

A study on Risk Management in Building Construction

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Abstract— The management of project venture is the science that applies abilities, apparatuses and procedures to satisfy need of exercises of undertaking by the implies that the forecasts and necessities of partners are satisfied or surpassed. The administration of Project hazard is a crucial part of the procedure, the objective of which is at recognizing the hazard that is potential which is associated with an undertaking and offering an explanation to those dangers. It incorporates exercises that expect to amplify the results identified with positive occasions and to diminish the effect of negative occasions. Normally it is trusted that chance in a situation can be chosen rather than destiny, and furthermore the innate vulnerability inside the plans that can influence the required aftereffect of accomplishing venture and business points. Hazard is blessing in every one of the exercises in a task; it is exclusively the quantity of sum that shifts from one action to various. Construction development industry characterizes the dangers and vulnerabilities that are more than other ventures. The arrangement procedure, keep up and executing all exercises of undertaking that is complex and tedious. The necessity of bunch of individuals with assorted ranges of abilities is required in entire procedure with the coordination of an assortment measure of complex and interconnected exercises. Numerous outside factor of the circumstance is made complex. The Development industry track record is amazingly awful as far as adapting to dangers, result in the disappointment of numerous activities to meet timetables of time, spending targets and once in a while even the work scope. As an outcome, a ton of enduring is forcing to the customers and temporary workers of such undertaking projects and furthermore to people in general. The work thinks about the disintegration of the task into modules and furthermore the each action or the disintegrated errand is investigated for the hazards related with that organize. In support of the better visibility and understandability of the activities the decision tree is being used for the activity representation. The proposed technique considers the dangers like monetary, social, ecological, political, and so on.

Index Terms— Construction industry, Risk management, Risk, Construction projects.

I. INTRODUCTION

The construction industry is extremely risk prone industry is construction industry, with project environment that is complex and dynamic for creating an atmosphere of huge uncertainty and risk. To diverse technical, socio-political and business risks

The vulnerable of industry depends. The track record to cope with these risks has not been of extremely high quality in construction industry. As an outcome, different failures bear in industries by the people working there, such as, failure of enduring by quality and need that is operational, overrun of price and uncertain delays in completion of project. By taken it into consideration, it can be assumed that a successful system of assessment and management of risk for industry construction remains a challenging task for the practitioners the industry.

The management of project is the science that applies skills, tools and techniques to fulfil need of activities of project by the means that the predictions and requirements of stakeholders are fulfilled or exceeded. The management of Project risk is a fundamental part of the process, the goal of which is at identifying the risk that is potential which is connected with a project and answering to those risks. It Includes activities that aim to maximize the results related to positive events and to reduce the impact of negative events. Usually it is believed that risk in an environment can be selected instead of fate, and also the inherent uncertainty within the plans that can affect the required result of achieving project and business aims. Risk is gift in all the activities in a project; it is solely the number of amount that varies from one activity to different.

Construction industry inherited the risks and uncertainties that are more than other industries. The planning process, maintain and executing all activities of project that is complex and time-consuming. The requirement of myriad of people with diverse skill sets is needed in whole process with

The coordination of a variety amount of complex and interconnected activities. Many external factor of the situation is made complex. The Construction industry track record is extremely bad in terms of coping with risks, outcome in the failure of many projects to meet schedules of time, budget targets and sometimes even the work scope. As a consequence, a lot of suffering is imposing to the clients and contractors of such projects and also to the public.

The process of risk management may consist of element that is connected more or less closely. There are three phases according to [1], the risk management process:

1. Risk identification;
2. Risk analysis;
3. Risk response



Figure1: Linear risk management process, Perry and Hayes (1985)

II. TYPES OF RISKS

There are different categorized of risks associated with the construction industry which are as following:

a) Technical risks:

- Inappropriate investigation of site
- Deficient design
- Adequacy of specifications
- Unreliability over the source and materials availability

b) Logistical risks:

- Enough transportation facilities availability
- Availability of resources-particularly construction equipment spare parts, fuel and labour.

c) Management related risks:

- Undetermined productivity of resources
- Problems in industrial relations

d) Environmental risks:

- Suggestions of weather and seasonal
- Hurricane

e) Financial risks:

- Variations and availability in foreign exchange
- Payment delay
- Inflation
- Local taxes

f) Repatriation of funds Socio-political risks:

- Accessibility of constraints and emigrant staff employment
- Customs and import restrictions and strategies
- Difficulties in discarding of plant and equipment
- Occasions on use of local firms and agents

III. OBJECTIVES

- To identify risks in construction projects so they could be managed while achieving project objectives.
- To suggest an appropriate model to predict the risk management protocol.

IV. PROBLEM STATEMENT

Construction projects are facing a number of risks which have negative effects on project objects such as time, cost and quality. This study is based on findings of a questionnaire-based survey on risk management in construction projects in Pakistan, reporting the significance of different type of risk, ultimate responsibility for them and the effectiveness of some most common risk management techniques practiced in the industry. The risks in the construction industry may vary from project to project where variation is because of many factors related to any construction project like environment factors, types of project, socio-economic factors, geographical factors, etc. The research methodology in the work tries to find the solution for the risk analysis on the basis of the certain considered factors for which the techniques and other approaches varies. The work considers the pattern matching or can also be termed as sequence matching for the prediction of the risk management strategy. For which the decision tree and sequence matching strategy is being used.

V. LITERATURE REVIEW

Risk management is getting much consideration, as it is viewed as a technique to improve cost, timetable, and specialized execution of new item advancement programs. Notwithstanding, there is an absence of exact research that examines the compelling joining of explicit Risk management rehearses proposed by different norms with new item improvement programs and their relationship with different components of Risk management achievement. In an overview of 291 new item advancement programs, this paper explores the relationship of Risk management rehearses with five classes of item improvement program execution: [2] Josef Oehmen et.al. (2015):

- A. Decision Making on the basis of Quality
- B. High program steadiness;
- C. Open, critical thinking association;
- D. Overall NPD project achievement and
- E. Overall item achievement.

The outcomes demonstrate that six classes of risk administration rehearse are best:

1. Development of risk management aptitudes and assets;
2. Tailor risk management to and coordinate it with new item advancement;
3. Quantify effects of risks on your fundamental destinations;
4. Support every single basic choice with risk management results;
5. Monitor and survey your risks, risk moderation activities, and risk management procedure; and
6. Create straightforwardness in regards to new item improvement risks.

The information demonstrates that the risk management rehearses are specifically connected with result measures in the initial three classes (improved basic leadership, program soundness and critical thinking). There is likewise proof that the risk Management rehearses in a roundabout way partner with the staying two classes of result measures (task and item achievement).

VI. RESEARCH METHODOLOGY

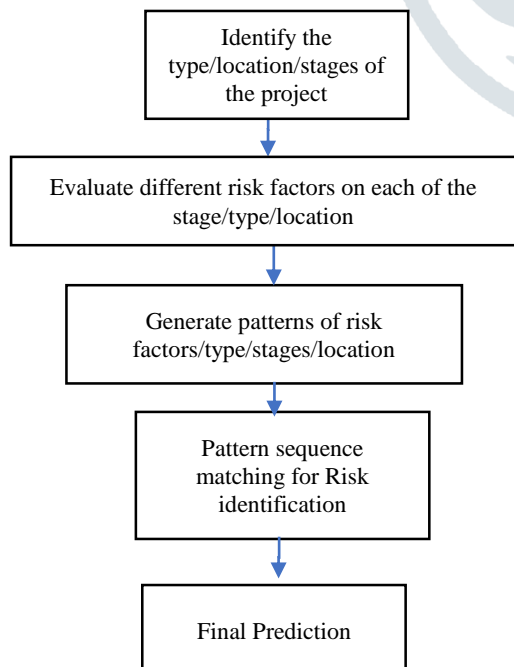


Figure 2: Proposed Architecture.

Well-ordered system of the proposed approach:

- **Step 1:-** The project is considered for the recognizable proof of the sort/area/ stages, the initial step was to deliberately survey before compositions in order to become familiar with the subject and about various ways to deal with interfacing risk management with the construction procedure as a reason for building up a necessary framework for overseeing risk in construction ventures.
- **Step 2:-** The risk factors related with stages/area/type are then assessed based on the examinations made by scientists,
- **Step 3:-** Patterns are created based on the risk factors/area/type/stages, utilizing the idea of choice tree as expressed beforehand,
- **Step 4:-** the produced examples are then coordinated with recently thought about information for the expectation of the risk,
- **Step 5:-** Final expectation and appropriate strides for minimization of that risk by the risk supervisory group.

Thinking about two kinds of project and area as in India and outside India and the phases for the construction project considered in the work are as under:

- 1) The Conception of the Project
- 2) The Design phase
- 3) Pre-construction phase
- 4) The Procurement phase
- 5) The Construction phase
- 6) The Post Construction phase

VII. RESULTS AND ANALYSIS

For the analysis the descriptive study is being considered where we will be considering many of the categories and parameters for the evaluation of the work.

Table 1: Risks factor analysis.

Risks	Traditional methods	Proposed Methodology
Economic	Considered partially	Included
Environmental	Not available	Included
Socio-Economic	Not available	Included
Political	Not available	Included

On the basis of the data presented in the above table, in column 1 various factors of risks are chosen and discussed whether they are the part of the current work or not and also

Compared with the traditional methods. In the traditional methods the financial considered is considered for the complete project like project a will take x amount which actually delays the completion of the project as the prices considered by various activities may varies with time. For the construction industry the environmental segment is the one which is to be considered at most because the risks are like by the project, is there any type of harm to the environment and also whether the type of construction which is to be considered will fit the available environment. Same in the case of the Socio-economic and political, in proposed methodology we focused on each and every stage of the work with all of the associated risks into it.

Table 2: Time, cost and others analysis.

Parameters	Traditional methods	Proposed Methodology
Time	Considered partially	Included
Cost	Considered partially	Included
Quality	Considered partially	Included
Risk management	Considered partially	Included

For the on-time and better completion of the project it is quite compulsory to consider out some of the points like time, cost quality and risks. In the case of the proposed methodology we have divided the complete project in different stages and the risks associated with every of the stage is considered or properly managed, which also helps in the quality management as well because we are working every of the stages.

In the risk management the factors considered are like economic, social, environment, political, etc. below are segments defining the different aspects of the traditional methods and proposed methodology.

Table 3: Analysis related to factors of environment.

Parameters	Traditional methods	Proposed Methodology
Earthquake	Considered partially	New technology implementation
Fire	Considered partially	Proposal follows high quality standards for construction
Rainfall	Considered partially	Adequate construction planning
High gale	Considered partially	Adequate construction planning
Environmental Damage/Pollution	Considered partially	All short of permissions and management as per the standards
Third party objections	Considered partially	Pre-NOCs

Table 4: Analysis of political risk.

Parameters	Traditional methods	Proposed Methodology
Change of laws	Not Considered	Pre field study makes aware about the laws.
War/Revolution/Riots	Not Considered	Political stands and cultural studies makes better management of such risks
Bribery/Corruption	Considered partially	All legal NOCs
Language/Culture	Considered partially	Proper market and field study
Lobby(Legal/ Illegal)	Considered partially	Considered

Rigid Bureaucracy	Considered partially	Considered
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Table 5: Analysis based on Economic factors.

Parameters	Traditional methods	Proposed Methodology
Increased material cost	No future evaluation	Proper pre-financial evaluation
Exchange rate fluctuation	No future evaluation	Critical markets study
Difficulty of financing	Not considered	Pre-financial contracts
Low market demand	No market study	Critical markets study
Strong Competitors	No market study	Critical markets study

Table 6: Risk assessments analysis.

Parameters	Traditional methods	Proposed Methodology
Need of risk management	The methodology is not conscious about the need of risk management and lacks a structured approach to face risk and uncertainty. Usually the organization is weak even in project management basic themes. Success in this kind of organizations depends on individuals characteristics and not on those of the organizations	The methodology has developed and implemented a formal RM system and Benefits of RM are understood in every level of the organization
Proactive actions	The methodology reacts after problems occur. No proactive action	There exists a standard process for RM which can be adequate for a particular project. There is a proactive approach for RM and Projects use previous experiences, especially for risk identification for each new project. Successes of previous projects can be repeated
Risk identification	No attempt to identify project risk is realised with the purpose of developing mitigation plans and	The methodology has established an integral RM plan with defined goals
Scarce	not attempt to learn from previous projects or to utilize lessons learned to prepare for uncertainty	Diverse strategies are implemented and documented as well as the results of RM. These are analysed latter.

Other than the segments discussed or evaluated above the proposed methodology works well for the below segments too,

Depending on circumstances, it can also provide: o subdivision of risk into more detail,

- ⇒ a measure of probability and impact,
- ⇒ identification of ownership of the risks,
- ⇒ importance/cost/acceptability of the risk, o practicality of mitigation actions,
- ⇒ cost and ownership of action,
- ⇒ timing of action,
- ⇒ Assessment of residual risk and measure of cost benefit.

VIII. CONCLUSION

The development of the framework was preceded by systematic analysis of prior studies of risk management and construction process, which resulted in several conclusions that were used for developing the framework for risk management in construction:

- ⇒ Risk management is by nature a cyclical process. Risks must be identified before the beginning of project realisation or the realisation of any phase through which the project passes. The environment in which the project is realised produces new risks during project realisation. The new risks must be analysed together with those identified and analysed earlier, in a continuous attempt to assess the probability and adverse effect of new risks in relation to existing ones. This creates the need for continuous risk management in all phases of project realisation.
- ⇒ The execution of a construction project is a process. The process in construction contains many special features in comparison with the process of other industries, which are an impediment for changes leading to process improvement. The risk that the project might be unsuccessful is in fact the risk that particular elements in the construction process might be unsuccessful. Risk management should be subordinated to the construction process. This means that the approach to risk management in construction should be changed from risk-driven project management to process-driven risk management. Improving certain elements of risk management lead to better understanding and to changes, in other words, to improvement of the construction process, which is one of the main goals of the construction industry.

It will research the breakdown of the construction process into phases so as to discover the group of activities necessary during the realisation of any construction project. Finally, it will research the connection between risk management and the construction process.

IX. REFERENCES

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