UNIVERSITI TEKNOLOGI MARA

RISK MITIGATION FRAMEWORK IN MANAGING RISKS FOR CIVIL ENGINEERING PROJECTS IN MALAYSIA

MUHAMAD HAFIZUDDIN IDRIS

MSc

November 2025

ABSTRACT

This research focuses on the importance of risk mitigation as a key component of project management to ensure efficiency and profitability in civil engineering projects. The primary aim of this research is to develop a risk mitigation framework for managing civil engineering projects in Malaysia. It focuses on three objectives: i) identifying the risk factors affecting risk mitigation in civil engineering projects; ii) determining strategies for implementing risk mitigation in these projects; and iii) proposing recommendations for a risk mitigation framework for civil engineering projects. A triangulation methodology was adopted. The first methodology is a questionnaire survey, where data was collected from respondents from G7 contractors' companies and civil engineering consultants obtained from the CIDB and BEM database. Out of 350 respondents, 118 responses were collected and analyzed using SPSS Version 21. Second, face-to-face interviews were held within thirty (30) of selected survey respondents to gain deeper insights into risk mitigation strategies. To complete the triangulation process, expert interviews were conducted with four (4) professionals holding key decision-making roles such as Project Director, Project Manager, and Risk Manager, involved in civil engineering projects. The findings revealed fourteen (14) critical risk factors commonly experienced by contractors and civil engineers during project execution, including construction delays, late payments, unavailability of funds, design and scope changes, and poor communication. Additional important risks included coordination issues, competency levels, scheduling challenges, construction ambiguities, inflation and price fluctuation, project complexity, material shortage, political environment and improper client intervention. The study emphasizes requires a systematic process of risk identification, analysis, and management. The proposed framework contributes to both academic literature and the construction industry, offering guidance for professionals in navigating risk mitigation strategies. By adopting this framework, civil engineering professionals and contractors can improve their ability to manage risks, align strategies with project objectives and enhance overall project success.

ACKNOWLEDGEMENT

All praises and thanks be to Allah, the Lord of the ' Alamin. Salutations be upon Prophet Muhammad (peace be upon him), and may the blessings of Allah be upon him. Alhamdulillah, I am deeply grateful to Allah for granting me the strength, perseverance, and opportunity to embark on and successfully complete this meaningful and challenging Master's journey.

I would like to express my sincere gratitude to my main supervisor, Professor Datin Sr Dr Hamimah binti Adnan, and my co-supervisor, Sr Dr Har Einur Azrin binti Baharuddin, for their continuous support, insightful guidance, and unwavering encouragement throughout the course of this research. Their supervision has been instrumental in the successful completion of this thesis.

My appreciation also extends to the academic and administrative staffs of the Postgraduate Department, College of Built Environment, Universiti Teknologi MARA (UiTM), Shah Alam, for their assistance and support during my studies.

I am profoundly thankful to my beloved family for their unwavering prayers, patience, and sacrifices throughout this journey. Special appreciation is extended to:

My beloved father, Idris bin Jaafar

My beloved mother,

My loving wife, Nor ' Atikah binti Abdul Karim

My precious daughter, Fatima Azzahra binti Muhamad Hafizuddin

My cheerful son, Ali Kareem bin Muhamad Hafizuddin

My affectionate son, Amir Idrees bin Muhamad Hafizuddin

This thesis is lovingly dedicated to my family, whose vision and determination to support my education have been a source of strength and motivation. This accomplishment is as much theirs as it is mine. Alhamdulillah.

Lastly, I would like to thank everyone who has contributed directly or indirectly to this research. Your support has been deeply appreciated.

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

1.1 Introduction

This chapter's introduction provides the background and an overview of the study's context. It begins with the background of the research, followed by a description of the problem statement. It also includes subsections outlining the purpose of this study, the questions to be answered, the objectives of the study, and the methodology chosen. A brief description of the scope of the research and its contribution to the body of knowledge is also presented, followed by an overview and structure of the overall research.

1.2 Research Background

Construction projects are characterized by varying degrees of uniqueness and complexity, active involvement of multiple stakeholders, capital intensity, dynamic environments, long production times, and exposure to external environmental and weather conditions (Siraj & Fayek, 2019). The industry's distinctive characteristics, including the dynamic work environment, use of heavy equipment, and the seemingly inevitable interaction between workers and potential hazards, contribute to a disproportionately high rate of injury and illness compared to other occupations.

Over time, new technologies have been introduced to advance construction operations, but even with the progress, the construction industry still faces several challenges in achieving project goals (Alaloulk et al., 2021). Risks have a significant impact on the construction industry and, if these risks are not properly managed, project performance will suffer. Poor management of potential risks and uncertainties throughout the project lifecycle often negatively impacts project goals.

The efficiency of the construction organization becomes apparent if the organization manages the encountered construction risks efficiently. The opportunity to increase efficiency and profitability in the construction industry is demonstrated by good risk management. Given its role as the main economic engine sector, the construction industry is one of the most important industries contributing to the