International Journal of Research in Engineering, Science and Management
Volume-1, Issue-10, October-2018
www.ijresm.com | ISSN (Online): 2581-5782

Identifying Risk in the Construction of Residential Buildings

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***Abstract*—This paper aims to identify, and analysis of risks associated with the residential construction projects. Based on a comprehensive assessment of conditions of contracts, this paper identifies risks and classifies them into several types. Literature review aims at discovering the frequently used techniques in risk identification and analysis. It is observed by qualitative risk analysis, opposition from social bodies, changes in design and suspension of work are recognized to influence the project objectives maximally. Identifying the risk in the initial phase is very necessary in order to reduce the total cost of project and to increase efficiency of the project. Early recognition can increase efficiency of the project.**

***Index Terms*—Construction projects, Contract, Qualitative risk analysis, Risks, Risk management.**

I. Introduction

Risk management is the process by which risk or uncertainty in the project is minimized and the project is completed in optimum duration, qualitatively and with maximum return. It is used assertively to plan and reduce the adverse asserts in completion of project and possibility. Though the term risk has got different meanings and from different angles, it can be defined as the potential that events expected or unexpected and which may have an adverse impact on a bank's earnings or capital or both. Both the risks having high probability low impact and low probability high impact are covered in this definition.

It is useful to recall at this position that risk and expected returns are positively related; higher the risk, higher the expected return and vice versa.

The scope of risk management function in any organization is to ensure that systems and processes are set up in accordance with the risk management policy of the organization. The very basic objective of risk management system is to put in place and operate a systematic process to give a reasonable degree of assurance to top management that the ultimate corporate goals that are vigorously pursued by it would be achieved in the most efficient manner. In this way, all the risks that come in the way of the institution achieving the goals it has set for itself would be managed properly by the risk management system. In the absence of such a system, no institution can exist in the long run without fulfilling the objectives for which it was set up. This project is about why to carry out the risk and financial management in construction industry. It gives the detail information about all types of risk that one needs to consider while starting and processing any construction project so that project does not face problems while completing the project. This project gives detail analysis of risk in form of identification, estimation, evaluation, monitoring and response.

It gives the detail solution how to eliminate these various risks factors. We went through numbers of international and national research papers to study these topics. Need to study the risk in construction project especially financial risk is very important because without finance any construction project cannot be completed successfully. No risk comes by knocking the door. For better quality of construction work all these factors need to be studied which are important in success of any construction project. Without finance no project can start so it is very necessary to analyze the whole project in financial point of view and risks associated with it.

If there is lag in financial supply there can be a delay in the completion of project, which ultimately increase the cost of project, and it fails in meeting with the expectations of customers which adversely affects the quality of the project, increasing in delay of the project and giving the possession of project to the concerned authority. Unsuccessful management of the finance may lead to project closure and all sorts of unwanted risk. Managing construction project involves making decisions relating to changes in conditions associated with construction, environment, and geotechnical, economic and legislative aspects and so on. Despite this risk management has only been applied in the construction industry for less than two decades.

Risk management process in construction projects can be explained as:

Risk management can be defined as the systematic process of analyzing, identifying, and responding to projects risk. It consists of maximizing the chances and the impact of positive events while minimizing the probability and the impact of negative events, in other to meet the project objectives. Risk management can be thought of as a decision-making process, and it entails having a full understanding of a known risk and/or necessary actions to reduce the effect and chances of the event of such risks, in other to reduce its complications and increase the chances of success.

There are three stages in the methods to managing risk in

construction industry a) risk identification; b) risk analysis and evaluation; and c) risk response. The term risk identification is referring to identifying and keeping records of the associated risks. Risk assessment on the other hand, means to examine the identified risks critically, refine the description of the risk, and making an estimate of their respective chances and effects on the project.

The risk response refers to the identification, selection, evaluation, and the action to implement the project. By making use of the risk management process, one can achieve a major improvement in the performance of the construction project management. The goal of risk management process is not to completely remove all project risks. Its aim is to produce an organized framework that will make management to manage project risks, most importantly the crucial ones, in a more efficient and effective way.

II. Objectives

- To know, what is management of risk
- To assess the common risks which cause adverse effect on construction of project.
- To know the importance of financial management in the construction of Residential Buildings.
- To find a solution to minimize these risks.

III. Methodology

The following section presents the steps to achieve the mentioned objectives.

1. In this study we will see what are the various types of risks occurred in the construction of the project.
2. With the help of the Literature survey we will find out the various techniques necessary for mitigating this risk.
3. Data Collection from project authorities.
    - With the help of the questionnaire distributed we have collected the data from the respective authorities.
    - Talk with Engineers, Supervisors and sub-contractors.
4. Analysis of the collected data:

Analyzing the data collected with the help of various techniques like Risk matrix, Risk Breakdown Structure, Cash Inflow – Cash Outflow

IV. Theoretical Contents

A. Work Breakdown Structure

Before the commencement of the project all tasks are listed, broken down into manageable subtasks& the schedule is prepared via MS Project or Primavera. It breaks down activities into smaller and more specific sub-tasks which gives an exact idea of what needs to be done and the amount of resources to be spent on that task.

B. Risk Matrix

A project manager with the help of a specialist should create a matrix that lists out all those risks which may have a considerable cost & time impact.

C. Risk Breakdown Structure

In project management language, risks include anything unplanned and unforeseen that can have a negative impact on the project's costs, timing or quality. A good project manager should be able to manage the risks effectively and get the project on track. One of the important tools available for managing risk is the Risk Breakdown Structure (RBS). RBS is a hierarchical representation of risks, starting from higher levels and going down to finer level risks. This is similar to the organization of the Work Breakdown Structure (WBS). For instance, at the top level you could split your risk into technical risk, management risk, scheduling risk and external risks (Level 1), then go on to finer levels such as design risks, funding risk etc. (Level 2) and so on. You can keep subdividing the risks into deeper levels as long it makes sense. An RBS template is typically chosen for the entire organization and it helps making sure all the relevant points are covered. The RBS works like a checklist. During the risk identification stage, the PM works through each of the items and checks those that are applicable for the given project.

D. Break-Even analysis

Break-Even analysis is a costing technique which shows the relationship between total cost and levels of output by classifying various cost elements, into fixed and variable. This analysis shows the amount of cost and profit or loss at various levels output.

E. Break-Even Point

It is the level of activity at which the total cost equals to the total selling price. The point is also known as 'No Loss Point'. It indicates the volume of sales from which the concern starts making profit.

F. Banking Risks

The risks to which the banks are particularly exposed are called as banking risks. There are 5 major types of banking risks. 1) Credit Risk2) Interest Rate Risk3) Market Risk4) Liquidity Risk5) Operational Risk.

G. Balance Sheet

A balance sheet is a financial statement that summarizes a company's assets, liabilities and shareholders' equity at a specific point in time. These three balance sheet segments give investors an idea as to what the company owns and owes, as well as the amount invested by shareholders.

H. Profit& Loss Account

It is an account in the books of an organization to which incomes and gains are credited and expenses and losses debited, so as to show the net profit or loss over a given period. A financial statement showing a company's net profit or loss in a given period.

V. Data Collection

We gathered some necessary data for the project such as its Balance sheet and profit loss account for that year. Balance sheet and Profit loss account are necessary to understand the financial situation of the company, how well company's performance was in that year. It is very useful to analyze the financial situation of company. After collecting some information, we got to know about the situation of company. This site was about to complete but still their flats was not getting sold. So, they started to face some financial problem which come under the financial risk.

At that time, they had to sell flats in any condition so basically company was facing serious financial problem. Company's cash outflow was more than the Cash Inflow at the start. So, we plotted the graph of Cash Inflow vs. Cash Outflow and classified distinct types of risks that occur on the site.

TABLE I
Classification of Risks

Conditions Of Contract	Risks Classification							
	Physical	Financial	Legal	Construction	Political	Design	Environmental	Contractual
General conditions								
Suspension of work		*			*			
Changes in design		*		*		*		
Extension of time		*						*
Penalty for delay		*						*
Insurance and Indemnity		*						*
Labour regulations	*				*		*	
Extra works		*		*				
Accidents	*							
Quality assurance plan		*		*		*	*	
Technical Specification								
General tech. spec.				*		*		
Supplementary tech. spec				*		*		
Prevention of property				*		*		
Tests List with frequency				*		*		
Special conditions								
Dispute and Arbitration			*					*
Arrangement of traffic during	*			*				
Completion certificate				*				*
Environmental safeguard	*						*	
Price variation clause		*						*
Opposition from social Bodies					*	*		

VI. Results and Discussion

This are the various risks that occur in the construction of the residential building. This is the data which is collected from the site engineer. Depending on their occurrence they are classified into various category, so it is easy to resolve those issue. After identifying these risks, it is necessary to apply some majors which will help to reduce the impact caused by these risks. We can use various ways like Risk Breakdown Structure, Work Breakdown Structure, Cash Inflow and outflow, Risk Matrix which we will see in the further study. In these it was necessary to find out the causes of the risks, list them out and work out to resolve them.

VII. Recommendations

Various risk mitigation strategies can be adopted to eliminate the impact of financial risk and its impact and pressure on the concerned authority. The use of Work Breakdown Structure and Risk Breakdown Structure can be extremely beneficial for the elimination of this problem. The study is limited regarding to the tracking process in terms of start variance and finish variance, schedule variance and cost variance indicators for the construction of residential project, which is a real estate project cost. A study of other large-scale residential projects could give a quite different picture as it may have a different scenario. Moreover, there is usually reluctance from the part of the project authorities to revel the data. More number of samples could give us a much clearer picture.

VIII. Conclusions

- Besides successful planning, according to a survey carried out by the government of India it has been reported that more than 80% of the projects suffer from severe financial risks. Reasons for such delays, which cause cost and time overruns and high level of financial risk, are huge and enormous. Financial risks are often the result of unclear contracts, quarrel between partners, project overruns and the major reason being loans, which are given on large interest rates. The impact of financial risks can be disruptive and expensive.
- Even though there are plenty of management techniques for financial risks, most of the projects do face this problem on a very large scale. Some of the projects have been shut down leaving the construction work incomplete taking money from people. All these problems make it very difficult to complete the project on time and within the estimated budget.
- The use of better strategies for management of financial risks and proper analysis of this particular factor can improve the situation and can lead to achievement of more growth and development of the economy as a whole.

Acknowledgement

The authors of this paper are highly obliged to the Department of Civil Engineering, TSSM's Padmabhushan Vasantadada Patil Institute of Technology, Bavdhan, and Pune. Authors would like to express their deep sense of gratitude towards management of TSSM's, Principal, Head of the Civil Department and PG Coordinator for their support.

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