

A Review and Examination of Risk Management and Elements Impacting Building Construction Projects

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Abstract

There is enough of concern and risk while developing construction projects since they take place in complex and changing surroundings. Risks arise from a variety of sources, and construction items are unique and only produced once. Construction projects vary in terms of their locations, manufacturing methods, materials, and final product quality in terms of quantity, durability, and quality. The completion of projects within budget, time, and performance requirements is the responsibility of managers. All project activities include some level of risk; the quantity varies solely throughout activities. Identification of hazards, qualitative and quantitative evaluation, and reaction with an appropriate technique for handling and controlling risks comprise the process of risk management. In many firms, the idea of risk management is becoming increasingly popular. In order to enhance performance, reduce losses, and boost revenues, many businesses frequently implement risk management procedures in their projects. The purpose of this study is to define the factors that raise risk in construction projects. The results were influenced by the status of the construction industry as it is now, a thorough interviewing process with industry experts, and a review of the literature.

Keywords: Construction projects, Risk management process, Risk analysis

1. Introduction

The successful completion of any capital project, especially one involving construction, is thought to be significantly influenced by risk, and risk management is a crucial step in this regard. Accordingly, one of the key areas of interest for both academics and industry professionals in building today is risk management. "A methodical approach to examining areas of risk and deliberately deciding how each should be treated" is one definition of risk management. The second-biggest industry in our nation is construction. The goals of construction projects are invariably distinct and constructed only once.

Design, physical, logistical, legal, environmental, managerial, financial, and political are types of factors influencing with building. Due to the particulars of building operations, including lengthy durations, complex procedures, unfavorable. It is a management technique designed to locate risk and uncertainty, assess their effects, and provide suitable management solutions. A correct and methodical

approach is essential, but knowledge and expertise of all kinds are even more crucial for making an efficient and successful risk management. It necessitates, for instance, understanding the unexpected occurrences that could happen while a project is being carried out, what to do in the event that one of these events occurs, how to evaluate risks and determine their chance of occurring, and so on. The success of the project is impacted by systemic risk management.

2. Objective of study

Analysing the major risk variables, risk management influencing building construction projects is the primary objective of this study.

3. Literature Review

A number of studies have been carried out to determine the factors of risk in construction project:

Patel Ankit Mahendra, Jayeshkumar R. Pitroda, and J. J. Bhavsar (2013) conducted "A study on the influence of risks on building projects in developing nations." According to the study, risks have a big impact on the goals of building projects, which are complicated and unpredictable by nature. Although there are many potential sources of these hazards, the construction sector has had difficulty managing them well.

Patel Kinnareesh (2013) conducted Research on India's risk assessment and management. They claim that it is reasonable to conclude that most building projects in India lack a methodical process for handling risks associated with the final products. Additionally, it is discovered that construction projects in India had hazards related to quality, construction, and finances.

The overall health and safety practices of Kathmandu are in dire need of reform, as Sharestha (2017) pointed out. By choosing a task, dividing it into smaller tasks, identifying potential risks, and taking preventative measures, work safety analysis is a commonly used, straightforward technique for safety management.

For high rise construction projects in Saudi Arabia, Said Ali et al. (2016) noted that RM plan summaries with planned tactics are approved for use in risk identification, risk actions, assessment, qualitative and quantitative risk methods, mitigation and response planning, monitoring and control, communication, and reporting..

Bhandari M.G. (2014) a research on risk management in construction was carried out. They categorise hazards into dangers connected to technology, logistics, management, the environment, finances, and sociopolitics.

According to Paul et al. (2018), risk assessment (RA) is the process of categorising project hazards and taking appropriate action to manage them. The approach relies on a questionnaire survey that was completed by high-rise building project contractors in the area. Through the use of a pilot research and professional guidance, a total of 24 hazards impacting variables in three divisions were discovered. In Ernakulum's construction sector, formal risk assessment methods are not frequently applied. Combining qualitative and quantitative methodologies to study the risks can lead to the development of the RM and RA.

The potential alternatives to risk event, consequence, or impact estimations for managing the risk of high-rise building projects discovered by Imayanti et al. (2017). It employed statistical methods for qualitative data analysis. Contractors will benefit from the estimation of this kind of risk, especially when building high-rises, since it allows them to address risk variables, likelihood, and importance.

4. Risk Management Process

A project's successful completion depends on the identification and mitigation of risks, which is what the risk management process consists of. When implemented appropriately and with sincerity, construction risk management may lower the probability of an incident happening as well as its consequences. The simplest definition of the risk management process is taking proactive steps to minimise future project risks. Risk identification is the first step, followed by risk analysis, risk prioritization, solution implementation, and risk monitoring.



Figure 1: Risk Management Process

4.1 Risk Identification

Risk Identification involves, Ensure the security and well-being of workers, guests, clients, and other stakeholders,

Raise your company's resilience, Assist in decision-making, Ensure legal and regulatory compliance, Conduct "what if" analyses, Protect your cash flow, Ensure the success of your projects, Support requests for action or expenditure, Enhance your company's strategic and day-to-day management.

The first stage in the Risk Management Programme is risk identification through Pejman (2012). This is often an informal process that may be carried out in a variety of ways based on how the project team is structured. This implies that the process of identifying risks is mostly based on historical data, which should be applied to forthcoming initiatives. An allocation must be made in order to identify any possible dangers.

Managers use various techniques for risk identification, the best-known of which are:

Interviewing, Assumptions analysis, Document reviews, Delphi technique, Brainstorming etc

4.2 Risk Analysis

The analysis of gathered information regarding possible danger takes place in the second phase, assessment. Shortlisting hazards that have the most influence on the project by calculating how frequently they occur is known as risk analysis. Two types of techniques—qualitative and quantitative—have been established for the examination of the indicated risk. When dangers may be categorised along a descriptive scale ranging from high to low, the qualitative approaches are most suitable.

Quantitative methods:

Sensitivity Analysis

Scenario Analysis

Decision Trees

Probabilistic Analysis (Monte Carlo Simulation)

Qualitative methods:

Risk probability and impact assessment

Probability/impact risk rating matrix

Risk categorization and Risk Urgency Assessment

4.3 Risk Response Planning

The third phase of the risk management process is called risk response planning.

Measures are done to address the hazards. Greater priority hazards require greater consideration.

Risk Response Planning includes appropriate responses in the event that a risk materialises as well as proactive steps to keep it from happening.

Choosing a risk response should be done carefully since sometimes addressing one risk might lead to another, or "secondary" danger.

When it comes to handling risks, the following five strategies are most frequently employed:

Risk avoidance, Risk transfer, Risk mitigation (reduction), Risk sharing, and Risk acceptance.

4.4 Risk Control

Putting risk response into practice is the final step in the risk management process. To make sure all reactions to risks are successful, they must be watched over and evaluated. Project plans must be modified to reflect the take-aways and complete documentation of all responses to risks for future use. Risk Control should be a continuous process in which the impact of the risk is again analysed and assessed; any modifications to the budget, schedule, etc. as a result of the risk should be recorded and updated in the project plans.

Benefits Of Risk Management System : There are many benefits to managing our risks effectively, including :

Informed decision making, a more resilient business, Increased likelihood of successful risk taking (capitalising on opportunities), Protection of revenue, profits or market share, Protection of reputation/goodwill, Improved product or service quality and reliability, Protection of valuable assets, Increased likelihood of achieving strategic goals or objectives, Reduced costs and/or increased profits, Less failures and downtime, Competitive advantage, Fewer nasty surprises.

Many risks are seen as having purely negative consequences and for this reason it's not uncommon for those involved in risk management to take a pessimistic view of risk. But we shouldn't forget that many risks also have positive consequences. Effective risk management can help us to reduce the negative and increase the positive consequences of risk, thus helping our business to grow and flourish.

Principles Of Risk Management: The following risk management tenets are listed by the International Organisation for Standardisation:

Risk management needs to add value, Organisational procedures have to include risk management as a fundamental component, Managing risks ought to be considered while making decisions, Uncertainty should be specifically addressed in risk management, Risk control needs to be organised and methodical, The best information available should serve as the foundation for risk management, Risk control needs to be customized, Human elements should be included in risk management, Risk management need to be inclusive and open, Risk management needs to be flexible, adaptable, and dynamic, Risk management need to be able to be enhanced and improved upon continuously.

5. Work Methodology

Ten building construction parameters were taken into consideration when developing the questionnaire survey for this study. Five-point rating scales, ranging from 1 to 5, are used to represent the respondent's relevance for each factor. 5 is extremely high, 4 is high, 3 is medium, 2 is low, and 1 is very low. An expert field research was conducted based on a questionnaire survey to get input on the parameters found in literature reviews from building industry professionals.

The questionnaires were distributed to Thirty firms in total; of these, twenty-eight received useful responses, and two were returned for incorrect information. As a result, the response rate of 70% is regarded as satisfactory for this kind of survey. Thirteen of the twenty-eight businesses examined are proprietors, and fifteen are contractors. Every questionnaire survey was completed by the project manager or project engineer on location. In several instances, consultants provided the responses on behalf of their customers, who included both contractors and owners.

Risk factors are,

Financial risk , Design and Technical Risks , Environmental Risks , Project management risks , Legal risks , Construction risks, Social & Political risks

To identify construction project risk and outcome is a list of 40 number of risk factors under the category of design, physical, logistics, legal, environmental, management, cultural, financial, construction and political.

Note: 1-strongly disagree 2-disagree 3-neutral 4-agree 5-strongly agree

Table 1. Mean parameter Values

SL.NO	PARAMETER	MEAN
1	Ignored cash flow	4.2
2	Obtaining a permission is difficult	3.38
3	Defective design	3.12
4	Poor relationship and partner disagreement	3.18
5	Resources Are Not Available	3.23

6. Result

With a mean score of 3.2723, the chance of a skilled labour shortage has the highest risk rating. Other concerns with the highest risk rating include time constraints, issues relating to subcontractors, project delays, incorrect contract document verification, and competition from other businesses. The effect of the skilled labour shortage, with the highest mean of 3.5883. Time constraints have the highest risk rating for construction enterprises, while additional hazards include a lack of skilled labour, project delays, mistakes in design drawings, poor project planning and budgeting, and loss from fluctuations in the rate of inflation. This research also analyses the mean of the impact risk variables and likelihood based on survey and questionnaire data. To get the greatest benefits from the risk management strategy, it should be used early on in any building project.

Table 2. Risk factors of Probability and Impact mean

Sl.No	Risk Factors	Probability	Impact
		Mean	
1	Absence of qualified employees	3.2723	3.1883
2	Temporary building permits that have expired	3.1284	3.4329
3	Project delay	3.0173	3.1273

4	New options are required to prevent , reduce or minimise environmental effect,	2.5632	2.3832
5	Problems at a place	2.5231	2.3415
6	comfortable workplace for employees	2.8561	2.6439
7	overruns in construction costs	2.6754	2.8533
8	Project partner's breach of contract	2.7563	2.6196
9	Lack of materials	2.7563	2.6194
10	Environmental analysis not fully completed	2.6754	2.4782
11	Labour conflict	2.5439	2.3782
12	disagreements within the project team	2.3451	2.1234
13	Bad relationships and disagreements with a partner	2.4321	2.3897
14	Building equipment failure	2.4678	2.2365
15	Modifications to Bank procedures and policies	2.4164	2.3178
16	Loss brought about by shifts in politics	2.4532	2.3289
17	loss brought caused by exchange rate fluctuations	2.3297	2.2345
18	Ignorance of dispute resolution	2.3531	2.3167
19	inadequate confirmation of contract papers	2.2754	2.2178
20	Cost growth brought on by changes in governmental regulations	2.3189	2.2167
21	Changes in technology	2.1742	2.1289
22	Errors in scheduling and contractor delays	2.1278	2.1984
23	Mistakes and omissions in design	2.2265	2.2164
24	Water shortage at the site;	2.2265	2.1173
25	distance from an urban area	2.0943	2.1789
26	Not fulfilling the contractually defined quality standards	2.2789	2.2178
27	Low confidence of lenders and shareholders	2.1178	2.1075
28	Rehabilitation and resettlement of individuals	2.1178	2.1076
29	Risk of insurance	2.1893	2.1764
30	Equipment breakdown	2.1893	2.1791
31	inadequate budgeting and planning for projects	2.1542	2.1843
32	Loss as a result of the inflation rate fluctuating	2.1058	2.1193
33	Issues brought on by close or adjacent developments	2.0178	2.0079
34	Wastage of material by workers	2.0194	2.0487
35	Time constraints	1.9943	1.9921
36	Unpredictability and injustice in the legal system	1.9945	1.9852
37	Insolvency of a project member	1.9854	1.9964
38	Top management change	1.9832	1.9963
39	Lack of electrical supply	1.9742	1.9532
40	Material theft on the job site	1.9124	1.9132

7. Conclusion

It is observed that of the risks that have been found, around 22% impede work progress more than other

risk factors and should be given more attention. Approximately 65% of the risks are minor yet have a significant impact. Through the use of a pilot research and expert support, 40 risk-affecting elements across seven divisions were found. Every factor's influence is examined. In the construction firm, formal risk assessment methods are not frequently employed. Combining qualitative and quantitative approaches for risk analysis can enhance risk management and evaluation.

An essential component of the building process is risk management. The process that is essential to the project's success is accurately identifying and evaluating the risk elements. Risk management is rarely used by the participants in construction projects. Managing risks as efficiently as possible is its primary goal. Through analysis, journals and literature reviews data are collected as shown. To discovery of potential building construction mitigation strategies, this assessment of major risk variables aims to reduce risk in subsequent projects. That's why it's important to have a well-documented method that serves as a single source of information for any possible risks that may arise during the course of a project.

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