

# Risk Management in Retrofitting Projects

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**Abstract** – Risk management is now an important management technique in any project because of the possible negative impact of a risk on project objectives. The goal of risk management in retrofitting projects is to make informed judgments, avoid unexpected cost overruns, schedule overruns, poor quality, and incidents, and make the appropriate decisions to meet the retrofitting objectives. To prevent such risks in retrofitting projects, we must first identify them and then manage them. The goal of this study is to identify and understand the risks associated with retrofitting projects, as well as what steps may be taken to mitigate those risks. A good risk management strategy can assist in not just preventing but also resolving risk. The risks are described in this article, together with their influence on the project and the solutions (recommendations) that can be implemented to reduce or mitigate the risk.



Fig -1: Retrofitting of the structure

**Key Words:** Risk management, Retrofitting, Strategy, Risk, Mitigate, implemented

## 1. INTRODUCTION

When a structure becomes old, its strength deteriorates with time, need extra reinforcement. The damages incurred as a result of the damaged structure are well-known around the world. The most significant loss is a loss of life, which is the primary issue. In order to avert such losses and others, damaged buildings must be strengthened. The term "retrofitting" refers to the process of adding strength to a weakened structure. Such a retrofitting project entails risk, which must be managed, and for which these risks must be identified. The majority of older buildings were built with little or no seismic consideration, posing the greatest risk. A retrofitting technique is the answer to such a problem.

### 1.1 Retrofitting

The process of implementing new technologies is known as retrofit. Retrofitting is a term used in the construction industry to describe the process of adding strength to existing structures in order to make them seismically resistant. Instead of creating a new structure, this technique focuses on extending the life of an existing structure. Retrofitting an old building typically entails rehabilitation, maintenance, and reinforcement of the structure, which is a requirement not only in construction but also in administration.

## 1.2 Risk Management

Risk management is the process of identifying, analyzing, and responding to all risks that exist during a project's life cycle in order to keep it on track and meet its goals. A risk is anything that could have an impact on the project's timeline, money, or performance. Risks are possibilities, and when they become realities, they become problems that must be addressed. Retrofitting projects, like any other construction job, are fraught with dangers and necessitate a well-thought-out risk management strategy.

### 1.3 Importance of Risk Management in Retrofitting Project

Risk management is an important part of the decision-making process in the construction industry. Risk can affect the efficiency, performance, quality, and cost of a retrofitting project. Different projects to develop risk management approaches have sprung up as project risk has become more of a concern. "A system that aims to identify and quantify all dangers to which a project is exposed so that a conscious decision on how to manage the risks may be taken," according to the definition of risk management. Successful project management necessitates the identification of the factors that influence the project's scope, cost, timeframe, contracting strategy, and task execution plan. Much of the research on risk identification, assessment, and management for retrofitting facilities, focuses on aspects such as location, risk categories, and project types.

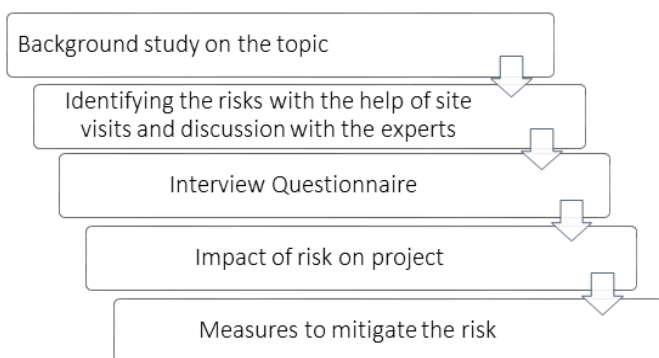
## 2. LITERATURE REVIEW

**Alfredo, Ximena, Rodolfo, Larissa (2014)** One of the most important responsibilities of a project manager is to control the project's risk. However, if adequate risk management is not done from the start of the project, this task becomes particularly complex and wasteful. A proper and methodical methodology, as well as expertise and experience, are required for an effective and productive risk management approach. This study takes a knowledge-based approach to risk management in construction projects, proposing a technique based on a three-fold arrangement that comprises risk management function modelling, evaluation, and the accessibility of a best practices model. The reality that risk management in construction projects is still really poor, and that the main reason of this condition is a lack of information, is a major preliminary finding of this research. It is predicted that using the proposed technique, clients and contractors would be able to build a project's risk management function based on best practices, as well as improve the function's performance.

This article gave a brief overview of a research project that is now underway with the goal of developing a knowledge-based approach to risk management in construction projects.

## 3. METHODOLOGY

The problem (risk) was identified through archival research, which was the first step in this study's methodology. After conducting interviews with the construction manager, contractors, structural engineers, a research method was developed. Interviewing, surveying, and analyzing the site were the methods used.



## 4. RISK ASSESSMENT

### 4.1 Identifying the Risk in Retrofitting Projects

To obtain the professional opinion based on experience of construction managers, structural engineers and contractors, a questionnaire listing the various risks was distributed following thorough literature review and interviews.

- Financial risk
- Social risk
- Industry risk
- Technological risk
- Installation risk
- Communication Risk

Questionnaire was made on the basis of risk, its impact on the project and its importance. Questionnaire had three parts,

1<sup>st</sup> part was about general information, such as name, occupation and no. of years working in retrofitting project,

2<sup>nd</sup> part was regarding identifying the risks and their impact on these retrofitting projects,

Q. Do you think these are the risk in a retrofitting project?

If yes what is the impact of the risk on the project.

Risks	Impact on the project

and 3<sup>rd</sup> part was about how these risks can be minimized or mitigated.

Q. What measures can we adapt so these risks can be minimized or mitigated?

Risks	Measures to mitigate the risk

### 4.2 Impact of these Risks on Retrofitting Projects

Financial risk

- Due to inaccurate retrofitting project estimates, the owner ends up paying more than necessary or may decide not to proceed with the project.
- Volatility in commodity prices, such as increases in labor expenses, material costs, equipment costs, electricity prices, and so on will increase the overall project cost which will affect the owner and the construction firm.

Social risk

- A lack of public approval, because retrofits are typically carried out while existing operations are still operational, creating significant disruption to tenants. Some tenants are unwilling to cooperate because they are concerned about losing revenue and commercial earnings during the retrofit.

#### Industry risk

- There may be a shortage of skilled personnel due to which the quality and finishing of the work to be done can get hampered.
- Lack of necessary knowledge about the retrofitting project among the parties involved can lead to inaccurate decisions.

#### Technological risk

- Inconsistent/poor performance of retrofitting technologies/materials can become the reason for structural failure.

#### Installation risk

- The retrofit techniques may not be applied effectively, resulting in the danger of not obtaining the desired strength.

#### Communication Risk

- Inefficient communication between contractors, consultants, and onsite workers can cause problems like delay and budget overruns in the project.

### 4.3 Measures to mitigate the risk

After identifying and analyzing the risks, the next stage is risk treatment, which is an action taken to address the risk. Consultation with construction managers, experienced professionals, and analysis of prior research can help develop mitigation solutions for the identified risks. As per the responses of the questionnaire survey the following measures were suggested:

#### Financial Risk –

To address the costs risk, we must first determine the scope of work to be completed and the project's expected outcomes. To generate an accurate project budget, you'll need to know the exact financial cost of each component. Include all other costs, such as taxes and cost associated with risk management activities. Add a contingency so that if the material pricing fluctuates, it will be used, and finally review your estimate two to three times.

#### Social risk –

If the retrofitting project takes less time or is completed on time, public approval can be boosted. Finding a new technology that causes the least amount of inconvenience to tenants can also help public cooperation in the project.

#### Industry risk -

Having skilled personnel for a particular approach can result in high-quality output. As a result, the construction manager should verify whether the contractor has a team of skilled laborers. Every team in the retrofitting project, including the construction manager, structural engineer, and contractor, should meet on a regular basis and be conversant with the project's goals and retrofitting techniques.

#### Technological risk -

In this risk, the structural engineer is crucial. He is the one who, based on NDT tests and calculations, determines which technology can be utilized to boost structural capacity. Before deciding on the technique to be used on site, the structural engineer must review it two to three times.

#### Installation risk -

The construction manager must pick a well-qualified contractor with past experience in the approach while it is being employed on site. Close supervision might also help to reduce the risk.

#### Communication Risk -

Keeping in daily contact with the construction manager, contractor, structural engineer, and laborers might help in the timely completion of the project. Construction managers can also assist in meeting each milestone on time and on budget by maintaining open lines of communication with all parties involved.

### 5. CONCLUSIONS

Risks might develop throughout any phase of a retrofitting project (design, construction and operation). Communication with owner, establishing the context of the retrofitting project, identifying possible retrofitting risks and their sources, analyzing identified risks, evaluating risks, identifying risk mitigation measures, developing guidelines to implement selected mitigation measures, and monitoring are all things that a risk management framework can help with. Once risk reduction measures have been adopted, the risk management process must be monitored on a regular basis to guarantee its effectiveness. A building retrofitting project's risk management plan should be monitored and reviewed regularly to ensure that it is working as intended. For retrofitting projects, construction managers should be hired so that they can adopt a risk management plan to reduce or eliminate risk.

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