004).

The process of risk management in six steps-Risk management planning, Risk identification, Qualitative Risk analysis, Quantitative Risk analysis, Risk response planning, Risk monitoring and control (Saynisch 2005). Similar studies done on project risk management process have also used the above applications in evaluating risks. (Boehm 1991, Chapman 1997,Cooper & et al 2005, NASA 1995, Patterson & Neailey, 2002, Tummala & Leung 1996, Zhi 1995). Lyons and Skitmore 2004, Raz and Michael 2001 and Simister 1994 proposed the following common methodologies.

Aim and objectives of the study

To identify the benchmark practices of risk management of USA and its feasibility of application by Indian construction Indian companies

Research Objectives:

- To identify the different practices of risk management used in construction industry in USA
- To evaluate the best practices in risk management in USA
- To identify the utility of these practices in India
- To assess the impact of risk management practices on cost reduction in construction business.

Research Question:

Whether the benchmark practices of risk management of USA could be utilised by Indian construction companies to save upon cost of projects?

Research design:

The research will be using exploratory approach to meet the aim of the research. The research will be using both primary data and secondary data. The emphasis will be on secondary data as this study would involve two different nations. It is not possible for me to cover both the nations, because of time and money constraint; therefore I will rely on secondary data more than primary data. I am doing the research on Risk management practices used in USA and then benchmarking them for use in India because Risk Management is being used in USA from a long time now. USA has expertise in Risk Management practices as they are using it from decades now.

The secondary data will be collected from academic journals and books on the subject area. I will use online resources to identify the relevant research articles conducted on 'Risk Management'; 'Risk management in construction business'; Risk management in construction business in USA'; and, 'Risk management in construction business in India'. Other than the research articles I will also be taking help of the books on this subject to build the theoretical background of the research.

To identify the best practices in risk management in USA, I will use the statistical records of the risk management practices used in USA and see which is the most commonly used risk management policy. I will be doing the same for India as well and then compare the results. After that I will decide which of the risk management practices can be used in India based on the surveys, questionnaires, interviews and other sources of primary and secondary data.

The primary data will be collected to fill the gaps of secondary data. The primary data will be collected using unstructured interviews, questionnaires, surveys of the 'Key informants' in construction business in two countries. The data collected for USA will be used to prepare the benchmarks and these benchmark risk management practices will then be used for Indian construction companies. After that I will assess the impact of these risk management practices on cost reduction by doing a case study.

1.1. Definitions and Terms used in the Study

Client – 'a part that carries out or assigns others to carry out construction, demolition or land Work' (PBL 1987).

Contract – 'a mutually binding agreement that obligates the seller to provide the specified product and obligates the buyer to pay for it' (PMI 2000).

Contractor – 'a performing organisation whose employees are most directly involved in

doing the work on the project' (PMI 2000).

Design-bid-build – 'a traditional procurement option where the client contracts separately with a designer and a constructor' (Ling and Kerch 2004).

Design-build – 'a procurement option where the contractor is responsible for construction and the full design' (Harris et al. 2006).

Effective risk management – 'doing the right things in a way to ensure that the project is risk efficient and project objectives are achieved' (Chapman and Ward 2003).

Opportunity – 'a source of upside risk' (Chapman and Ward 2002).

Partnering – 'a structured management approach to facilitate teamworking across contractual Boundaries' (Smith et al. 2006).

Project – 'a unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constrains of time, cost and resources' (IEC 2001).

Project life cycle – 'a collection of generally sequential project phases whose name and number are determined by the control needs of the organisation or organisations involved in the project '(PMI 2000).

Project phases – 'parts of the project that are marked by completion of one or more deliverables' (PMI 2000).

Project risk – 'an uncertain event or condition that, if occurs, has a positive or a negative effect on a project objective' (PMI 2000).

Risk – 'an implication of significant uncertainty, which may be upside and downside (Chapman and Ward 2002)'.

Risk management – 'a systematic process of identifying, analysing and responding to project risks' (PMI 2000).

Risk identification – 'Determining which risks might affect the project and documenting their characteristics' (PMI 2000).

Risk assessment – 'Assessing the impact and likelihood of identified risks' (PMI 2000).

Risk response – 'a process of selection and implementation of measures to modify risk' (IEC 2001).

Uncertainty – a lack of confidence, linking unpredictability and vagueness (Chapman and Ward 2002).

1.2.Assumptions and Limitations of the study

Several assumptions and limitations are relevant to the present study. First, generalizability of data is limited as the data collected for the study was qualitative in nature. In addition to support the findings case study analysis was used. There are also possible factors that are researchers outside the control such as setting, time of day, recent conflicts, and participants fatigue (Shell, 2001). In evaluating and conducting scholarly a final limitation is based upon the researcher's lack of experience in conducting scholarly research and evaluating the data.

1.8. Outline of Chapters

Chapter 1 Introduction, background and significance of the study along with the aim and objectives of the study are highlighted.
Chapter 2 Literature review related to Construction industry of different countries are highlighted and in particular reference to US construction industry.
Chapter 3 Research methodology where it identified the proper research design, approach and data collection methods.
Chapter 4 explain the research findings through secondary data sources where it collate, synthesize and concise the factors that success the construction industry in US and their feasibility of applying in to Indian construction industry
Chapter 5 concludes this research paper with synthesize the findings along with the future recommendation and implications

1.3. Conclusion

The present chapter highlights about the introduction to the problem, background of the study, rationale, with aim and objective of the study in order to address the benchmarks of US construction industry and its application in Indian construction industry.

Chapter II

Literature Review

1. Introduction

Risk management practices improve working conditions and positively influence employee's attitudes and behaviour with regard to risks and reduce accidents in workplace.

2. Risk and Risk Management

Risk can be defined in different ways. Risk can be defined as an uncertain event or condition. It is state of uncertainty where some of the possibilities involve a loss, catastrophe, or other undesirable outcome. According to Barrie, D et al 1992 and Healy J.R, 1982 risk can be expressed as an exposure to economic gain or loss arising from involvement in the construction process. Salihudi. H et al, 2009 expresses risk as a probability of occurrence of some unpredictable, uncertain or undesirable events that will change the prospects for the profitability on a given investment. Risk is something rather nebulous that, if it happens, will be undesirable. Project risk can be defined as an uncertain event or condition that, if it occurs, has a positive or a negative effect on at least one project objective. A risk may have one or more causes and, if it occurs, it may have one or more impacts (Boothroyd, C et al 1998, Bufaied, A.S., 1987).Risk can be measured as a set of possibilities each with quantified probabilities and quantified losses. Salihudi.H et al, 2009 summarizes risk as:

- Failure to keep within cost projected
- Failure to achieve within the desired date
- Failure to achieve the desired quality and operational requirements

3. Global Risk management techniques

According to Raz & Michel 2001, risk management in projects is one of the key in project management. Management of the construction risk depends on the objectives of the construction project. According to Barrie, D 1992 risk management involves systematic identification of risk, analyzing and assessing the same, which will help significantly in success

of the project. But analyzing various risks will consume more time and hence may delay the managerial strategy. Salihudin H et al, 2009 says the primary objective should be in identifying the vital, critical risk in the project. As a result only that factor can be analyzed further and determined. The risk management process is jointly done by the project manager, project sponsor, and project team members. The process helps them to develop a written plan that helps in identifying, assessing and quantifying a response to monitor and control project risks. According to Mary. K 2004, management of risk should be integrated at strategic, programmed and operational levels. As a result the activity of each level will support the process of risk management.

Saynisch 2005, describes process of risk management in six steps-Risk management planning, Risk identification, Qualitative Risk analysis, Quantitative Risk analysis, Risk response planning, Risk monitoring and control. Similar studies done on project risk management process have also used the above applications in evaluating risks. (Boehm 1991, Chapman 1997,Cooper & et al 2005, NASA 1995, Patterson & Neailey, 2002, Tummala & Leung 1996, Zhi 1995). Lyons and Skitmore 2004, Raz and Michael 2001 and Simister 1994 proposed the following common methodologies.

Risk Management planning

Planning of risk management is the key to successful completion of the other risk management steps. It is the process of deciding how to approach and conduct the risk management activities for project. This process is done early during the planning of the project.

Risk identification

Identification of risk in the project is the main challenge in the risk management process. The existence of risk condition in the process or events is usually identified by the project manager or team members but the actual risk identification is not always easy. According to Joseph W project risk therefore should be identified in terms of schedule, budget, quality or mission accomplishment. Further the risk also categorized based on the human and natural risk. The cultural subcategories, social, technical, managerial, health, legal, financial, economic, political are the categories that comes under Human risks. In the Natural risks these deals with weather condition such as flood, typhoon, hurricane and geological systems such as earth quake, geotechnical issues, volcanic eruption. The following are the brief description of each of the following.

Political risk is defined as foreign government interference with the normal conduct of business [Ashley & Bonner, 1987]. It includes war, civil disorder and industrial relations actions that affect the progress of the project. Wang et al. [1999] identified political risks to include expropriation, force majeure, delay in approvals, corruption and change in law. Social risks relate to criminal acts, civil torts and substance abuse. Economic risks are those that relate to materials supply, labour supply, equipment availability, inflations, tariffs, fiscal policies and exchange rates. While it is possible to mitigate exchange rate and convertibility risk by having dual currency contracts and hedging tools, these were found to be in effective in China [2000]. Financial risks are risks relating to interest rates, credit ratings, capital supply, cash flows and rentals. Local entities_ reliability risk arises because projects involve local partners such as

contractors, customers, suppliers and the success of these projects depends on their reliability and creditworthiness [Wang et al., 2000]. Tendering models to reflect the economic climate surrounding a project had been designed to help mitigate this risk [Neufville et al, 1977]. Legal risks are associated with contract clauses, regulations and codes, and the risk allocation is through contractual aspect of building procurement. This risk differs from country to country and contract incentives in response to this risk have been developed [Levitt et al 1980]. In some countries such as Taiwan, risks are primarily allocated by contract clauses [Wang et al 2003]. If the firm has the ability to undertake the project, but project conditions are risky, negotiations and the development of strategic terms of a contract should be undertaken carefully [Han & Diekmann, 2001]. Managerial risks relate to productivity, quality assurance, cost control and human resource management. Kangari [Wang & Chou, 2003] found that the most important risks in construction projects are those relating to safety, quality of work, defects, productivity and competence. One managementrisk that frequently arises in international construction is inadequate choice of project partner to joint ventures [Shen et al, 2001]. Technical risks include design failure, equipment and systems failure, estimation error, collision andaccidents. Other risks in this category are site location and access, and new technology failure. For local-foreign joint ventures, a technical risk that can arise is the partners_ different practices and working procedures [Shen et al, 2001]. Cultural risks arise because of differences in religion, culture and custom. In general, Europeans have a culture that is confrontational, have less respect for hierarchy, will point out the negative and if there is no agreement, will resort to arguments [Swierczek, 1994]. On the other hand, Asians, in general, avoid conflict and negative aspects wherever possible, and have respect for seniority and hierarchy [Swierczek, 1994].

According to Boothroyd C and Emmett J 1998, identification of risks in the project is coupled with maintaining a project risk register. The risks that may come up during the execution of the projects are documented. These are subsequently altered with the results from qualitative risk analysis and risk response planning. This process is assessed and revised throughout the project because new risks may be identified during the progress of the project. The frequency of assessment and revision may vary from case to case. It is also important to specify the impact of a particular risk factor on the objective of the project.

Qualitative Risk Analysis

The important and key risk factors identified in the above steps are prioritized according to the probability of occurrence, impact on project objective, time frame, project cost, and quality. The management of the organization and project sponsor is involved in this step. They analyze the impact of a particular risk factor and asses them as low, moderate, high, or very high priority. The results obtained during the qualitative analysis indicate the requirement of more or less risk management plans further during the project.

Quantitative Risk Analysis

It is the numeric means of calculating the probability that a project will end in time and does not exceed its cost. The analysis is done by examining impact of all the quantified risks which are identified in the previous step. This step uses statistical techniques which include special softwares. The results are expressed in terms of probability distribution. The quantitative analysis gives an in depth risk analysis based on the cost and complexity of the

project. It also indicates the progress of the project is in the schedule or not. Molak 1997 and NASA 1995 used fault tree and event tree analysis in analyzing technical risk as a part of quantitative risk analysis. Han and Diekmann disagree with the above methods. He states that a statistical approach requires time for collecting data, and decision tree has complexity with respect to variables. As a result cross impact analysis was used in construction projects.

Risk Response Planning

It involves development of action plans to increase opportunities and decrease threat to the project objectives. It centers on high risk factors which were identified and analyzed during the previous steps. Here, each team is given a responsibility for each risk response. The responses are implemented and monitored by the respective team owner. Depending on the impact of risk many strategies are designed and adopted during the progress of the project.

1. Active acceptance- where in a contingency reserve is set up.
2. Passive acceptance- where in it requires no action leaving the team to deal with the threats as they occur.

Risk Monitoring and Control

This step helps in keeping track of the identified risks along with residual risks and new risks. It ensures that the planned strategy is executed and evaluated effectively. During the execution of the project new risks may appear and expected risk may disappear. So it is important to

review the risk register regularly and new risks are discussed and analyzed properly. Thus risk control includes suitably modifying response strategies, taking decisive actions, placement of a contingency plan, re structuring the project accordingly.

4. Risk Management techniques in construction industry

There is a risk factor involved in every effort undertaken by humans; our ability to deal with risk determines whether we succeed or fail in our venture (Dey, 2009). Projects related to engineering and science involves heavy risk. Even so, it has only been realized recently that it is imperative to underline the project's risk factors, evaluate their impact in the different spheres, and to monitor them through a specified framework for risk management, particularly in case of projects related to defence, oil and petroleum industries and construction.

The construction and engineering industry have been infamous for poor risk management, considering that most important projects fail to comply with the time schedules, cost estimates and the overall specifications. Intense competition and varying customers' requirements require that new projects be developed within shorter durations (Adams, 2008).

In general, construction projects can be of 3 types: Building construction, Heavy/civil construction, and Industrial construction. Each of them requires unique team to plan, design, construct and maintain project. According to Barrie D. and Paulson B 1992, constructions industry is one of the most dynamic, risky, challenging fields. It has a number of uncertainties and is involved with a high degree of risk due to nature of construction business activities, processes, environment and organization. Salihudi H 2009, opines that the major contributors to

risk in construction industry are complexities of project, location, type of contract, familiarity with the work and breakdown in communication. Risks in construction projects can be classified based on

1. Socioeconomic factors which may include – environmental protection, Public safety regulation, economic instability, exchange rate fluctuation
2. Organizational relationships which may include- contractual relations, attitudes of participant, communication
3. Technological problems which may include- design assumptions, site conditions, construction procedures, construction occupational safety.

`Many studies have shown that risk in the construction process is one of the factors which affect the bidding decision. The factors which affect contractors pricing for risks in the tendering stage have been studied.

Edwin H.W.C and Maria C.Y.A 2009 studied various factors that influence contractors risk behavior in bidding process and enhancing cost effectiveness of risk related action. Dozzi et al 1996 opined that contractor's decision to bid is affected by many variables. These factors are categorized into environmental factors, company factors, and project factors. According to Akintoye 2000 other factors such as project environment, quality, cost etc may also influence the performance of the project.

In fact, according to Dey and Ogunlana (2004), all construction projects are beset with uncertainty and risk, regardless of the project size. However, size itself is one of the major risk factors, others being the nature of the project, pace of construction, product location, technology

employed and expertise in the work. Mills (2001) has highlighted the risks in project management practices in case of European Aerospace plc. Tang et al. (2007) advocate preparing a pragmatic blueprint for determining the problems and ensuring corrective responses. Dey (2009) has taken the case of fast track projects to highlight the risk management systems.

The incidence of uncertainty and risk is much higher in construction industry as compared to any industry (Mattar and Cheah, 2006). Liu et al. (2009) opined that the construction projects, particularly the large projects, are long drawn out and intricate, and this is true for their usage. The development of these products involves using the experience and the talents of the various categories of people and different concepts. Coordinating the ideas and interests of such a large number of people causes a severe impediment in the achievement of the project objectives. External and other uncontrollable factors like weather and other natural phenomenon complicate the situation further (Choi and Mahadevan, 2008).

Clearly, risk management forms a crucial aspect of managing a construction project. In fact, management of construction projects requires extensive process of deciding over the various aspects of risk (Dey, 2009). Literature is teeming with various systems of risk management, including the system of identifying risks, analysis of risks, spontaneous response mechanism, and regular monitoring of various aspects of risk. All these considerations ultimately serve to enhance the value addition to the project, and improve the performance of the construction industry. Consequently, the subject of risk management in the construction industry has become the focus of many a research (Cano and Cruz, 2002).

Dey and Ogunlana (2004), highlighted the various uncontrollable sources of risks which a contractor is likely to face and these include estimator-specific factors/ design and project-

specific factors/ subcontractor-generated risk factors/ client related factors/ unknown geological conditions/ economic and political risk factors/ contract-specific factors. These factors require attention from different participating members who are interested in the completion of the project, and their collective expectations, values and beliefs of these distinct groups of participants will ultimately influence the nature of the system of risk management in the context of the product (Liu et al., 2007). Undoubtedly, there is going to be disparity in the behavioural patterns and aspirations of each of these groups. The contractors are ultimately working for profits; however, the objectives of the clients with respect to the project have to integrate the cost, time and quality aspects, which would ultimately be the integral part of their corporate objectives. Rahman and Kumaraswamy (2002) conducted the survey which discovered that there was complete polarity in the perspectives of the different participants regarding risk allocation. Ökmen and Öztaş (2008) agreed with the view and added that there is wide schism in the views regarding the acceptance of risk by the project participants.

Dey and Ogunlana (2004) believed that the lack of synchronization between the interests of the clients and contractors in the traditional approach to addressing the risk factors in a project has led to a challenging situation which has had an ultimately adverse impact on the overall efficiency and productivity.

Dey (2009) highlighted that technical deficiencies leading to the failure of the project could be caused by the divergent views of the project's participating members. Cano and Cruz (2002) also underscored the fact that although the objectives of the contractors and the clients are bound to be diverse, the biggest cause for concern arises from the confrontations arising as a result of the contract related to the project. To ensure that the project does not suffer from the lack of

synchronization between the participants, researchers advocate adopting strategies like partnerships, alliances, and contractual relationships cooperative principles to ensure alignment of the objectives.

The trends in the construction industry as observed Rahman and Kumaraswamy (2004) indicate that the participants are increasingly addressing the issue of risk management jointly by implementing the principles of partnering. Tang et al. (2007) also found that partnering has gained considerable attention for the purpose of risk management, indicating that teaming up of the participants enables them to utilize comprehensive information through the system of transparent communication, which enables clarity in decisions, whereby it is possible to optimally utilize all the opportunities to address all possible risks associated with the projects. Clearly, management of risks is an important aspect of decision-making. The quality of the decision is, however, influenced by the effectiveness of information acquired by the participants. Therefore, information remains the most important aspect of identifying and analyzing risk.

Global project management institutes recommend risk management as one of the integral part of project management (Simon et al 1997, IPMA 1998, PMI 2000, AEIPRO 2001 cited in Del Cano A and De la Cruz M.P, 2002). A number of risk management process has been written by various authors (Al-Bahar and Crandall 1990, the U.K.Ministry of Defense MoD-PE-DPP 1991, del Can o 1992, Wideman 1992, BSI 1999, NASA Rosenberg et al. 1999, the U.S. Department of Defense DSMC 2000, and the U.S. Department of Transportation DOT 2000 cited in Del Cano A and De la Cruz M.P, 2002). PRAM (Simon et al. 1997, Chapman and Ward 1997) RAMP (ICE et al. 1998) and PMBoK-2000 (Project 2000) are some of the recent, broadly

covered project risk management strategies. The RAMP process has been specially designed for the construction environment.

Del Cano A and De la Cruz M.P , 2002 developed an integrated method PUMA (Project Uncertainty Management) for construction projects based on the structure of earlier methods of RAMP, PUMA and PMBoK-2000. The method includes a generic project risk management process which can be customized according to the individual needs of each organization or each project. The projects are classified according to the relative size, complexity and organization risk maturity level. The method emphasizes that a strict project risk management process should be followed with flexible strategies according to the organization circumstances.

Sachs et al 2008 developed a method to connect gap between qualitative and quantitative risk assessment method. This method QQIR quantifying qualitative information on risk involves fuzzy set theory and derives customized probability density functions for stochastic application in risk assessment and financial modeling.

Sachs et al 2008 used the QQIR method as a tool for quantifying perception on risk. The method was successfully validated and used to study the impact of political risk in infrastructure projects in Asia.

5. Construction industry in India

Construction industry in India is a major contributor in growth of economy. It accounts for 15% of nations GDP Gross domestic product grew at 5.2% in 2001 and 4.6% in 2002. GDP is predicted to grow 6.2% p.a in 2002-2006 (WHO, 2004 cited in Florence Yean Y. L, Linda H, 2006). In the past few years a large number of construction projects have come up due to a

relatively lower capital cost. Many foreign architectural, engineering and construction firms are expanding and investing in Indian market (Florence Yean Y. L, Linda H, 2006). A policy of the Government of India favors foreign investment. Foreign direct investment is allowed for developing townships, commercial establishments, can participate in build operate transfer projects (GOI, 2003 Cited in Florence Yean Y. L, Linda H, 2006).

Florence Yean Y. L, Linda H, 2006 studied some of the risks and risk response techniques foreign firms may adopt when working in India. According to Indian Infrastructure 1999, participation of private sectors in financing construction projects are low. This is due to high commercial risk, poor risk management, and inefficient dispute resolution mechanism. Although project management practices have improved, the construction industry still suffers from ill defined design, contractor issues and mismanaged vendors. Construction companies therefore should have an independent risk management team or should give importance to the objectives of risk management.

1. Conclusion:

Based on the literature review it is observed that most of the advanced countries use a systematic and structured approach in identification and assessment of the risks involved. The review reveals that quantification of the risk to an affordable extent is the key to have an effective risk management approach. The literature review also observed that there is no stringent focus on the risk assessment and management in India. The Statistical cost control techniques are found to be more promising in terms of cost and risk management projects. Systematic step by step approach in risk management is the primary approach to be adopted by the construction industry in India. Focus to be given on risk quantification and management.

Chapter III

RESEARCH METHODOLOGY

3.0. INTRODUCTION

An overview of the implementation of research design to analyze the impact of risk management in construction is dealt with in this chapter. The research process adopted is initially discussed followed by the details of the collection of data and the methods used for the analysis of the data. The methods and approaches selected are also justified in this chapter. Apart from these topics, all concerns associated with ethical issues, validity, triangulation, reliability and limitations are included (Flick, 2002). The definition of pure research methodology as given by Silverman (as cited in Hussey & Hussey, 1997) is "Methodologies refer to the overall approach to the research process, from the theoretical underpinning to the collection and analysis of data. Like theories, methodologies cannot be true or false, only more or less useful".

3.1. RESEARCH PROCESS

The existing literature on this topic has been used to frame the research questions for this study. Justification of the approaches used was required to provide solutions to the research questions framed. The research process used in this study is based on the research model developed by Saunders et al (2003, p.83) i.e. the 'the research onion'. The methods used for data collection, strategies adopted, paradigms, time frame, procedures, philosophies and the

available choices of the researcher are depicted in the figure 1.The issues effecting the choice of the data collection methods is also depicted. (Saunders et al 2000, p.84).

At the onset, the study was based on the model 'the research onion' developed by Saunder et al (2007). This model offers guidance and solutions to the research questions and helps in the development of an appropriate research philosophy. Justification for selection of elements in each layer and its role in the achievement of research objectives was given using the 'onion' method.

The researcher adopted the following aspects as being represented by the layers of the 'onion' model.

1. Philosophy of research
2. Approach of the adopted research
3. Methodology/strategy of the research
4. Time Horizons or time lines
5. Methods used for data collection

3.1.1 RESEARCH PHILOSOPHY

The outer layer of 'onion' model by Saunders et al (2007) is represented by research philosophy. Research paradigm as defined by Lincoln and Guba (1985) *"Paradigms represent what we think about the world (but cannot prove). Our actions in the world, including the actions we take as inquirers, cannot occur without reference to those paradigms" 'As we think, so do we act"*. Methodological, epistemological and ontological

are the different approaches in research that help the researcher and are determined by the research paradigm. This was suggested by Guba & Lincoln (1994).

According to Saunders et al (2004, p.84), the research philosophy depends on the way you think about the knowledge development. The present thesis adopts 'Constructionist' as its epistemological perspective which is observed to be unswerving with the nature of research and its objectives (Crotty, 1998). Crotty's view about the Constructionist (p.42), '*All knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their workd, and developed and transmitted within an essentially social context".* The main aim of this thesis is to study the risk management techniques in the construction industry using secondary data analysis.

RESEARCH APPROACH

The explicit use of the theory within the research design is indicated by the research approach (Saunders, *et al*., 2000). The research approach is described by Mason (2002,) as "deciding what theory does for your arguments". This helps the researcher in the following ways

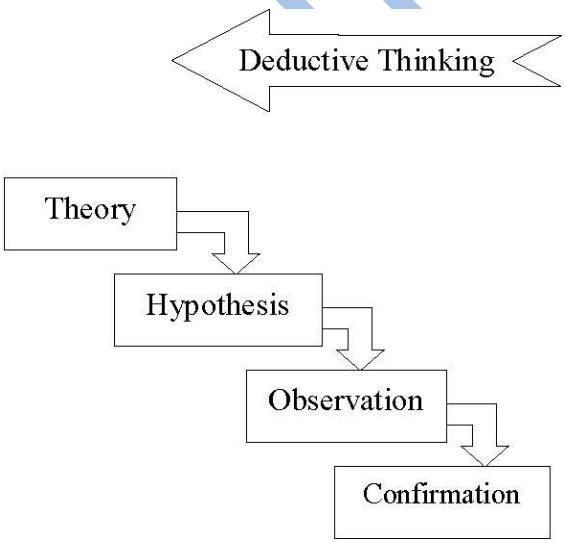
1. Improved decision making on the design of the research.
2. Provides the knowledge of the advantages and disadvantages of decision making process.
3. The research design is modified to take the constraints also into consideration. Example formation of a hypothesis with insufficient data and knowledge. (Saunders *et al*, 2008).

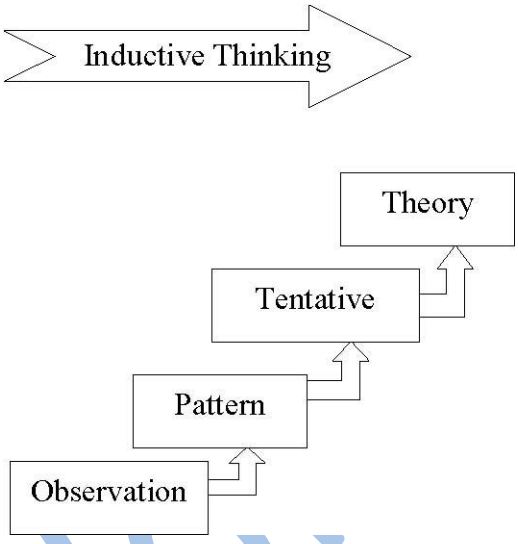
INDUCTIVE AND DEDUCTIVE APPROACH

In the first instance, the inductive approach towards research provides an in depth view of the subjects with a human perspective according to Saunders *et al* (2000). Then the analysis of the research context can be examined minutely. Collection of data related to qualitative aspects is also required. Apart from these, as the research progresses the flexibility of the structure in this approach allows for modifications of the research emphasis to be incorporated. The concern for generalization is reduced with the comprehension that research is a part of the research process. The deductive approach is defined by Marcoulides (1998) as a "testing of theories". Initially the researcher begins with a set of theories in mind based on which the hypotheses are formed. Later the hypotheses are tested by the researcher.

Marcoulides (1998) defines the deductive approach as a testing of theories. The researcher begins with a set of theories in mind and forms the hypotheses on their basis. After that, the research tests the hypotheses.

Figure 2: Deductive Versus Inductive Approach





Source: Adapted from Trochim (2001)

The difference between the deductive and the inductive approaches is shown in the figure. The main difference is that the deductive reasoning moves from generic to specific i.e. it follows a top-down approach and in the other a bottom-up approach is followed which moves from specific to generic. The inductive approach is followed in this study for two reasons. The first reason is that there are so many risk management literatures, and researcher wanted to study particularly on the USA approach of risk management and apply to the Indian context. Due to time constraint, researcher used already published sources to test the research objectives.

3.1.2.2. QUALITATIVE AND QUANTITATIVE RESEARCH DESIGN

The research strategy as described by Saunders et al. (2000) is a generic plan that helps researcher to arrive at solutions to the problems specific to the research. Different types of research strategies can be followed in a research. A general proposal given by the researcher to

arrive at solutions to the research problems and the questions set constitutes a research strategy (Saunders *et al*, 2000). To get a better understanding of the reasons in conducting this research which is to determine the risk management techniques in banking sector and for a broader perspective and in depth knowledge about the project, in the first phase exploratory research strategy was adopted.

Qualitative and quantitative methodologies are the most commonly used research strategies. Behaviour, opinion and knowledge forms the basis of the Qualitative approach and quantitative study explores the statistics with the data collected. Both qualitative and quantitative approaches were used in the present research. To obtain reliability and for the general reusability of the results of the research to other situations, quantitative tools derived from physical sciences are used for the analysis of the data. This was suggested by Creswell (2003, as cited in Plack, 2005). The definition of qualitative case study in terms of its end product was given by Merriam (1998). It stated that "A qualitative case study is an intensive holistic description and analysis of a single instance, phenomenon, or social, unit".

As analysis of the textual data was required in the present study, the choice of the researcher was qualitative approach (Guba & Lincoln, 1994 as cited in Plack, 2005) in order to get the fact that it provides a thorough and complete picture of a phenomenon as explained by Creswell (2003).

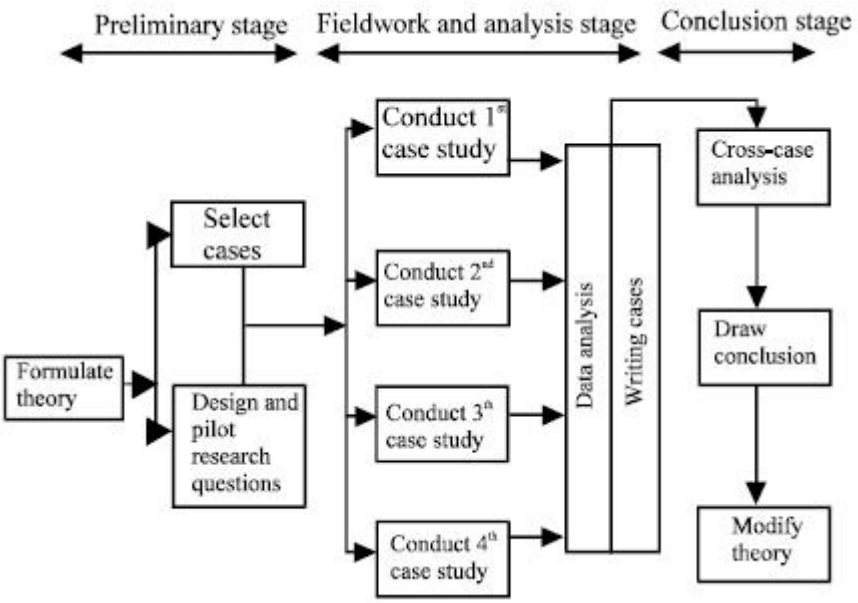
Research technique

3.1.4.1. Case study analysis

According to the research problem, the method of undertaking the research study would vary. Morgan and Smircich (1980; As cited in Noor 2008) are of the opinion that it is on the type of the social phenomenon being studied, the suitability of the method of research is derived. A case study approach was used to study the risk management in construction industry.

3.1.4.2. Case studies

Yin (1989; as cited in Noor, 2008) suggests that a case is defined as "an event, an entity, an individual or even a unit of analysis". A case study is also defined as an "empirical inquiry that investigates a contemporary phenomenon within its real life context using multiple sources of evidence" (Anderson, 1993, p.152). The reasoning such as 'why' and 'how the events happen are all' and 'what actually occurred could be perceived' are all concerned to the case studies. 'The case study does not deal with the organization as a whole. But the study pays attention to a specific issue, attribute or a unit of analysis. Hence in this study in order to gain insight about the various problems of watching television among children, case study method was chosen. The intricacies of these real life activities could be perceived by means of the evidence gained from multiple sources'. According to the opinion of Patton (1987; as cited in Noor, 2008), case study is an appropriate method to gain deeper insight into the problem under investigation. Case studies are particularly important and useful in cases which are rich in information and help to gain an in-depth view.



Steps involved in a case study (Adopted from Noor, 2008, p.1603)

3.1.3 TIME FRAMES

Time-frames are of two types the longitudinal and the cross-sectional. Data over a long period of time is examined by the longitudinal time frame. Data would be collected at any given moment of time in the case of cross sectional frame. The time frame is longer in longitudinal when compared to cross sectional study. Due to time constraint the researcher limited his research to cross-sectional time frame and collected and analyzed data at a single point of time.

Collection of data from more than one situation at any given point of time is involved in the design of cross sectional time frame. For the analysis of the data from the sample taken to represent the population, of all observational or descriptive epidemiology the simplest one is the cross sectional time frame. The advantages associated with cross sectional time frame e.g. economical and quickest means of study has prompted the researcher to select it.

Data collection methods

PRIMARY DATA

Responses got through the direct interaction with the people constitute this type of data. The feelings, attitudes, choices, preferences and the personal experiences of the people who form a part of the sample are collected as primary data. Conduction of interviews and surveys, laboratory measurements, field observations etc are some of the means by which the primary data is accumulated. The present research do not makes use of survey method to obtain the information about the risk management.

3.1.4.3 SECONDARY DATA ANALYSIS

Desk-based research is used to collect the secondary data. In the present study researcher used secondary analysis in order to test the hypothesis. The value of a research, according to Jackson (1994) depends upon the methods used for data collection and also if both the types of data i.e. secondary and primary data are included in it. Discreet data collection method is used to obtain secondary data and its accuracy depends on the source of the data and its location as stated by Creswell (2003). Authentic academic papers published and theories which can be verified can be used as a source for the secondary data. Critical evaluation of the data should be done by the researcher before using it in the study to ensure its reliability and validity. According to (Creswell, 2003), only the data available in academic papers and researches with proper references and verification should be used by the researcher. The same approach was followed in the collection of data for conducting the present research.

3.1.5 DATA ANALYSIS

After the cases are being presented, the researcher would try to give an overall picture of the whole concept taken for the analysis to present the situation on the impact of television advertisement on children. Based on the facts derived from the cases in the USA Risk management, the researcher would present his conclusions. Also the study cases would be compared and contrasted in the light of the facts that are collected for the present study. In the section on summary and conclusions, the implications of the interpretations and findings would be provided on the basis of the existing facts rather than providing new facts. Hence the process of sifting and sorting and the interpretation of the available information is the essence of the case study.

3.6. Summary

The research process and design adopted in this study was covered in this chapter. The research philosophy used in the current study was constructivism. It also used inductive approach in study of qualitative data and case study method for research design. The collection of data was done primarily through secondary.

CHAPTER IV

DATA ANALYSIS

This chapter makes an attempt to identify the different practices of risk management used in construction industry in USA and to evaluate the best practices in risk management in USA

using the available literature. Also the utility of these practices in India would be analyzed and the impact of risk management practices on cost reduction in construction business would be captured in this process.

Risk management practices used in US

Widely used risk management techniques

There are many different techniques that are available for the accomplishment of the basic steps in the management of risks. Some of the techniques would be appropriate for the management of risks in particular circumstances or when there is a specific requirement for a certain degree of risk. In general the effort that is put in and the nature of the technique that is implemented should have a match with that of the degree of risk that is involved in a project.

In case of a project that involves multiple disciplines and hence requires a comprehensive method of analysis of risks, there should be specific quantification of the risks and the action plans for the risks. If the project is small as well as straight forward it would suffice, if a project leader has a one page written summary of the potential risks expected. Following are some of the techniques that are commonly used in case of risk management (Voetsch, Cioffi, Anbari, 2004)

- Interviewing the concerned people
- Brainstorming of the project team
- Reviewing of the similar projects that are done already
- Analogy comparing
- Creation of checklists
- Assumption analysis
- Evaluation of the programs and review techniques (PERT)

- Modeling of the risks
- Developing a risk response matrix
- Adopting Monte Carlo stimulations
- Tracking of the performance
- Reviewing of the risks and the audits

There are some major indicators of risk management in a project and this includes the conduction of the risk analysis during the selection of the project itself and the conduction of the "quantitative risk impact analysis" during the selection of the project and planning of the project and the inclusion of the formal as well as the non- formal contingency funds. There should also be an inclusion of the formal and the non formal contingency times. The next important factor is the advance planning in case of the handling of specific events of risks and the conduction of formal sessions for the identification of risks all through the project and the creation of the risk register. There should also be an exclusive member available for the handling of all the issues related to risks and these are the standard sequence of events recommended for effective risk management as reviewed in, PMI®-PMBOK® Guide 2000 US-EPA 1999, US-DoD 1996, US-FAA 1999 etc.

There are also some indicators of monitoring as well as the handling of risks in the industry that includes regular planning of risk response, conduction of reviews of risk for the assessment of possible risks in course of execution of the project, conduction of auditions of risk at some point of execution of the project and this confirms the presence as well as the implementation of a formal plan of risk management. These are the methods that are comprehensively reviewed and recommended by the US-EPA 1999, US-DoD 1996, US-FAA 1999 etc.

Risk factor analysis

The risk factor analysis aims to recognize the factors or determinants that are important for driving the decisions of the people at the top level and also the costs, technical performance and other schedules for a project. The following are the major steps that are undertaken to perform an risk factor analysis (Darby and Kindinger, 2000).

- Listing of the activities and other important measures that constitute a project
- Identification of the technical risks that are applicable to the project
- Development of a scale for the ranking of risk for each and every factor
- Provide the ranking for every activity for every risk factor
- Provide a summation of the results for every risk factor
- Documentation of the results and the identification of the actions that involve the reductions in risks and provide it for an detailed evaluation by the members in the project

Identifying the major risk factors

Following are the major sources of risk that are encountered in the industry

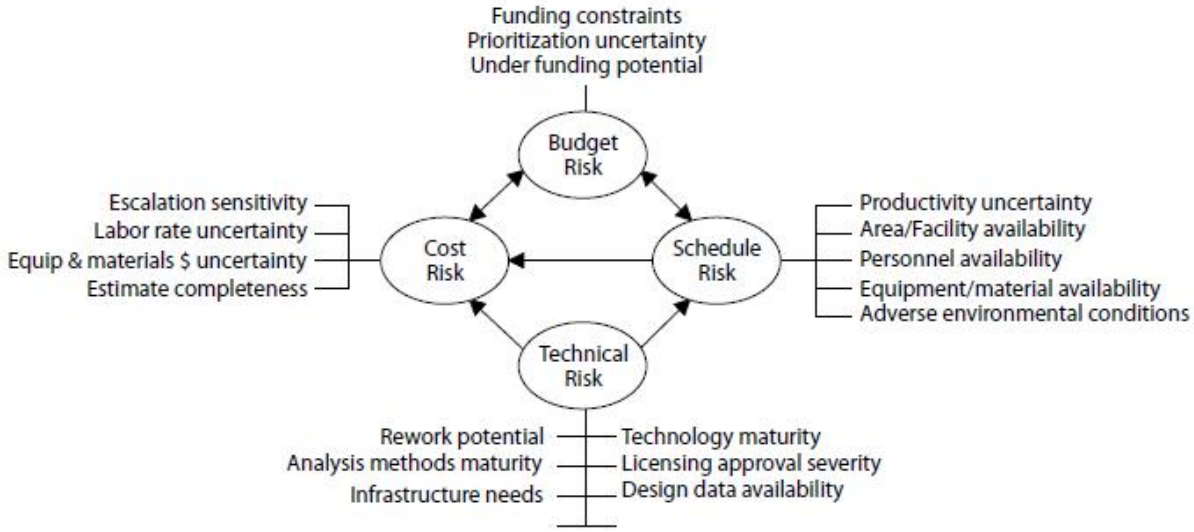
- Technical risks
- Cost risks
- Funding risks
- Schedule risks (Darby and Kindinger, 2000).

Guidelines for qualitative risk ranking

The following figures show the systematic method of documentation of risk for every qualitative risk factor and this helps in the assessment of risk over projects or the programs in a consistent manner. There are specific and well defined definitions of risks provided in terms of three sets of risk as follows

- None/low
- Medium
- High

Qualitative Risk Factor Ranking Criteria



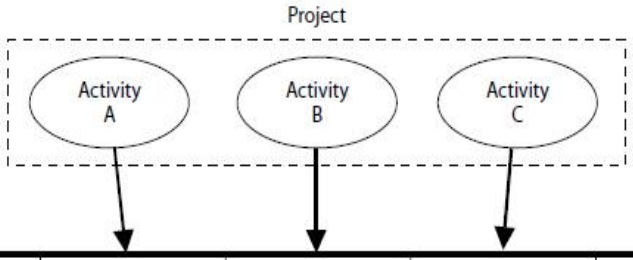
Source (Darby and Kindinger, 2000).

Evaluation of the risk factors

By the use of the rankings provided for every qualitative risk factor, the program or project activities could be assessed in a systematic manner. Then the personnel involved in the project will go on to evaluate the project after being trained in the particular approach or there would also be a team exclusively for risk analysis who execute on the basis of the interviews with the members in the team. The results and outputs of the analysis would be recorded on the respective work sheets that are prepared for every activity in the project. The major component of such work sheets is that they have the ranking of risk for every activity of the project numerical value as provided below

- High-3
- Medium-2
- Low-1
- None-0

Risk Factor Evaluation

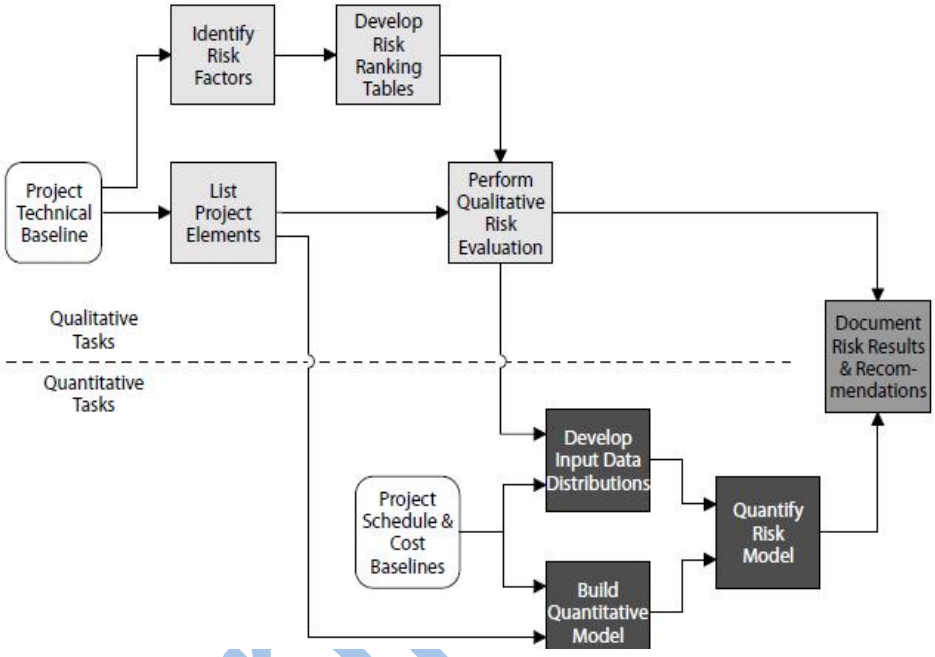


Risk Factor	A	B	C	Risk Factor Total
I)	Low (1)	Low (1)	High (3)	5
II)	Medium (2)	High (3)	Medium (2)	7
III)	Low (1)	Low (1)	High (3)	5
Activity Total	4	5	8	

Source (Darby and Kindinger, 2000)

Also, where ever it is appropriate, there can be the use of the intermediate values like 2.5. the assignment of the numerical values for the ranking of risk in every category will lead to easy assembling of the results and hence this would help further in the development of the distributions in probability. The work sheets that contain the records for risk ranking also would have a statement of justification for why such a score for risk was assigned to the particular factor and would also provide references for the apt interviews as well as documents (Darby and Kindinger, 2000).

Integrated Qualitative and Quantitative Risk Analysis at LANL



Source (Darby and Kindinger, 2000)

Uses of the risk factor analysis

This kind of qualitative ranking of the risk factors in project management would provide a way to prioritize in first orders of the risk for every activity of the project even before the actions for the reduction of risks are implemented. The most important application of conducting the risk factor analysis is proper identification of the actions to be executed in the reduction of the risks. When such an analysis is conducted, there could be often straight forward conclusions that could

be arrived at on the issue of risk at hand. There can be an effective development of the input distributions for the modeling of quantitative risk (Darby and Kindinger, 2000)..

International project risk assessment (IRPA)

In the United States, the construction industry is the one that accounts for over 3.5 trillion US dollars and this also constitutes about 10 percent of the gross domestic product of the world. There is not one tool that is available in a easy manner for the identification of risks in the industry of international construction

The need for such a tool was identified and addressed by the construction Industry institute (CII). Hence the international project assessment tool was developed by their research team and the tool is the best one that provides a organized method of identification, assessment and determination of the importance of the risks relative to the other particular risks that are prevalent across the life cycle of the project and also the spectrum of participants who are required for allowing mitigation (Walewski, Gibson, Vines)

Using the IRPA tool

Since the risks are said to occur all through the life of the project, proper management of risks should not be restricted to an analysis for one time. As risks are supposed to evolve in course of time, the evaluation of risks should be done during the time of planning of the project as well as the decision making time. Hence the IRPA tool should be able to make decisions on the programs, validating the feasibility of the project, deciding on whether to proceed with that of the construction and engineering in a detailed manner. The tools could be availed as a checklist during any time of the project.

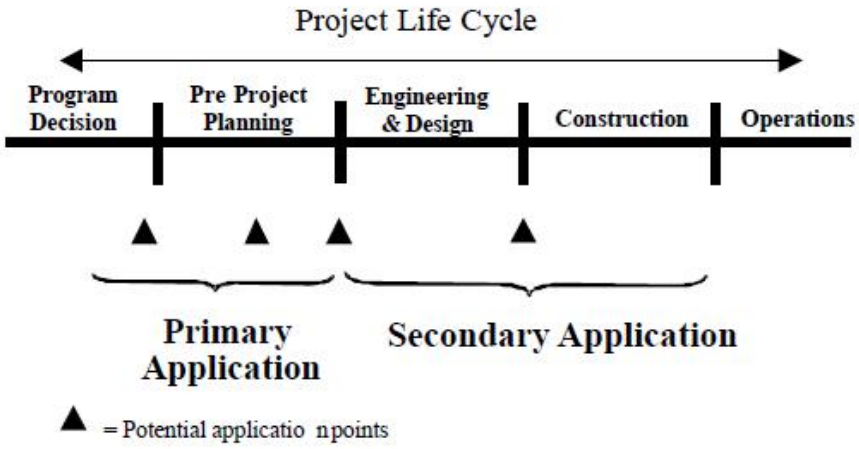
Definitions of relative impacts

Occurrence	Probability
NA - Not applicable to this project.	Zero
1 - Very Low chance of occurrence, rare and occurs only in exceptional circumstances.	(<10% c hance)
2 - Low chance and unlikely to occur in most circumstances.	(10% chance of occurrence <35%)
3 - Medium chance and possible to occur in most circumstances.	(35% chance of occurrence <65%)
4 - High chance of happening and will probably occur in mos t circumstances.	(65% chance of occurrence <90%)
5 - Very High chance of occurrence and almost certain and expected in most circumstances.	(90% or greater chance of occurrence)

Source: (Walewski, Gibson, Vines)

The format in which the tool is prepared is something very important to be familiarized with during the evaluation of the project. Two types of work sheet could be made use of by the teams and the major differentiating factor is regarding the choice of selection of the relative level of impact or the use of relative impact at the base line for every element. One can use the base line when there is a non availability of specific base lines or when the participants in the project do have only a little know-how on the potential consequences of the project.

IRPA tool application in the life cycle of a project



Source: (Walewski, Gibson, Vines)

The combined action of the likelihood of occurrence of a risk as well as the relative impact is the major factors that determine the importance of risks for a particular element in a project. Fig 2. The right level of risk and the comparative importance of the same is recognized and then it is plotted at is particular location on the matrix of risk. The items of risk that get plotted in the upper right hand corner in the matrix of risk are indicative of the maximum risk to the project. But those risks that get plotted on the lower left are not that much of concern. Hence subsequently the elements captured as posing higher risks would be mitigated to the project team. As and when the assessment of the risks proceeds, such dangers would become visible and this kind of foresight would help greatly in the monitoring of the risk and in the control as well as the mitigation measures. Hence the IRPA tool provides the team a process that would help in the gauging of the relative importance of the risks associated with the project at hand. It should also be kept in mind that in case of any specific risks the relative importance will keep on oscillating during the cycle of life in any project and an adjustment in the methods of mitigation should also be implemented as and when the nature of the risks change. With this kind of guidance in hand, the team that is involved in the assessment of risks would go on to determine the type as well the extent of mitigation for the individual

Example of an IRPA assessment sheet

CATEGORY	Likelihood of Occurrence (L)						Relative Impact (I)					Baseline	L,I	Comments
		Very low →				Very High	Negligible →				Extreme			
	NA	1	2	3	4	5	A	B	C	D	E			
I.A. BUSINESS PLAN														
I.A1. Business case												E		
I.A2. Economic model / feasibility												D		
I.A3. Economic Incentives / barriers												E		
I.A4. Market/Product												D		
I.A5. Standards and practices												D		
I.A6. Operations												D		
I.A7. Tax and tariff												D		

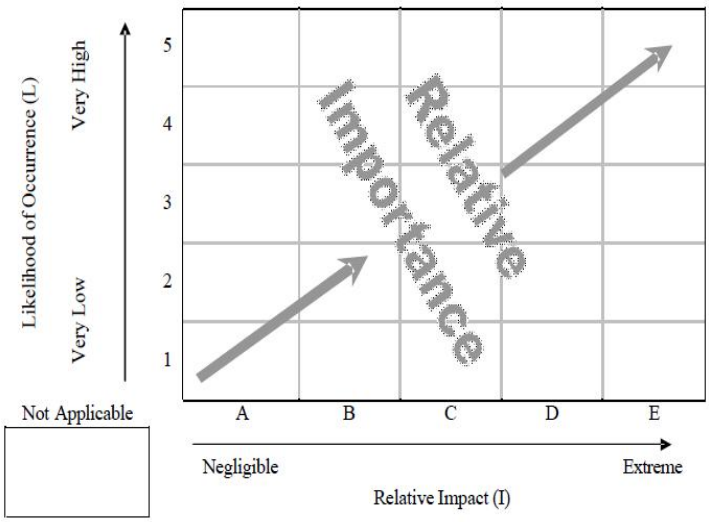
Likelihood of Occurrence
NA= Not applicable to this project
1 = Very Low probability and occurs in only exceptional circumstances (<10% chance)
2 = Low chance and unlikely to occur in most circumstances (10% chance <35%)
3 = Medium chance and will probably occur in most circumstances (35% chance <65%)
4 = High chance and will occur in most circumstances (65% chance <90%)
5 = Very High chance, almost certain and expected to occur (90% or greater chance of occurrence)

Relative Impact
A = Negligible impact and a routine procedures sufficient to deal with the consequences
B = Minor impact and would threaten an element of the function
C = Moderate impact and would necessitate significant adjustment to the overall function
D = Significant impact and would threaten goals and objectives; requires close manageme
E = Extreme impact and would stop achievement of functional goals and objectives

Source: (Walewski, Gibson, Vines)

A register called as the risk register could be used in the tracking as well as the confirmation of the process of mitigation. The main intention behind the use of the risk register is that it helps in the systematic identification as well as the tracking of the specific as well as high priority risks that are a result of the IRPA assessment. Hence the research team has developed a methodology of high level for the tracking of individual issues of risk. The team also recommends the following processes of risk management for improvement of the performance of the project

Example of an risk matrix in IRPA



Source: (Walewski, Gibson, Vines)

- A process of risk management should be organized as well as formalized so that it could be kept simple.
- The risk management should be begun early so that it could be most effective
- The perspective should be kept broad so that a series of diversified inputs could be obtained
- Sufficient analysis, pre-planning in the project, and also engineering should be undertaken
- The partnership should be with those of contractor management and the owners
- There should be a effective documentation of risks
- There should be a proper identification of the projects that have a more amount of risk associated with them and those projects associated with the following processes are more prone to risk

    1. More resources

2. A great extent of novelty
3. Planning horizons that are long
4. Big size
5. Complicated nature of the project
6. Involvement of many organizations
7. Newly introduced jurisdiction for any of the major participating teams
8. Significant issues

Risk management practices in the Indian industry

Construction industry development council :

The Indian government in conjunction with that of the construction industry has developed the construction industry development council (CIDC) inorder to shape the indian construction industry. This council started its full fledged functioning in the year 1996 and there are many important projects that are being implemented by the construction industry.

Management of risk by a system of grading:

The construction industry development council along with an institution called as Investment and credit rating agency Ltd (ICRA ltd) has put forth a detailed as well as a very reliable system for the assesement of the potential for performance of all the aspects that are involved in a project namely the owner, consultant, contractor and also the project itself. Hence the extent of uncertainties in the project are minimized which would help all the people involved in the project like the contractor, owner consultant etc who would potentially gain in the project completion. This would also help the involved financial agency in the quantification of the risks and hence

there is a generation of more confidence in the advancement of money at rates that are acceptable (construction.indianetzone.com, 2010).

Risk management by insurance cover in construction sector projects

There is a memorandum of understanding that has been signed between the CIDC as well as the Acturial society of India for the development of insurance products that could be used in the construction projects. This would help in the gaining of credits easily for those construction projects that are highly prone to risk.

There are some risks in the construction business that slightly exceed when compared to that of the other ventures of business. The insurance field in our nation has not begun to identify the scope of the mutual benefits it would gain by its operation in this sector. There are only three policies that are available, namely, the plant and machinery policy, compensation act policy for workmen and the all risk policy. But the methodology for the estimation of risks and the processes of management in the sector of construction is to be placed yet on the scientific basis.

The new system of grading is an instrument for the assessment of risk by the companies of insurance in India who are venturing in this area. For the purpose of coverage of risk, the premier could be down pegged to some levels that are computable and thus the pure speculations could be reduced. Hence for the construction agencies, this could become equitable and also attractive. There are many types of risks for which insurance policies have been put forth by the CIDC (construction.indianetzone.com, 2010)

- Transit insurance policy (TI)
- Financial risk coverage policy (FRC
- Force majeure loss policy (FNL)
- Life of building policy

- Delay in meeting obligation by client policy (DIMO)
- Loss of profit policy (LOP)
- Casual workman compensation policy (CWC)
- Settlement of claims policy (SOC)
- Loss of performance of construction equipment policy (LOPCE)

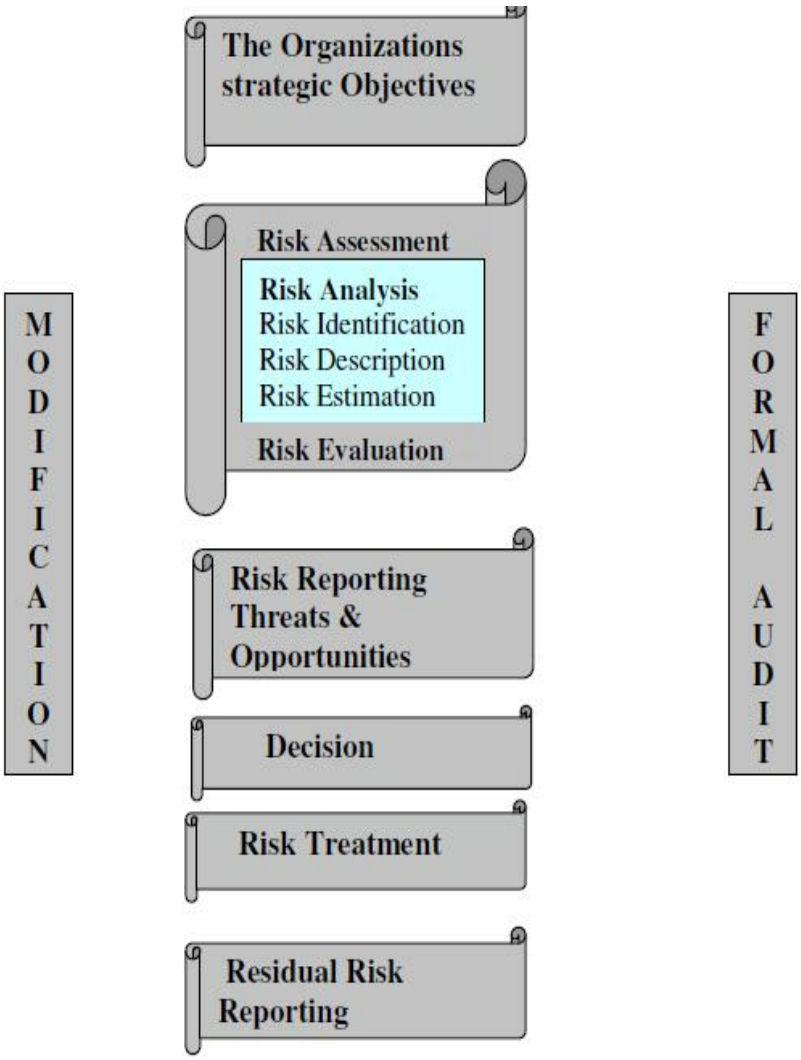
In order to avoid the concept of misusing by means of the purchaser, the CIDC has also designed the following systems of support.

1. Grading the entities in the construction for a detailed as well as comprehensive assessment of the entities of construction and a reliable risk assessment
2. Lending of the engineers for overseeing the faithfulness involved in the operations (construction.indianetzone.com, 2010).

Risk Management Practices in Insurance of construction in India

For the identification of the risks that pertain to certain businesses, the insurance industry is particularly focused. The risks that are related to the property, liability and the interruption related risks are noted keenly by means of the insurers. The services of risk management like the inspections of underwriting or inspections that arise post the losses for settling the claims are used by such people in India. The support provided by the insurance companies in the public sector like the Loss prevention association of India (LPA) as well as the TAC- Tarrif advisory committee would be used by the people who insure in addition to the services that are offered internally by the individual firms.

Assessment of risks



After dissolving the Loss prevention association of Indian and also after the activities of the committee of tarrif advisory has been redefined the firms were seeking out for services of risk management that are specialized for the private sector. The process of de-tariffication has led to the using of services of risk in the insuring companies, farms that are single entities and also the broking houses. They are used for the purpose of "insurance underwriting business risk management", the risk management of the consultancy services are taken as adding value for the clients in the insurance business. the upcoming of the multinational firms and also realizing the

importance of the services of risk management by means of the clients have led to the forcing of the insurance companies to bring in services of risk management that are innovative and would suit highly to the market situation in India.

Important tools of Risk Assessment

For the identification of good risks from that of the bad risks, the tool of elementary risk audits is adopted by means of the insurance firm for the purpose of underwriting The safety related audits including the audits for fire safety, electrical safety, method of comprehensive safety audits have been adopted and followed as a tool apart from being a statutory observance for the improvement of safety as well as the minimization of the level of hazard in the industries.

Auditions based on risks like the risk involving machinery breakdown and the following audits of business interruption are becoming crucial in the places of power plants of the construction industries in order to improve the practices of maintenance and also for the purpose of financing of risks including the coverage of insurance and the pooling of risks.

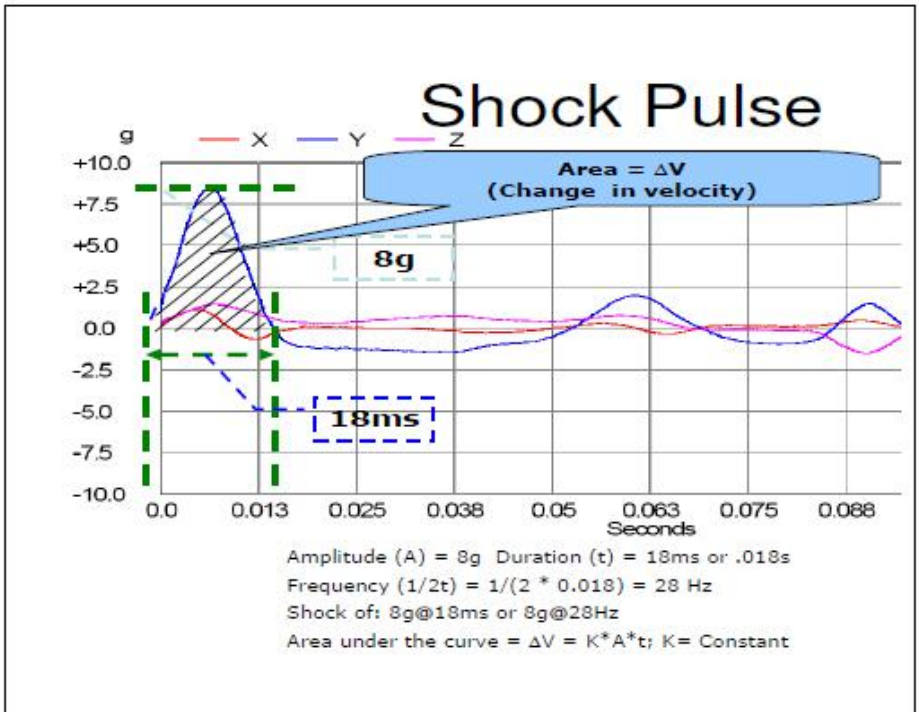
Modern Trends of Risk Management

Due to the progress in the industrialization all over the nation the requirement for transporting the raw material, machinery and the equipment involved in the construction has scaled to a greater level and hence the requirements for logistic risk management has also gone up. There have been a lot of sophisticated equipments like the data loggers as well as the shock loggers for

the computation of the waves of shock on packing as well as reviewing the impacts such as the losses that are incurred during the transit and these have helped in the reduction of the losses by the construction industries.

The major objective of a good practice of risk management is the recognition of the risks and the simultaneous treatment of the risks. The aim is the addition of maximum value of sustainability to all activities involved by the organization. This assembles the perception of the major ups as well as downs of all such factors that can affect the firm. This leads to an increase in the success probability and a reduction of the failure probability and the uncertainties that exist in the achievement of the overall objectives of the organization (Sethi, 2007).

Data logger



Source : (Sethi, 2007).

Also in recent times, there are many terms - "Holistic Risk Management", "Risk Models", "Risk Management Models" and "Enterprise Risk management" that are extensively in use today. Also there is an appointment of the chief risk officers at the top levels of management and this elucidates the importance of managing risks among the organizations.

A study done called *KPMG* study places a lot of emphasis on the view of a company that should be integrated that gives room for the exploration of interdependencies. The author states that "Risk models offer the advantage of combining all relevant operations of an insurance company (eg underwriting, investment, pricing, taxes, assets, liabilities etc) into an integrated model which provides an insight into future operations and capital requirements. Risk models can be beneficial in evaluating decisions and in analyzing alternative business strategies. These evaluations or analysis should focus on major risk scenarios, including what happen if more than one thing goes wrong at the same time. Risk models also provide information on options or strategies, identifying those with the latest significant risks and those with the greatest rewards. Thus they can help companies prepare strategies to deal with financial threats". (Sethi, 2007)

CBR system of risk management

This system of risk management requires and is designed on the basis of the case presentation. This kind of case presentation should be able to cover the major features of the project so that there could be a covering of the risks that are relevant to the present project and involves the covering of the risks in the cases that are retrieved and many other alternatives to reduce the risk probabilities. The system should also be capable of provision of a measure of the effect of the risk with every event so that there could a proper prioritizing of the risk. For the purpose of risk management that is interceptive, there should be an assurance that there is a retrieval of many of

the similar cases of risk and also a mitigation of the strategies and other alternatives. Kumar and viswanthan (2007) state that "Designing an integrated CBR system for both the preventive and interceptive risk management of construction supply chain requires the clear understanding of various risks and critical project features which induce the risk events. In order to identify critical project features, it is important to know the nature of supply chain risks, the sources of risks and the consequences of risk events. Following subsections suggest tools to deal with them".

One type of a project for example, air, or road or thermal power project uses the same type of material and one and the same structure of supply chain. Though there can be differences in the technical particulars of the project's components and also the particulars, the firms involved in supply and subcontracting might be different, but the nature of the supply chain would remain the same

For a project involving a construction works, there should either be a procurement of the materials by the firm or the procurement of the design and the engineering services wiring works etc. the issues that are related to the risk management of the supply chain of goods and also the supply chain of services vary and also partitioning the events of risk in both of the categories of procuring materials provides us with an efficient way for classifying the case representation and this in turn would help in the proper retrieving of the cases in the CBR system.

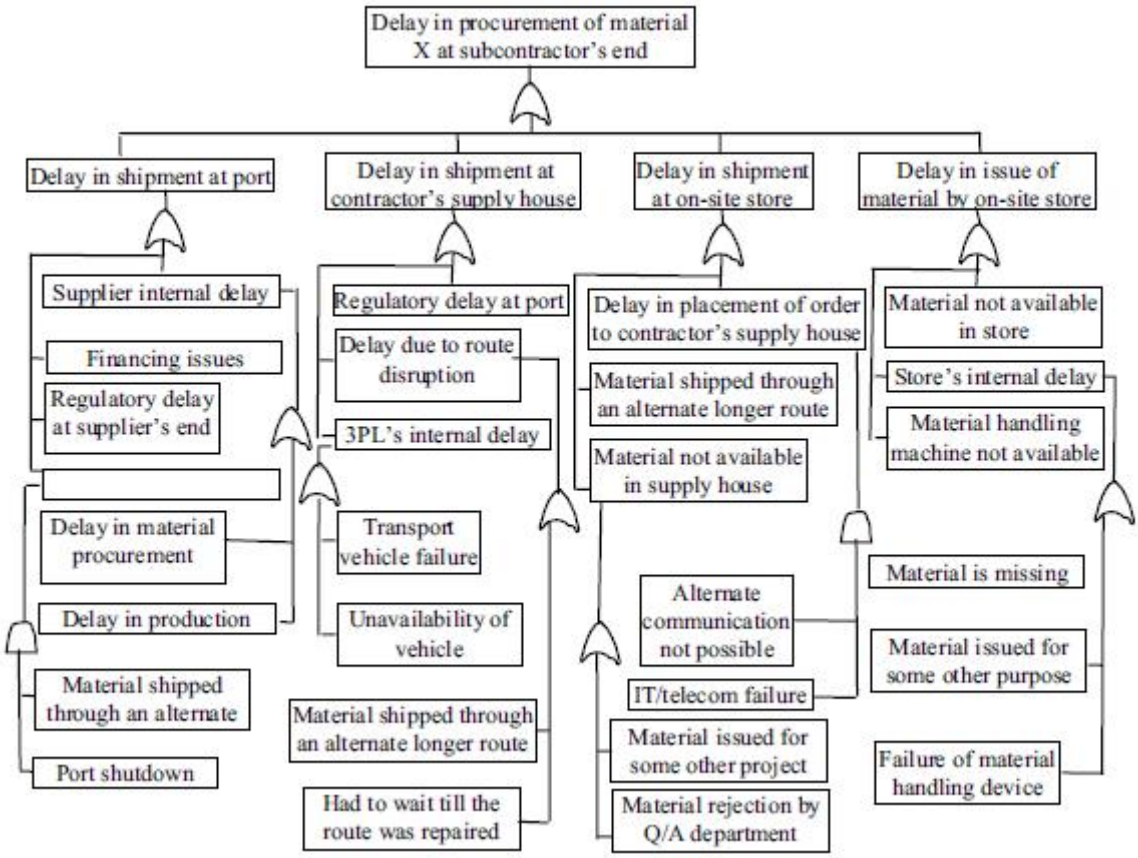
There are some materials or services that are highly pose risks while there are others that do not pose any risk. During the process of managing the risks, the main focus should be on the materials that are prone highly to risk. Such a situation is exemplified by the construction of the oil platforms in case of engineering projects. In this case the design or the topographic analysis of the site are the major services that are very crucial and even a minor error in this step would result in the degeneration of the platform due to instabilities and lead to the incurring of huge

losses. In case of supply chains involving specific services or materials, the risks involved are almost similar and does not take into consideration the type of the project. In case of procuring an industrial turbine, there could be similar risks incurred in the supply chain, even when it's used for a thermal or a hydroelectric plant (Kumar and viswanthan , 2007).

Identifying project features

In case of a case presentation, it is imperative to see the important features of the project which lead to the induction of the events of risk and also segregating them for the proper retrieval in the CBR process. In order to identify such features, an analysis called as the fault tree analysis (FTA) could be performed for various events of risk. It is used in case of identification of the basis reasons behind the incurring of risks and also to arrive at the probability at which it occurs.

Fault tree analysis



Source: (Kumar and Viswanthan , 2007)

Case representation

We represent the case class as an 8 component-group as

T, F,CS, R, Pr ,C, I, Pr e

T represents the type of the project. It can be a railway project or an air port project

F represents n-tuple that elucidates the features of the project

CS represents n-tuple that involves the services and components associated with the risk.

R represents an n –tuple that contains the events of the risk.

Pr represents probability with which the event of risk occurs

C is indicative of the result of the event of risk in case an unexpected loss occurs

I represents a set of n tuple that are strategies for the management of risks

Pre represents n-tuple containing the preventive mechanisms in the management of risks (Kumar and viswanthan , 2007)

Case indexing and Retrieve process

Even though the case for the purpose of preventive as well as interceptive management of risk very common, there would be a vast difference in the functions of retrieval. The algorithm for retrieval makes use of the appropriate function for retrieval on the basis of certain conditions as well as the selection of the user on the type of the problem. The problem may be of a preventive or an interceptive type. The process of indexing or a method based on the similarity for both of the problems would not be the same. The method of indexing permits the system to pay attention

to the appropriate features of the problem of managing risk and thus the system is made to work in an efficient and effective manner.

In case of problems of preventive risk management, only the index type of projects are used and there is a recommendation for the other aspects of the problem as well to be matched on the basis of similarities. In such a case there is an assumption that the firm has handled similar projects in the past as well.

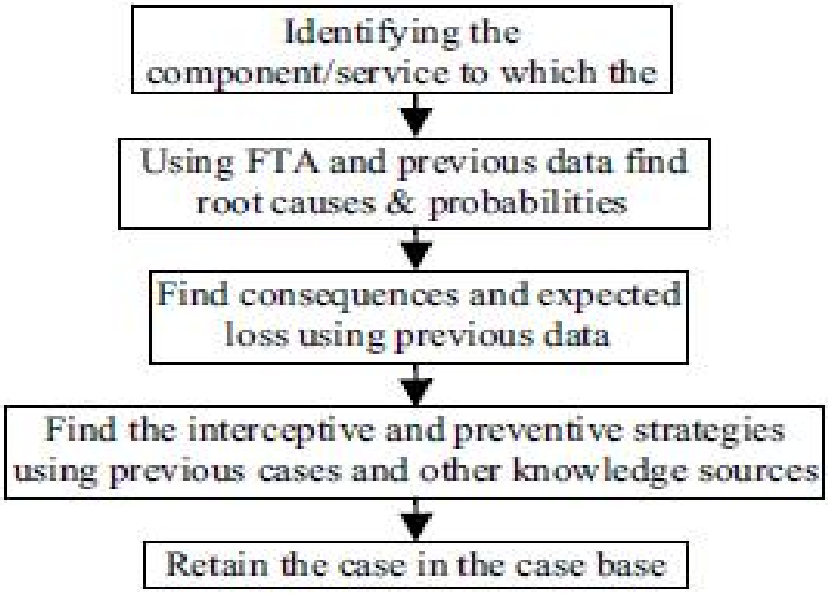
For problems involving interceptive management of risks, there could be an assigning of indexes to the type of projects as well as the features of the project and its services and projects. In the system of integrated CBR, there would be a conditional indexing on the basis of the end users choice of the options on the preventive and interceptive risk management (Kumar and viswanthan , 2007).

Revise and Retain processes

After the retrieving of many of the case there should be a selection of the proper mechanism of preventive or interceptive risks on the basis of the existing case. With the possession of more cases in the base of the case, there would be a bulkiness of the case base and hence there would be a difficulty in the selection of the best possible case for the problem at hand. At this time point, there is a process of adaptation that is required by the system. On the basis of the aspects of the project and also the other inputs that are relevant there is an adoption of the strategies on whether there should be a interceptive or preventive strategy that should be used. The case adaptation on the basis of the rules is the most widely used method. There is a definition of rules

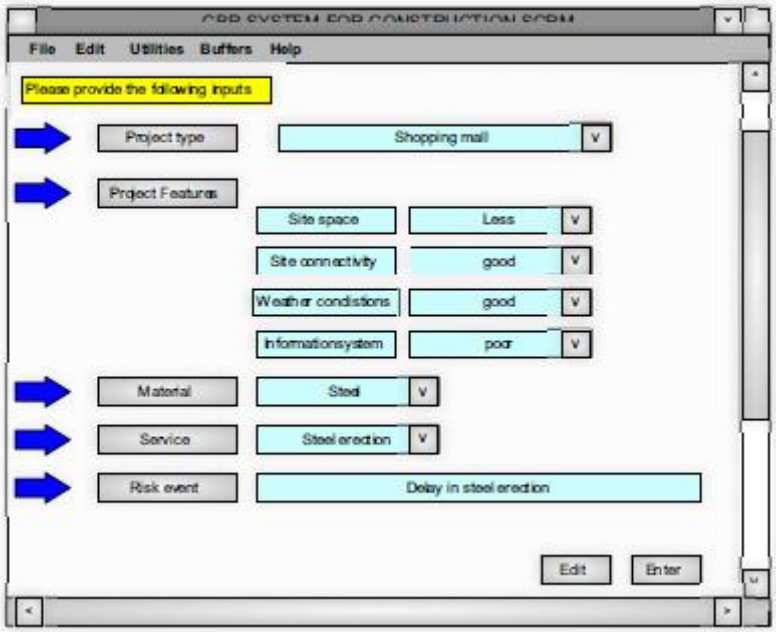
that impose restrictions on the application of the suggested strategies of managing risk on the basis of certain constraints.

Approach proposed for the retrieval of a new case



Source: (Kumar and Viswanthan , 2007)

User-system interface of CBR-DSS



Source: (Kumar and Viswanthan , 2007)

Utility of risk assessment in cost reductions

Control of cost and comprehensive coverage

In case of construction insurance, the cost can range from that of 4 percent to over 8 percent of the value of the contract and this cost could be controlled by obtaining of a wide coverage of insurance that is obtained by the consulting practice of the construction insurance. This involves the following

- Assessment and redrafting of the requirements of insurance of the architect as well as the construction agreements
- In case of OCIP as well as CCIP wrap up projects, the feasibility as well as the structure could be determined

Negotiation of coverage of insurance that is favorable and low rates in the contracts of construction opportunities (riskconsultinggroup.com, 2010)

There is also a determination of the opportunities of reduction of costs in the long run as well as the short term and also an evaluation of the previous as well as the future and present operations and the risks associated by the insurance companies. Other facilities that could be availed are the determination of coverage for insurance and the enhancements that are requisite. There could also be an implementation of cost reduction as well as the enhancements for the coverage of insurance (riskconsultinggroup.com, 2010)

Plans of action are essential in case of the risks that are existing in case of those possessing a high degree of criticality from that of the impact matrices. There are a lot of cost effectiveness in

the action plans and the technique of three point estimates are used in bringing about the cost effectiveness and following are the components of a cover of action plan.

- There should be a proper description of the activities that are planned and the ownership
- The estimate also cover the starting date and the condtions of risk triggers that are identified
- The requirements of costs as well as resources
- Identification of the secondary risks, actions and the comments by the using of the BRAG coding that has been used widely

If the actions for the mitigation of risks do not yield successful results, then there is a chance tht the risks would become a problem and there should be a fall back plan which should be initiated. Though there is an argument that this is just a risk that is unnecessary there are a lot of benefits that are associated with the plans of fall back that were developed already because they can be immediately put to use without wasting any time and their contents resemble the plan of mitigation which are as follows:

- Describing a plan for the purpose of recovery and for a clear ownership
- Date of initiation and description of the trigger condition
- Costs associated and the resources
- The secondary risks that are encountered as a result of the plans of fall back
- Comments and the status of acitons

(riskconsultinggroup.com, 2010)

CHAPTER V

SUMMARY AND CONCLUSIONS

In the United States, there are many different techniques that are available for the accomplishment of the basic steps in the management of risks. Some of the techniques would be appropriate for the management of risks in particular circumstances or when there is a specific requirement for a certain degree of risk. They are Interviewing the concerned people, Brainstorming of the project team, Reviewing of the similar projects that are done already, Analogy comparing, Creation of checklists, Assumption analysis, Evaluation of the programs and review techniques (PERT), Modeling of the risks, Developing a risk response matrix, Adopting Monte Carlo stimulations, Tracking of the performance, Reviewing of the risks and the audits. There are also some specific tools that are widely in use today.

Since the risks are said to occur all through the life of the project, proper management of risks should not be restricted to an analysis for one time. As risks are supposed to evolve in course of time, the evaluation of risks should be done during the time of planning of the project as well as the decision making time. Hence the IRPA tool should be able to make decisions on the programs, validating the feasibility of the project, deciding on whether to proceed with that of the construction and engineering in a detailed manner. The tools could be availed as a checklist during any time of the project.

Qualitative ranking of the risk factors in project management using risk factor analysis would provide a way to prioritize in first orders of the risk for every activity of the project even before the actions for the reduction of risks are implemented. The most important application of conducting the risk factor analysis is proper identification of the actions to be executed in the

reduction of the risks. When such an analysis is conducted, there could be often straight forward conclusions that could be arrived at on the issue of risk at hand.

The Indian government in conjunction with that of the construction industry has developed the construction industry development council (CIDC) in order to shape the Indian construction industry. This council started its full fledged functioning in the year 1996 and there are many important projects that are being implemented by the construction industry. Due to the progress in the industrialization all over the nation the requirement for transporting the raw material, machinery and the equipment involved in the construction has scaled to a greater level and hence the requirements for logistic risk management has also gone up. There have been a lot of sophisticated equipments like the data loggers as well as the shock loggers for the computation of the waves of shock on packing as well as reviewing the impacts such as the losses that are incurred during the transit and these have helped in the reduction of the losses by the construction industries.

The system of CBR is capable of provision of a measure of the effect of the risk with every event so that there could a proper prioritizing of the risk. For the purpose of risk management that is interceptive, there should be an assurance that there is a retrieval of many of the similar cases of risk and also a mitigation of the strategies and other alternatives.

There is also a determination of the opportunities of reduction of costs in the long run as well as the short term and also an evaluation of the previous as well as the future and present operations and the risks associated by the insurance companies.

Hence it is evident that the construction industry in the US is well advanced in terms of risk assesement and the practices such as IRPA tool and the Risk factor analysis would be great tools

for the Indian construction industry. But in some areas the Indian industry is well equipped as is evident in case of companies like Cholamandalam MS which has won the Risk Manager of the year 2007 award in Asia. But still India has a long way to go in terms of managing especially in fields like insurance in the construction industries.

Recommendations

The process of risk management should be chronic and continuous and should aim at the development of processes running all through the strategy of the organization as well as the implementation of the strategy. There should be a methodical addressing of every risk that surrounds the activities of the organization in the present, future and the past. There should be an integration of the process of risk management into the culture of an organization with a policy as well as a programme led by the top level management. There should also be a translation of the strategy into objectives that are operational, tactical. The assignment of responsibilities all through the organization should be in such a way that at every level each manager and the employees under him/ her should be able to manage the risks involved as a part of the job being done by each of them. Sethi states that "it supports accountability, performance measurement and reward, thus promoting operational efficiency at all levels. The participation with the global players has not only helped to bring the global technology, standards and practices to India but the Indian Standards of practices has improved up to international standard. The Indian Risk Management companies like Cholamandalam MS Risk Services winning the Risk Manager of the year 2007 from Asia Insurance Review Awards is a truly recognition of the improvised risk management practices in the subcontinent leading towards better safer and less hazardous working places in the Indian Industries" (Sethi, 2007)

Limitations of the study

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