



Faculty of Economics and Business

Factors Influencing Project Performance in Malaysian Construction Industry

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Doctor of Business Administration

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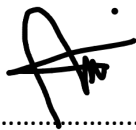
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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



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ABSTRACT

Success in a construction project is indicated by the performance in timeliness, cost, quality and stakeholder's satisfaction. Construction projects in Malaysia bears a high risk of being over budget and completed way past due. Thus, identifying the most influential factor towards a successful implementation of construction projects is crucial. Although a number of factors have been found to potentially influence the success of a construction project, the correlation between these aspects has not been extensively investigated. This research investigates the relationship between six (6) factors; top management support level, project management maturity, realistic schedule and budgeting, clear project goal definition, project team competency, and risk management. The results demonstrated the factors which has the most influence on Malaysian construction projects' success. Purposive and non-proportionate quota sampling was adopted to gather 224 samples from various project managers and leaders working in construction companies with CIDB G7 grade throughout Malaysia. To gather quantitative data, a questionnaire was developed by modifying previous research' questionnaires, and its validity and reliability were assessed using SmartPLS (SEM). The results show that defining clear goals, realistic scheduling and budgeting and project management maturity has the most impact towards project performance success in Malaysian construction industry. This study has made a significant theoretical contribution to the larger body of knowledge by establishing the most influence factors that contributed to project success. Furthermore, the outcome from this study shall contribute to construction companies, project management bodies, practicing project managers, and project analyst involved in the Malaysian construction industry.

Keywords: Project Management, Malaysia, Construction Industry, Project Success

Faktor-Faktor yang Mempengaruhi Prestasi Projek dalam Industri Pembinaan Malaysia

ABSTRAK

Kejayaan dalam projek pembinaan boleh diukur berdasarkan prestasi ketepatan waktu projek, kos, kualiti, dan kepuasan pihak berkepentingan. Projek pembinaan di Malaysia mempunyai risiko tinggi untuk melebihi bajet dan tempoh yang ditetapkan. Oleh itu, mengenal pasti faktor yang paling mempengaruhi kepada pelaksanaan projek pembinaan yang berjaya adalah penting. Walaupun beberapa faktor telah dikenal pasti, hubungan antara aspek-aspek ini belum dikaji secara mendalam. Kajian ini menilai hubungan enam (6) faktor iaitu; tahap sokongan pengurusan tinggi, kematangan pengurusan projek, jadual dan belanjawan yang realistik, definisi matlamat projek yang jelas, kecekapan pasukan projek, dan pengurusan risiko. Kajian ini mengenal pasti faktor-faktor utama yang mempengaruhi kejayaan projek pembinaan di Malaysia. Sebanyak 224 sampel diperoleh melalui pensampelan sasaran dan bukan berkadar dari pelbagai pengurus projek dan pemimpin yang bekerja di syarikat pembinaan dengan gred CIDB G7 di seluruh Malaysia. Buat kajian ini, satu soal selidik disediakan melalui modifikasi penyelidikan tersedia, dan kebolehpercayaan serta kebolehguamanannya dinilai menggunakan SmartPLS (SEM). Hasil kajian menunjukkan matlamat yang jelas, pengurusan risiko projek dan kematangan pengurusan projek mempunyai impak terbesar terhadap kejayaan prestasi projek dalam industri pembinaan Malaysia. Hasil kajian ini menyumbang kepada penambahan pemahaman terhadap faktor-faktor yang paling berpengaruh kepada kejayaan projek. Selain itu, kajian ini akan menyumbang kepada syarikat pembinaan, badan pengurusan projek, pengurus projek, dan penganalisa projek dalam industri pembinaan Malaysia.

Kata Kunci: Pengurusan Projek, Malaysia, Industri Pembinaan, Kejayaan Projek

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LIST OF ABBREVIATIONS

AM	Arithmetic Mean
AVE	Average Variance Extracted
CIDB	Construction Industry Development Board
CMV	Common Method Variance
CR	Composite Reliability
PLS-SEM	Partial Least Squares Structural Equation Modelling
SME	Small and Medium Enterprises
SPSS	Statistical Package for Social Sciences

CHAPTER 1

INTRODUCTION

1.1 Introduction

The aim of this research is to explore strategies that work and offer recommendations for enhancing the performance of construction projects in Malaysia. To establish a foundation for the subject, explanations and definitions of the key terms used in construction project managements is elaborated beforehand. The construction industry is, almost by definition, interdisciplinary and operating within a variety of frameworks as well as interacting closely with a diverse range of stakeholders, which includes architects, contractors, consultants, project sponsors/owners, or governmental organisations. In the construction industry, achieving successful project status has been deemed a difficult task. Failure of a project to meet its objectives usually results in a financial loss for all participating stakeholders. A failing project suffers from overruns in time and cost; this comes at a huge price to the stakeholders

In Malaysia, construction continues to play a pivotal role in advancing the country's infrastructure and modernization efforts. With an average annual growth rate of 7.2% from 1991 to 2020, the industry has witnessed substantial expansion, contributing an average yearly share of 3.9% to the nation's gross domestic product (GDP) (New Straits Times, 2022). According to the Department of Statistics Malaysia, the construction sector maintained its upward trajectory in the first quarter of 2023, registering a growth rate of 9.4% (DOSM, 2023). The notable contributions are attributed to civil engineering, specialized construction activities, and non-residential buildings. Forecasts suggest that the domestic construction sector is poised to grow by 6.1% this year, bolstered by improved

performances across all subsectors. This growth is primarily driven by increased demand for industrial buildings, propelled by enhanced private investment and robust domestic economic activities (New Straits Time, 2023).

The significance of the construction industry lies in its integral role in bolstering the economy, owing to its dynamic nature and interconnectedness with various sectors (Chia et al., 2014; Khan et al., 2014; Berawi et al., 2019). Moreover, the construction industry serves as the backbone for socio-economic infrastructure, facilitating industrial growth and providing essential amenities. These amenities include commercial and residential zones, transportation networks such as highways and railways, water reservoirs like dams, recreational areas such as playgrounds and stadiums, healthcare facilities, ports, airports, communication infrastructure, and power generation and distribution stations. Furthermore, in emerging nations, it lays the groundwork for crucial substructures aimed at elevating societal living standards (Chia et al., 2012; Razak Bin Ibrahim et al., 2010; Al-Shayea et al., 2019).

The Malaysian construction industry contributes greatly to the country's economy, but it has received negative publicity due to cost overruns, unrealistic schedules, accidents, poor workmanship, conflict among project joint members, and most definitely, the sore sight of an abandoned and unfinished private and public construction projects (Ting et. Al, 2019). It is deemed common to see structures collapsing, roads cracking, bridges toppling, and mosquito infested abandoned buildings, reflecting the dire need of improvement especially in Malaysia's construction industry, which has left a negative impression in the minds of the public. There is an urgent need to prevent project failure, particularly due to poor project management practices. As more organisations rely on project structures and tools to ensure

project success, it is critical to identify factors that lead to better project management practices for sustainability and viability (Latoni & Gacia, 2014). In order to find areas that may influence the success of construction projects to finish within the quality, timeline, and funds allocated, factors affecting construction project performance have been examined in this study. The primary goal of this research is to identify the most significant factors that affect project performance success in the Malaysian construction sector. For professionals working in Malaysia's construction industry, the study's findings will be useful in pinpointing the essential elements of a successful project. This will therefore enable companies to concentrate their limited resources on the important driving elements that may raise the likelihood that projects will be completed on schedule, within budget, and with high quality.

1.2 Background of the Study

According to the Project Management Institute (PMI) (2017), a project is a brief endeavour that is performed with the goal of producing a unique product, service, or outcome. Project management is the use of knowledge, skills, tools, and procedures to achieve project criteria. A construction project team, or stakeholder, is, in the majority of the world's construction sectors, a cross-functional team composed of individuals from different departments collaborating to accomplish a particular and distinct aim. According to Moretti and Oscar (2014), the process of effectively initiating and completing construction activities has so sparked the interest of senior management and researchers. Three basic criteria generally govern every construction project: budget, schedule, and quality (PMI, 2017). These variables are related to one another in a way that means that if one changes, the others are likely to be impacted as well. For instance, if the timeline is shortened, it is typical for the budget to go up since more resources are needed to finish the same amount of work in

less time. Consequently, the product's scope or quality may be decreased to deliver it in a shorter amount of time within a similar budget if an increase in budget is not achievable (PMI, 2017). Therefore, the objectives of every construction project are to finish the project scope on schedule and within budget. Every construction project has to deal with the difficulty of keeping an eye on and managing potential hazards and changes.

The term "project management" refers to the expertise that is utilised to oversee and manage change as well as guide a cross-functional team. Project management, according to the PMI, is the application of knowledge, abilities, instruments, and methods to project operations with the goal of achieving project requirements (PMI, 2017). The work is completed in detail by applying and integrating the 42 logically grouped project management processes, which are broken down into five process areas known as a project life cycle and include initiation, planning, execution, monitoring and control, and closing. The Project Management Book of Knowledge (PMBOK) divides the project lifecycle into four stages, which are depicted in Figure 1.1. Starting the project, planning and preparing for it, carrying out the work, and completing the project (PMI, 2017).

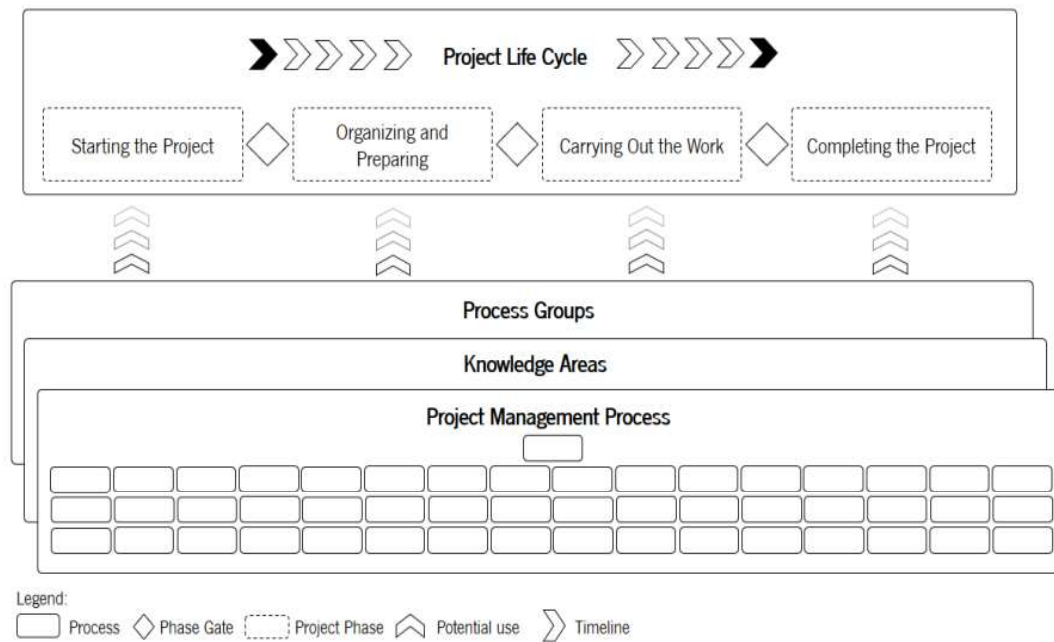


Figure 1.1 :Project Life Cycle

Source: Project Management Institute. (2017)

The ever-evolving construction market necessitates a paradigm shift in project management, emphasizing dynamic teams that can bridge functional gaps and deliver complex, time-bound projects (Ramli et al., 2021). According to Abu Hassan et. al., (2022), in today's dynamic Malaysian construction market, managing 'one-time special jobs' effectively requires a shift towards project-specific approaches. This involves meticulous goal-setting, flexible scheduling methodologies, and a commitment to continuous monitoring and adaptation to ensure project success.

1.3 Problem Statement

Recent researches are trying to uncover the various methods and challenges to improve project performance. Projects, according to Ahmed, Azmi, Mohamad, and Ahmad

(2016), carry out an operational strategy. The project's execution serves as an indicator for how well it is doing in terms of its ability to fulfil its improvement-related targets (Alsuliman, 2019). According to The Ministry of Rural and Regional Development (2017), the ministry had to take action in response to evidence that roughly 75% of construction projects took longer than expected and had to be delayed. According to the Malaysian government, improving construction quality is necessary for transforming the industry (Othman, Norfarahhanim, Ghani, & Woon, 2020).

Effective project management is crucial in the construction industry. Owing to the increased demand for construction projects, project performance monitoring is essential to the project's success. The predominance of matrix structures in today's project-driven organisations can be a major strain, as members report to several supervisors across different departments (e.g., civil, mechanical, and electrical). Due to the competing priorities created by this dual reporting, team members may feel more pressure to perform and may perceive themselves as less successful (Ling & Hamid, 2019). Malaysian organisations have significant difficulties because of the complex web of reporting links seen in matrix structures, especially in cross-functional project teams. Balancing competing demands and managing parallel reporting lines can result in job ambiguity, more effort, and ultimately, a sense of heightened project failure risk for each team member (Abdul Rahman et.al., 2020). The industry has some difficulties and barriers when integrating this component as well. This is evident from Kerzner's (2016), which highlights the vital leadership and management roles of a project manager while highlighting the significance of people-related issues in project development (Adu, 2019). Moreover, a lack of trust and top-level management support will hinder the collaborative team's success (Buli, 2019). Project management maturity (PMM) organisations continue to be plagued with project failures, which are typified by budget

overruns, schedule delays, and stakeholder discontent (Karim et al., 2023). The idea of Organisational Project Management Maturity (OPM) has gained popularity in Malaysia as a response to the increasing need for better project outcomes. OPM aims to systematically integrate, assess, and progress project management practices inside local organisations." (Abu Karim et al., 2022).

However, not all businesses will profit from the same ideal state of development (Wheatley, 2007). An excessively strict focus on raising PMM can result in bureaucratic inefficiencies, hinder innovation, and demotivate workers in Malaysian organisations, according to a case study by Wong et al. (2021). It emphasises the necessity of a flexible strategy that strikes a balance between agility and adaptation and PMM progress. These findings highlight the need for additional research on how project management maturity affects construction project success.

The nature of construction projects itself, which have extremely high constraints such as having to finish within a given amount of time regardless of viability, is the biggest cause of delays in the business. According to Chan et al. (2019), emphasising profit through significant budget constraints can have a detrimental effect on project results in the Malaysian construction industry, leading to delays, cost overruns, and schedule disruptions. Due to budgetary restrictions that are solely based on maximising profits, the construction sector in Malaysia is susceptible to project failure. Delays, overruns, and changes to the schedule may arise from this, which may lead to financial losses and reputational damage. These commercial and financial limitations present major obstacles for project teams. Cost overruns are causing organisations to become more complex, and previously unidentified issues are being updated (Simard, Aubry, & Laberge, 2018). Top management has not

supported the crisis because of the tension between a person's logic and an organization's goal (Ong & Bahar, 2018). The low project performance issue of not having enough money to support the project's advancement, which leads to late payments from the owner or customer, is also the outcome of unrealistic planning and poor cash flow management (Alsuliman, 2019).

According to Omar et al. (2019), there is a substantial impact on project performance in the oil and gas industry in Malaysia due to unclear project goals and unclear expectations regarding scope and outcomes. This can result in budget overruns, schedule slippages, and ultimately, stakeholder dissatisfaction with the project. Project success and stakeholder relationships are severely impacted by unclear project goals, scope, and expected deliverables, which is still a common problem in Malaysia. This can result in project delays, cost overruns, and ultimately, unsatisfying outcomes for owners (Emma et al., 2021).

A well-defined project outline is essential for the success of building projects. It impacts stakeholder communication and design quality as well as the project's overall performance in terms of budget, timeliness, and quality. The importance of owner competency in project definition has been highlighted in recent studies by Salleh et al. (2020) and Omar et al. (2019), especially in Malaysia's construction and oil and gas sectors where integrated projects are common. To guarantee project success and prevent expensive rework, owners must clearly articulate the goals, specifications, and scope of the project. Investing in stakeholder competency development programmes to improve their ability to articulate project objectives, requirements, and scope is essential in order to address the ongoing issues with ambiguous project briefs in Malaysia's integrated projects. This will have a major positive impact on the owner's happiness and project success. The local government claims

that the Malaysian construction industry is still beset by incapacity and a shortage of skilled project managers. About 90% of projects that were abandoned were due to management problems, according to data from the Ministry of Housing and Local Government in 2017.

While there is a growing awareness of the importance of construction project management competencies, challenges persist, particularly in handling sustainable structures (Hwang, 2013; Hasan, Sarpin, & Iskak, 2022). Despite decades of study and professionalization in project management, projects continue to deviate from budgets and schedules due to planning errors and human factors (Iriarte & Bayona, 2020; Shenhar & Holzmann, 2017). The task of developing the project within the constraints of budget, schedule, and quality falls to project managers. Highly qualified employees and the project team are required to ensure the project's success by incorporating their abilities, know-how, and unique qualities into the building project.

Hwang (2013) states that the construction industry is become increasingly conscious of the connection between project success and construction project management competencies. When it comes to construction, sustainable structures usually confront more complex issues than standard buildings. This extra difficulty is only apparent from the viewpoint of the project manager and his or her group (Hasan, Sarpin & Iskak ,2022).

On the other hand, as the need for building projects increased, so too has the body of study on project management since the field's professionalisation in the 1950s. Projects are still not succeeding as planned, even with studies on effective management and the development of project management standards (Iriarte & Bayona, 2020; Takagi &Varajão, 2019). Projects frequently stray from budgets and schedules, even in large projects, where administration usually takes up a sizable portion of the budget (Shenhar & Holzmann, 2017;

Turner & Xue, 2018). Project failures are mostly caused by errors in planning and estimating, a failure to carry out activities in accordance with the plan, or human error (Iman & Siew, 2014).

In the Malaysian construction industry, persistent challenges have hindered project performance, leading to delays, cost overruns, and stakeholder dissatisfaction. Despite efforts to address these issues, inadequate attention to critical factors such as project management practices and risk management strategies continues to undermine project success. The industry's complex landscape, characterized by dynamic market conditions, regulatory requirements, and organizational dynamics, exacerbates these challenges, making effective project management and risk mitigation imperative for achieving desired project outcomes. However, the current state of project management maturity and risk management practices within Malaysian construction organizations remains unclear, hindering efforts to improve project performance and enhance industry competitiveness (Karim et al., 2023; Omar et al., 2019).

Therefore, there is an urgent need to investigate the critical factors influencing project performance and risk management practices within the Malaysian construction industry. By identifying gaps, barriers, and opportunities for improvement, this study aims to provide actionable insights for stakeholders to enhance project resilience, mitigate risks, and drive positive project outcomes. Through a comprehensive analysis of the Malaysian construction landscape and empirical research into project management and risk management practices, this study seeks to contribute to the advancement of project management knowledge and practices in the Malaysian context, ultimately fostering

sustainable growth and development in the construction industry (Hwang, 2013; Hasan, Sarpin & Iskak, 2022).

A building project's performance might reveal its level of success. Numerous variables, such as project complexity, contractual agreements, participant relationships, project manager competency, and the skills of key project participants, will affect a project's performance. It is generally acknowledged that time, cost, and quality are the three main concern variables in project performance measurements. The "golden triangle" is made up of these three main parts (Figure 1.2). According to Atkinson (2006). In conclusion, the goal of this study is to determine the factors influencing the success of building projects in Malaysia. The study's conclusions will enable construction stakeholders, particularly contractors, to focus their limited resources on the most crucial locations for development.

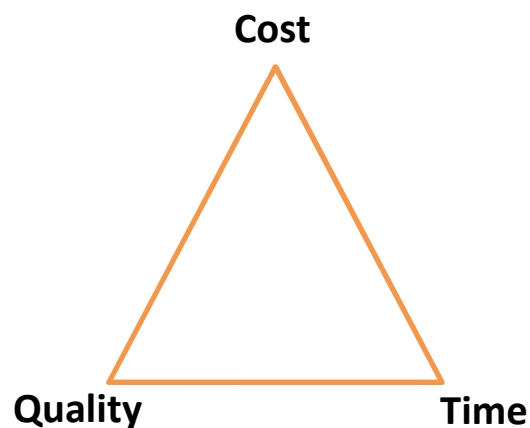


Figure 1.2: The “Golden Triangle” (Huffman & Klian, 2013)

1.4 Objectives

The general objective of this study is to determine the factors that have the greatest influence in the performance of projects within the Malaysian construction industry. The management team, future construction project leaders, and project stakeholders will focus their limited resources on the most important elements that could help construction projects be completed successfully after first identifying all the potential contributing aspects.

1.4.1 Specific Objectives

Based on the related literature reviews of project recovery management, the research-specific objectives are the following:

- i. To investigate the relationship between the level of top management support and the performance of construction projects in Malaysia.
- ii. To assess the impact of level of project management maturity and the performance of construction projects in Malaysia.
- iii. To analyse the association between realistic scheduling and budgeting to the performance of construction projects in Malaysia.
- iv. To determine the influence of defining clear project goals to the performance of construction projects in Malaysia.
- v. To evaluate the impact of project team competency towards the performance of construction projects in Malaysia.

- vi. To examine the influence of risk management to the performance of construction projects in Malaysia.

1.5 Research Questions

This study reviewed and evaluated relevant literature, discussed emerging research themes and has developed corresponding research questions. The developed research questions are as follows:

1. How does the level of top management support and affect the performance of construction projects in Malaysia?
2. How does the level of project management maturity and performance of construction projects in Malaysia?
3. What is the relationship between realistic schedule and budgeting and performance of construction projects in Malaysia?
4. How does defining clear project goals corresponds to the performance of construction projects in Malaysia?
5. What is the relationship between project team competency and the performance of construction projects in Malaysia?
6. What is the relationship between risk management and performance of construction projects in Malaysia?

1.6 Significance of the Study

This study investigates and identify important elements that need to be addressed to improve project performance in the Malaysian construction industry. Both research institutions and business practitioners in the construction sector will profit from this study. Around the world, construction projects continues to be a key component of economic and social progress. The economic and social well-being in Malaysia is closely linked to the performance of construction projects given the provision of essential infrastructure, such as housing, roads, and healthcare facilities, is a crucial function of this business, as noted by Salleh et al. (2020) and Azizi et al. (2022). This facilitates the growth and advancement of other sectors and the general development of the country. In Malaysia, where urbanisation and population growth are occurring at a rapid pace, the construction industry plays a critical role in providing basic infrastructure such as the Pan Borneo Highway, affordable housing developments, and state-of-the-art medical facilities. (Omar et al., 2019; Abdullah et al., 2017). These initiatives, carried out by a booming construction sector, stimulate economic expansion and raise Malaysians' standard of living. Additionally, the absence of office buildings, which are also provided by development activities, makes it impossible for enterprises to operate. Given its importance, the building sector is a major contributor to economic growth in Malaysia and most other countries in the world.

Governments all around the world frequently allocate a sizeable portion of their annual budgets to various construction-related programmes because of their importance for socioeconomic advancement. With nearly RM 146.37 billion spent on construction projects, 2019 was the most expensive year in Malaysia. The value of construction projects increased at a rate of about RM110 billion year between 2012 and 2018 (Department of Statistics

Malaysia, 2019). It is not assured that the Malaysian government will always have money for these projects given the state of the economy. Thus, it is essential to enhance the performance of construction projects in order to optimise the use of the restricted financial resources at hand. Malaysia's construction industry is facing several challenges, including a lack of workers, insufficient environmental protection, sub-par work, and low productivity. The successful completion of these projects is expected to yield beneficial outcomes for the construction sector and economic development, per the study's conclusions. Contractors and project managers will benefit from identifying areas of weaknesses that will contribute to develop strategies to ensure the success of their project, maximise organisational profit, and enhance their reputation in the market. Additionally, stakeholders from the government sectors and policymakers, particularly those involved in construction projects, will benefit from this study as it enables effective analysis of success factors and how they impact project completion. Construction projects will, thus, operate in a more cost-effective mode within the time constraints, saving stakeholders from absorbing negative effects of project delays and other failures.

Last but not least, this study will provide additional perspective and insights to project management bodies or institutions. Although there is a body of research that identifies major causes of project delays and another, additional literature that identifies a variety of success factors, there is a limited effort to illustrate the symbiotic relationship between effective project management strategies or factors against the performance of construction projects in Malaysia, as well as demonstrating the application of this knowledge of this interaction will allow the delivery of more successful projects. This is also the first study to quantify and rank these relationships to assist project parties in minimizing construction project problems. The current study was motivated by this research gap, which

is also evident in Malaysia. This research serves as a foundation for additional local research. Internationally, the findings of this study could serve as evidence for future comparative studies on various cultural, social, political, and environmental issues.

1.7 Definition of Terms

In this paper, six factors have been studied to determine their influence on project performance in the Malaysian construction industry. Table 1.1 below describes these factors and their definitions.

Table 1.1: Factors influencing the project performance and its description

Term	Definition	Sources
Level of Top Management Support	The extent to which senior management provides resources, guidance, and commitment to project success.	Chan, A. P., & Chan, A. P. (2004). Key performance indicators for measuring construction success
Project Management Maturity (PMM)	The level of development and implementation of project management processes and practices within an organization.	Project Management Institute. (2017). A guide to the project management body of knowledge (PMBOK® guide) (6th ed.). Project Management Institut

Table 1.1: continued

Realistic Scheduling and Budgeting	The process of developing project schedules and budgets that are achievable and based on accurate estimations of time and cost requirements.	Gido, J., & Clements, J. P. (2012). Successful project management (5th ed.). South-Western Cengage Learning.
Defining Clear Project Goals	The process of establishing specific, measurable, achievable, relevant, and time-bound objectives for a project.	Kerzner, H. (2017). Project management: A systems approach to planning, scheduling, and controlling (12th ed.). Wiley.
Project Team Competency	The collective knowledge, skills, and abilities of project team members necessary for executing project tasks effectively and achieving project objectives.	PMI. (2017). A guide to the project management body of knowledge (PMBOK® guide) (6th ed.). Project Management Institute.
Risk Management	The systematic process of identifying, analyzing, mitigating, and monitoring project risks throughout the project lifecycle to minimize the impact of uncertainties on project objectives.	Hillson, D., & Murray-Webster, R. (2017). Understanding and managing risk attitude (3rd ed.). Gower Publishing Limited

Table 1.1: continued

Project Performance	The degree to which a project meets its objectives, including completion within budget, schedule adherence, quality of deliverables, and stakeholder satisfaction.	PMI. (2017). A guide to the project management body of knowledge (PMBOK® guide) (6th ed.). Project Management Institute
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1.8 Scope of the Study

The aim of this study is to explore strategies that offer recommendations for enhancing project performance by examining the relationship between project performance and effective factors in the construction sector of Malaysia. Six criteria (independent variables) were taken into consideration in this study, which focused on what makes a project successful: project management maturity, realistic scheduling and budgeting, project team competency, identifying clear project goals, top management support and risk management. Subsequently, each of these factors was examined to ascertain how they affect the project's outcome (dependent variable). The Malaysian construction industry was selected as the study's main focus given the availability and access to information for researchers and the large number of targeted respondents available. A set of questionnaire was sent out to participants in the construction sector, specifically project managers and leaders employed by Grade G7 contractors as rated by the Construction sector Development Board (CIDB). As to the CIDB registration, G7 contractors hold the highest grade and are often awarded mega projects along with a team of project personnel.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter aims to identify, study, and determine the most effective factors to improve the performance of Malaysian construction projects. This chapter explores the relationship between the findings from current research and the success of construction projects. This literature review provided a detailed history and previous research on factors influencing the construction project performance, with critical insight gained by focusing on project management theory as a base and benchmark for conducting the review.

2.2 Project Management

One way to ensure that the work undertaken by experts is completed on time and with optimal quality is to apply project management concepts (PMI, 2015). Although their complexity and size might vary, construction projects usually consist of five stages, which is sometimes referred to as the “Project Life Cycle”. Each stage is made up of different process groups, as Table 2.1 illustrates, that requires specific approach by a project leader to complete its intended target and meet a set schedule (PMI, 2015). This makes construction projects easier to monitor and updates senior management. According to Choudhury (1988), project management is the process of applying knowledge, abilities, strategies, and instruments to various project operations in order to achieve the project's goals. In order for project management to be effective, the procedures of planning, initiating, carrying out, controlling, monitoring, and concluding must be applied and integrated. The project manager bears the responsibility of accomplishing all project-related objectives (Project Management

Institute, 2013). Furthermore, as stated by PMI (2015), project management is the process of designing, organising, supervising, controlling, and carrying out project to achieve predefined and shared benefits. Projects are brief, unique activities that are started with the intention of achieving a certain goal. The project management technique is most effective in bringing about the change that the project brings about (Kerzner,2013).

Table 2.1 : Project Management Process Groups

KNOWLEDGE AREAS		Project Management Process Group				
		Initiating	Planning	Executing	Monitoring & controlling	Closing
	Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.5 Monitor and Control Project Work	4.7 Close Project or Phase
				4.4 Manage Project Knowledge	4.6 Perform Integrated Change Control	
	Project Scope Management		5.1 Plan Scope Management		5.5 Validate Scope	
			5.2 Collect Requirements		5.6 Control Scope	
			5.3 Define Scope			
			5.4 Create WBS			
	Project Schedule Management		6.1 Plan Schedule Management		6.6 Control Schedule	
			6.2 Define Activities			
6.3 Sequence Activities						
6.4 Estimate Activity Durations						
6.5 Develop Schedule						
Project Cost Management		7.1 Plan Cost Management		7.4 Control Costs		
		7.2 Estimate Costs				
		7.3 Determine Budget				

Table 2.1: continued					
Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
Project Resource Management		9.1 Plan Resource Management	9.3 Acquire Resources	9.6 Control Resources	
		9.2 Estimate Activity Resources	9.4 Develop Team		
			9.5 Manage Team		
	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & controlling	Closing
Project Communications Management		10.1 Plan Communication s Management	10.2 Manage Communications	10.3 Monitor Communication s	
Project Risk Management		11.1 Plan Risk Management	11.6 Implement Risk Responses	11.7 Monitor Risks	
		11.2 Identify Risks			
		11.3 Perform Qualitative Risk Analysis			
		11.4 Perform Quantitative Risk Analysis			
		11.5 Plan Risk Responses			
Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

Source: Project Management Institute. (2017). *A Guide to the Project Management Body of Knowledge (PMBOK Guide)* (6th ed.).

Traditionally, time, cost and quality are usually referred to as the “iron triangle” has been accepted as the most widely used criteria for measuring success (Jha & Iyer,2007). Though there are numerous definitions for project management, essentially the discipline is understood to be an academic one that places a strong emphasis on planning-oriented techniques. Engineering research or theory pertaining to optimisation can benefit from the application of these methods (Lock, 2013). A project's success can be determined by a number of broad factors. Project management has garnered interest from multiple academic areas in the last ten years. A thorough assessment by Subramanyan (2014) indicates that the fields of project management and project organisation are seeing the emergence of various fresh viewpoints. These viewpoints range from managing stakeholders to managing project costs, quality, and schedules.

Project management is a discipline that was created to plan, organise, and oversee the execution of commercial, industrial, and information Technology (IT) projects. These programmes require the efficient management of numerous intricate processes (Lock, 2013). The ever-present risk factors in a project create roadblocks to its effective conclusion. The project management process is extremely dynamic and makes efficient use of the organization's resources to guarantee the planned and regulated achievement of objectives in compliance with those needs while also managing risk. A specific set of factors and limitations control project management (Young, 2013). The success of a project will depend on how well it is managed in terms of resources and time (Association for Project Management (APM), 2015).

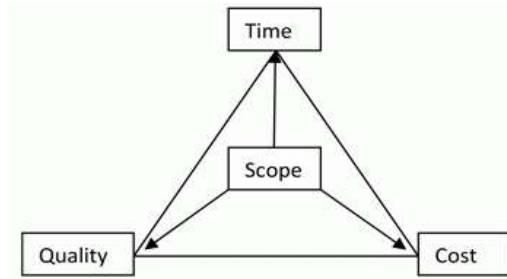


Figure 2.1: *Components of Project Success (Commitment, Coordination, Competence and The Iron Triangle) (Jha and Iyer, 2015)*

In light of the above findings, the definitions based on numerous works of literature are helpful for identifying multiple perspectives, the scope, and the importance of construction project management in the context of today. It helps in identifying the features of project management that have evolved as the field has developed and the changes this discipline has undergone. The project management technique, which was once a management discipline, is now relevant to various sectors because it achieves goals in accordance with its definitions.

2.3 Project Performance in Construction Industry

Improving the performance of the construction business requires an in-depth review of project performance. Project performance measures do not have a clear definition or are not standardised throughout the industry. Different performance assessment models take into account various criteria while evaluating performance. After examining a number of factors, a study of the literature focuses on three primary performance areas: quality, time, and cost. Moreover, the construction industry does not use a standardised performance model. It has been noted that emphasis on organisational outcomes, client satisfaction, and leadership skill are given greater weight than construction project performance. According to Lee and Husaini (2014), different researches use different levels of detail in their measures. There are other performance criteria that need to be contextualised with the construction industry

in mind. Given the significance of the construction industry on the global economy, performance monitoring in the industry is also crucial. Therefore, effective project management is crucial for raising performance levels in the construction industry. According to various research studies, performance measurement is essential (Jin, Deng, Li, and Skitmore, 2013). Key performance indicators are the main focus of current research on performance measurement (Ngacho and Das, 2014).

Thus, a review of the literature concentrates on three key performance categories out of multiple identified areas: cost, schedule, and quality. Authors have recently concentrated on discovering a few extra performance areas. Moreover, the building industry does not use a standardised performance model. A comprehensive analysis by Kulatunga and Haigh (2013) found that the efficiency of building projects is not given as much weight as organisational outcomes, customer satisfaction, and leadership ability. The degree of specificity in the metrics employed in each research varies. Contextualising additional performance criteria with the construction industry in mind is necessary. Quality is a key concern in the construction sector to deliver better services.

The aim of any construction project is to finish the job within the estimated budget, schedule, and scope while maintaining the necessary quality standards. Poor-quality work jeopardises the finances and reputation of the building company and wastes time and money. The client may exaggerate the demand for quality if the necessary standards are not clearly outlined in the contract, which could cause issues with the contractor. Ugwu and Haupt (2012) stated that performance data recording and documentation may come in handy later on, for instance in settling dispute resolution cases involving claims and maintenance and repair projects.

Huggare and Peter (2015) pointed out that three stages of analysis are required to evaluate the results of project management methods: comparing summary statistics of design performance, stating that any differences are statistically significant, and determining the least squares regression line of a plot of design performance measurement versus the quantity or application of project management to evaluate management influence on design phase and cost per unit. An important competitive concern of the new millennium is the performance assessment of building projects. Performance measurement is the process of assessing the efficacy and efficiency of an action, and it is an essential part of management (Neely et al., 2019). Some of the primary concerns with performance evaluation include "what to measure," "which measures to employ," "how to measure," and "how to interpret results" (Sandanayake and Oduoza, 2018).

2.4 Underpinning Theories Within the Field

2.4.1 Theory of Change

The Theory of Change (TOC) is primarily focused on managing uncertainty to ease resource constraints for various projects and can be used to evaluate project constraints, issues, and related problems and offer a revolutionary solution (Rand, 2000). For example, resource availability facilitates project scheduling to the extent that activities employing the same resources are scheduled in sequence (Steyn, 2002). The TOC is used to generate schedules for resources. Leach (2010) asserts that more intricate planning and sophisticated computer programmes cannot tackle the constraint-based problems (over time, within budget, and under-scope). It is possible to suggest that the reality of project is dynamic given unreliable estimates, dependent events, and frequently limited resources. As a determinant

in project performance, risk management is connected to TOC, as change can be introduced and accepted in risk analysis. In order to improve project execution, organisations should focus on project schedules instead of segregating the process to individual phases and adjusting each of the phase's efficacy (Bevilacqua et al., 2009). This will help pinpoint the main obstacle preventing better project execution.

The TOC includes a series of iterative procedures for enhancing the current state of affairs. The goal is to find the project management plan's weakest point (which is viewed as a constraint), exploit the limitation, prioritise managing the constraint over everything else, and if all other measures fail, return to the first step (Rand, 2000). According to Leach (2010, p.62) the use of TOC requirements in support of organisational policy and resource availability can enhance the timelines of the project. The practice of TOC in project management is crucial because it can reduce delays besides improve the possibility of completing the project according to the set schedule, within allocated budget, and in accordance with scope and quality criteria.

1.1.2 Resource Based View/Resource Advantage Theory

According to Barney's (1991) Resource Advantage Theory (RAT), each organization's own blend of resources is what causes it to function differently from other organisations. The idea is a part of the Resource Based View (RBV) of the firm literature, a larger body of work. According to a series of theories known as RBV, businesses can gain a competitive edge by organising their internal resources so that they are valued, unique, and organised for value capture. The RBV focuses on the utilisation and deployment of resources, the creation of core competences based on resources, and the resulting

competitive advantage (Das and Teng, 2000). As a result, the factors of project team competency, level of maturity in project management, and competency of the team are related to RBV theory in this study as effective management of these factors by the companies will give the organisation a competitive advantage and, as a result, will have an impact on the success of the project.

Growing empirical data reveals that the degree of autonomy and authority project managers have over their projects is directly related to the success of the projects (Grey and Larson, 2011). Project outcomes can decline in some organisations as a result of internal resource competition between project managers and operational managers as well as conflicting organisational agendas. Therefore, by offering a supportive environment for project managers, an organization's project management capabilities also directly contribute to the success of a project. A complex combination of organisational arrangements and management practises, such as organisational structure, role design, reporting processes, methods and procedures, focus and values, contracting relationships, and human resource management, are said to be used to demonstrate organisational capability in project management (Sauer et al., 2001). According to Sauer et al. (2001), to ensure project success, organisations must set up the necessary structures and procedures to support their organisational project management competency and capability. This will in turn create a positive feedback loop and increase organisational support for project execution.

A project team is described by PMI (2013) as a transient group of individuals that require a variety of resources; it functions as a kind of temporary structure inside the bigger company. A project's competitive advantage or disadvantage can be attributed to the particular combination of resources that this temporary organisation has access to (Barney, 2001a, b). As a result, the project team's ability to acquire crucial resources which grants it

a competitive edge over all the projects inside the organisation as well as across the industry and the market share is necessary for a project to succeed; at least in part. As a result, the primary idea behind RAT is the lack of resources within the external environment and how they influence the success of a project.

2.4.3 Goal-setting Theory (GST)

The goal-setting theory of motivation was introduced by Edwin Locke in the 1960s (Locke & Latham, 2006). The hypothesis suggests that goal-setting and task performance are directly related. Higher and better task performance is influenced by the clear, difficult goals and suitable feedback.

Clear, specific, and challenging goals are more motivating than easy, general, and vague ones. Greater output and higher performance are the results of setting specific, clear goals. Clear, measurable, and clear objectives that are also backed by completion deadlines help prevent misunderstanding. Clear, realisable, and challenging goals should be defined (Lunenburg, 2011). This notion is connected to the study's aspect of clearly defining project goals. The project team is further inspired to complete the next project or objective as a result. Additionally, effective feedback on results influences employee behaviour and results in higher performance than when feedback is not provided. Gaining reputation, giving clarifications, and tackling goal barriers are all possible through feedback. It encourages greater participation at work, which increases satisfaction with work.

2.4.4 Theory of Triple Constraints

The concept of a project is a short-term cooperative endeavour with the goal of producing a singular good, service, or result. This definition directly informs the Triple Constraints Theory (PMI, 2015). It is a unique, transient attempt conducted to realise predetermined goals, that are expressed either from project outputs, outcomes, or rewards. According to the Association of Project Management (2015), a project is considered successful once the goals are met whilst sticking to the set timeline and project budget set forth. Projects In Controlled Environments (PRINCE2) (2015) describes it as a temporary organisation established with the goal of providing one or more business goods in accordance with a decided Business Case (Office of Government Commerce, 2005).

The Triple Constraints theory also implies an additional crucial element: generally within organisations, and each organisation, there is limited number of resources that can be used to complete an endless number of tasks. This leads to scarcity and provides us with the three restrictions of a project timeline, budget, and its acceptable degree of project performance requirement (Dobson, 2004).

According to the Triple Constraint Theory, time, cost, and performance make up this triangle of restrictions. The environment inside each project completion is constrained by this triangle (Dobson, 2004). According to Wayngaad et.al. (2012), one of the important characteristics (pertaining to this study) is the triple constraint theory, allowing for a balance of interdependent foundations, namely cost, scope, and time, as a function of the project's goal.

2.5 Project Success

Despite contradictory opinions (Salleh et al., 2020) and ongoing debates over the gold standard for achieving it (Azizi et al., 2022), the idea of "project success" remains a debatable idea in literature. While proven techniques such as the proposed approach by Ika (2009), which offer helpful starting points, continuously researching and refining success indicators is necessary due to the changing nature of project types and stakeholder expectations. While traditional criteria like cost, schedule, quality, and shareholder satisfaction remain important (Salleh et al., 2020), contemporary understandings of project success in Malaysian construction require a more holistic approach, encompassing factors like conflict management, resource optimization, environmental impact, and alignment with evolving stakeholder expectations (Azizi et al., 2022). The majority of study generally focuses on the variables influencing the success of construction projects and the techniques used to measure that performance. The diverse perspectives of project stakeholders about project success and its factors will vary, just as construction project objectives vary and are influenced by varied success variables. Therefore, the ability to complete a construction project in accordance with the golden triangle within the project's budget, timeframe, and scope baseline is considered the study's definition of success.

2.6 Effective Factors of Project Success

A meta-analysis of earlier studies on the variables affecting the performance and outcome of building projects was finished. Six of the key variables that the majority of academics have identified are the ones that this study will look into more. Organisations,

mostly construction businesses, can control the six driving forces to increase the likelihood of success when implementing a certain construction project.

2.6.1 Impact of Level of Top Management Support on Project Performance Success

Senior-level individuals with leadership and managerial abilities are regarded as members of the top management. The role of the top management is to provide their employees with a great working environment and facilities as well as their responsibility to provide support to employees during project implement. Top management should provide encouragement as it is critical in determining the success of the project (Ahmed et al., 2016; Sperber & Linder, 2016). According to recent study, it considered top management support is essential to that project's success. Top management, consisting of individuals who serve as chief executive officers and a single or a team of managers which meets the required standards to lead a company (Ong & Bahar, 2018). According to Mozumder (2018), top management appears to have a greater influence on organisational outcomes through programmatic decision-making and organisational support. To ensure the success of a project, top management support and efficient planning are essential (Ahmed et al., 2016; Musambayi, 2018). Expertise, abilities, skills, and knowledge are examples of top management capabilities that improve company's performance (Mölders et al., 2019; Le et al., 2020).

According to Scott-(2008) Young's research, when five-dimension statements are measured, top management has a significant impact on project success. These include how top management responds to requests for more resources, how it shares accountability for a project's success, how much authority it has acquired, how the top management team helps

during a crisis, and how the project team is supported by top management when making decisions. Moreover, the support of top management is essential to the success of the project as it offers vital political backing and resource alignment to meet the project's requirements.

Furthermore, top management support is most frequently cited critical factors (Liu & Seddon, 2009), ranking first for projects across industries. The working environment in the Malaysian construction industry different compared to the Western countries due to the top management being typically, does not involve actively during work implementation due to the large gap created by high centralisation between management layers (Haque & Anwar, 2012).

It was mentioned in research by Sial (2014) , in his study done on public construction projects in Pakistan, that mandatory notices are not conveyed from upper management to project managers, which leads to poor ability to lead and is one of the most frequent reasons why projects in Pakistan's public sector organisations fail. Project managers need direct connection to upper management in order to increase the likelihood of project success. Then, top management needs to help project managers by giving them resources, giving them authority, offering crisis assistance, and making sure that the organisation maintains a skilled staff through training and skill-enhancement initiatives (Kuesten, 2013).

In summary, project outcomes are significantly impacted by top-level management support. The ability of senior management to assign tasks, offer crisis support, monitor and report team progress, and grant sufficient authority to the team to achieve objectives are important signs of their support.

2.6.2 Impact of Level of Project Management Maturity on Project Performance

Success

Construction project success is influenced by organisational maturity in the project team (or standardisation of project practices), claim Dragan & Peerasit (2005). This process of standardisation aids in the development of organisations' project management maturity by giving project managers a code of conduct and standard operating procedures for building projects.

In addition, a new standard known as the organisational project management maturity model has been released by the Project Management Institute (PMI). This model explains the importance of project management maturity and the level of maturity with respect to the construction project's chance of success. According to the Organisational Project Management Maturity Model-OPM3 (OPM 2013, p. 241) and The Standard for Organisational Project Management (OPM 12018, p. 48), organisational project management maturity is the capacity of the organisation to generate a predictable, controllable, and reliable result.

Since project outcomes are crucial to the construction industry's performance, project management maturity models must be applied in this sector. An effective method for evaluating an organization's project management capabilities is the maturity model. Its main objective is to give companies the tools they need to accomplish their objectives in a more planned and predictable way, increasing the possibility that they will succeed in terms of output, outcomes, and profit.

Project management skills are a critical strength in any Project Based-Firms or PBF. The financial success of a PBF is largely dependent on the outcomes of the project (Chen et al. 2019). According to Yazici (2010), organisations with superior degrees of project management (PM) maturity demonstrate improved performance during acquisition or preserverance for a competitive edge. According to Prado (2016), project management maturity (PMM) and success go hand in hand. Building upon the foundational work of Latonio & Garcia (2007), recent studies by Salleh et al. (2020) and Abdullah et al. (2017) refined the concept of Organizational Project Management Maturity (OPM) within the context of Malaysian sectors like Public Infrastructure and Residential Construction, emphasizing the significance of customising PMM assessments to local priorities and challenges. Moreover, possessing standard practices and operating procedures does not always indicate a high level of project management maturity. Instead, a distinction needs to be made between the organization's having the procedures in place but not enforcing them versus applying and enforcing them on a regular basis (Rald & Livin, 2003). According to Fabbro and Tonchia (2021), the five degrees of maturity listed in Table 2.2 can explain the organizational maturity model. The assessment can be applied to an establishment and it's enforcement and incorporation of formal project management practices. Level one companies have no formal reporting processes and their companies practises project management on an ad hoc basis, which results in irregular standards and low predictability on the performance of the project (Rald & Livin, 2003), that results in overbudgeting, postponement, and low-quality deliverables. Building upon the foundation by Rald & Livin (2003), recent localised studies have refined the concept of Level 5 maturity within specific sectors like infrastructure and residential construction. Salleh et al. (2020) and Abdullah et

al. (2017) highlight the importance of considering factors like stakeholder collaboration and environmental consciousness as key differentiators for Level 5 organizations in Malaysia.

The organisation is fully capable of managing projects, as evidenced by the advanced project management maturity level. This helps the project manager handle the project with ease and ensure the success of a building project since it is generally acknowledged by all team members. According to Chan, Zailan, and Fernando (2009), Project Management Maturity (PMM) can help businesses transition from structured, ad hoc methods to more mature, well-organized project management procedures.

Table 2.2 : Organisational Project Management Maturity Model

Maturity Level	Description of Organisation
Level 5 Optimizing with a focus on continuous improvement	In Level organisations, project management is consistently applied efficiently and effectively, resulting in project success. Project management is viewed as a critical business process and efforts are made to continuously improve the project process
Level 4 Comprehensive or integrated	In level 4 organisations, the project management culture is widely accepted and adherence to project processes result in successful projects
Level 3 Integrated or structured	In level 3 organisations have integrated, documented, and standardized project management methodologies, tools, and techniques
Level 2 Consistent or repeatable	In level 2 organisations, project management has been introduced and efforts are being made to gain wide acceptance of methodologies, tools, and techniques
Level 1 Ad-hoc or basic	Level 1 organisations do not have formal project management procedures, resulting in inconsistency and unpredictable project performance

Source: *The Journal of Modern Project Management*, 8. (Fabbro ,2021).

Additionally, it has been shown that an organisation's efficiency and capability can be improved by raising the maturity level of their project management, and that formalising programme management practices within organisational maturity frameworks can greatly increase the success rate of collaborative projects in Malaysia (Karim, 2022).

According to Kwak et al. (2015), maturity models (MM) have changed over time, started out by concentrating on process management, shifting to management systems, and recently adopting a more organizationally-focused, holistic approach. Their findings indicate that one of the main advantages of MM is their capacity to boost comprehensiveness (the PMM framework's capacity to address various facets of the organization's work) and effectiveness (the PMM framework's capacity to identify, prioritise, and lead the essential improvement) in enhancing efforts and gains.

2.6.3 Impact of Realistic Schedule and Budgeting on Project Success

The use of sustainable resources is now required for many structures, including housing projects, road projects, pipe installation, and other projects that involve several sustainable construction projects. We call these kinds of projects "repetitive projects". Three key components of project success are Quality, Cost, and Timeline. If all project expenses are taken into account and the budget is not exceeded, the project is regarded successful if it is finished ahead of schedule. The phases of a project's life cycle include planning, initiating, executing, monitoring, controlling, and closing. Project planning, which describes what and how things will be done in the project during the following stages, is the second step of a project. This project stage is referred to as the project management plan by the Project Management Institute, one of the professional organisations for project management. This procedure will define, create, and coordinate all secondary plans, combining them into a

single comprehensive plan that includes the project budget, project schedule, and ultimate deliverable (also referred to as the project scope baseline in the PMBOK) (PMI, 2017). The element in the Project Budgeting and Scheduling parts of the PMBOK is shown in Figure 2.2 in the subsequent page.

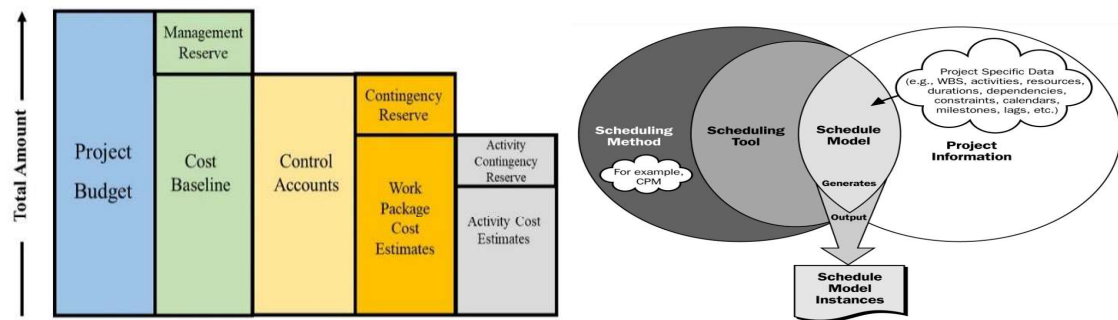


Figure 2.2: *Elements in Project Estimating and Scheduling* (Adapted from Project Management Institute, 2017).

The job must be of a high enough calibre to satisfy the necessary requirements and standards. Project scheduling is crucial since it provides information about the project's timeline, resource performance, including labour, materials, equipment, and cost estimates, as well as project length plans and the estimated time of project completion (Husen, 2009). Without a doubt, every construction project has a plan and a timeline for how it should be completed.

In Malaysian construction projects, schedule and quality have a big impact on a project's success (Yusri M., 2019). Establishing the significance of project planning, the PMI (established in 1969) reinforced this notion within the project management corpus of knowledge. Research confirming that project planning is one of the key factors influencing project success adds credence to the importance of project planning. A realistic project plan acts as a roadmap for working towards project success throughout the planning phase. It

consists of a realistic timetable and budget. One of the most important success criteria for building projects in Malaysia, according to this study by Abdul Hamid et al. (2016), is effective planning. On the other hand, it was discovered that inadequate planning was a significant factor in project failure, resulting in problems such as scope creep, budget overruns, and schedule delays. In a study involving 1448 projects, Dvia and Lechler (2004) looked at the correlations between project planning variables, planning quality, project scope and goal modifications, project plan changes during execution, and project success. The following seven criteria determines the degree of realistic planning: the task was broken down into work packages, each work package was given a time limit, and each team was informed of the tasks that have spare time or resources. Each work package contained an exact requirement for key staff, a clear budget plan, and a predecessor and successor.

Yusry (2019) suggested that schedule commitment and project success have a substantial positive link. There was a greater chance that projects that followed their timetables would be finished on time and under budget, which led to higher success rates. On the other hand, excessive delays, cost overruns, and quality problems were caused by ill-conceived or unrealistic schedules. This underlines the significance of realistic scheduling techniques and draws attention to the negative consequences of imprecise planning. His study also demonstrated that successful project completion and timetable adherence required competent staff, good communication, and economical resource allocation. These elements lessen interruptions that could cause schedules to go behind and help ensure that plans are carried out smoothly. This also highlights how crucial it is for the project manager to ascertain the resources needed to finish the job and satisfy the client's business and product objectives. This guarantees that the project will be able to deliver the final product within reasonable budgets and schedules (Nasir & Sahibuddin, 2011). In summary, project planning

forms the foundation for any project. When risks or events arise during a project's execution, having a realistic plan is especially important because it enables the project to regulate changes within a controllable range and ultimately achieve the client's goal.

2.6.4 Impact of Defining Clear Project Goals on Project Success

In order to build a strong basis for construction projects, the project defining phase is essential. In order to minimise disruptions and manage unplanned occurrences throughout the project lifecycle, Zwika et al. (2019) indicates that properly specifying project goals, scope, and restrictions during the initial project design stage is vital. Construction work frequently encounters issues due to unclear project objectives, scope, and expected results (Fageha & Aibinu, 2013). This greatly raises the risks of client's dissatisfaction. The most crucial skill for owners to have is the ability to clearly define the project's requirements, objectives, and scope in the brief (Xia and Chan 2010; Xia et al. 2012a, 2013), which is crucial for project management (Atkinson et al. 2006). This is especially true for integrated projects, as owners are advised to fully comprehend the project's scope and the needs of the end-users before conveying them to the contractor (Chan et al., 2001; Xia et al., 2012). According to the Nasir and Sahibuddin (2014) Delphi Study, having well-defined goals and objectives has a major beneficial influence on the effectiveness of the project. The crew as a whole should be informed of the project's objectives, they advised. Senior management, pertinent stakeholders, and all members should define, amend, and concur on these objectives. Better alignment and a more realistic assessment of the goal's feasibility are the results of educating the entire team about the objectives (and restrictions), which ultimately leads to the success of the project (Nasir & Sahibuddin, 2014).

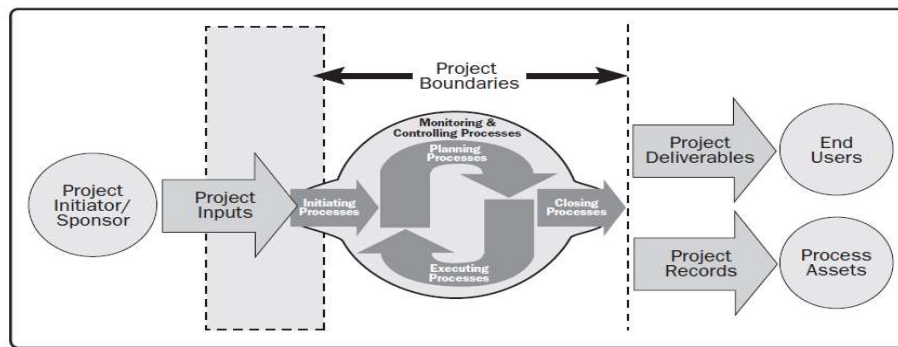


Figure 2.3: *Project Goal Defining* (Adapted from Project Management Institute,2017)

Based on the requirements of clients or stakeholders and the available resources, the project goal should be established in the initial stages. The project charter, which is decided upon and authorised by the clients or stakeholders, will include documentation of this to help define the project's bounds. Moreover, it facilitates the matching of plans and requirements with stakeholder expectations. A comprehensive understanding of the project's objectives and how their involvement may help guarantee that expectations are realised is provided to all project participants and stakeholders by clearly defining the aim (PMI, 2017).

2.6.5 Impact of Project Team Competency on Project Success

Research by Samariet al. (2016) suggests that low levels of understanding about construction, particularly sustainable construction, and the cost effect are some of the difficulties faced by Malaysian construction practitioners. There is also a lack of policies to direct and support stakeholders. According to research by Adeleke et al. (2019), which may have relevance for Malaysia, insufficient project expertise and a shortage of trained labour were major causes of construction delays and project failures in Nigeria. They underlined the necessity of funding construction industry professionals' education and training in order

to close skill gaps and advance their understanding of complex materials, systems, and designs. The experience, superior social skills, technical knowledge, professional ethics, and capacity to oversee construction projects define a project manager's competencies. Construction projects are more likely to succeed as a result of the role of the project manager, whose skill is crucial for reducing potential obstacles. (Mohammad & Mirghasemi, 2014).

The project manager and team members in a global project team might be more varied, use various electronic tools, and be spread geographically to differing degrees. In this scenario, project managers' ability to interact with internal team dynamics and communicate effectively is even more crucial. To ensure the project's success, members must have clear communication, confidence in one another, and competence. Project leaders must actively collaborate with the critical team, monitor each member's competency, and use effective communication techniques in order to strengthen project control (Verburg, Bosch-Sijtsema, & Vartiainen, 2013). Within the construction process, a project manager is a key player. Someone with the necessary experience, backed by knowledgeable administrative and professional staff, would oversee the project and be responsible for its day-to-day operations (Mohammad Mirghasemi et al., 2014).

Therefore, it is crucial to understand the competences that project managers need to manage construction projects, especially those that include high levels of complexity or sustainability. Rapid and unforeseen changes have occurred in the business environment due to globalisation, digitalization, and transformation. Consequently, the project's completion ability has become essential to the company's expansion and existence. Project managers are becoming increasingly interested in the issue of success, which has grown in importance (Steinfeld P., 2011). The initial project success study focused on success criteria and critical

success factors. Researchers have recently concentrated on the relationship between project manager and project team capability and project success (Turner, 2011). The project management team's ability and competency to achieve the business strategic goal is critical to driving project performance.

2.6.6 Impact of Project Risk Management on Project Success

In many organisations, risk management (RM), has become increasingly common. Numerous businesses use RM in their projects to boost output and profitability as well as enhance overall company performance (Ahmadi et al., 2017). In project management literature, the terms "risks" and "uncertainties" are frequently employed (Hopkinson, 2017; Qureshi et al., 2020). Risk management for a typical project consists of five stages. Nonetheless, the goal of traditional RM is generally to be on the lookout for threats or negative risk. The project risk management process is visualised below in Figure 2.4 (Bahamid & Doh, 2017; Hillson, 2020).

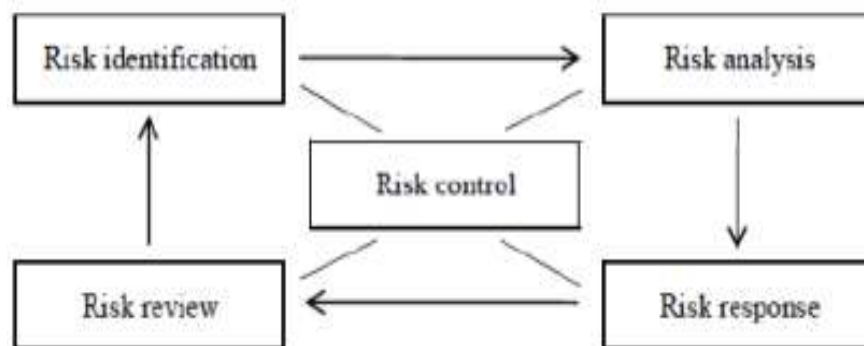


Figure 2.4: *The Risk Management Process* (Hillson, 2020).

Using the same four components or steps as Bazin (2017) and Hillson (2020), Pialles (2017) presents the model as a circular project that highlights the fact that risk management is a time-learning process. The basic idea of risk management is consistent across the literature; however, the actual procedure differs depending on the industry and type of organisation. Setting the scene is the aim of the definition phase, which is the first stage of a conventional risk management approach. Since the project objectives are being identified and settled upon in this phase, it is considered significant according to both Shahmid and Doh (2017), and Hillson (2020). The outcome of the first phase is a definition document, also referred to as the Risk Management Plan (Hillson, 2020), which documents the choice regarding the scope and specifics of the risk process. The main risk management process involves four stages namely: Risk Identification and classification, Risk analysis and assessments, Risk management response, monitoring and control development (Bazin, 2017).

2.7 Conceptual Framework

By analysing the conceptual framework in Figure 2.5, hypotheses are constructed to quantify and ascertain the link between variables. The information sharing instruments that Chong and Besharati (2004, pp. 173, p. 174) identified are the independent variables used for testing in this study. They are as follows:

- Level of top management support
- Project management maturity level
- Realistic scheduling and budgeting

- Clear project goals
- Project team competency
- Risk management

Meanwhile the dependent variable is the ‘project success’.

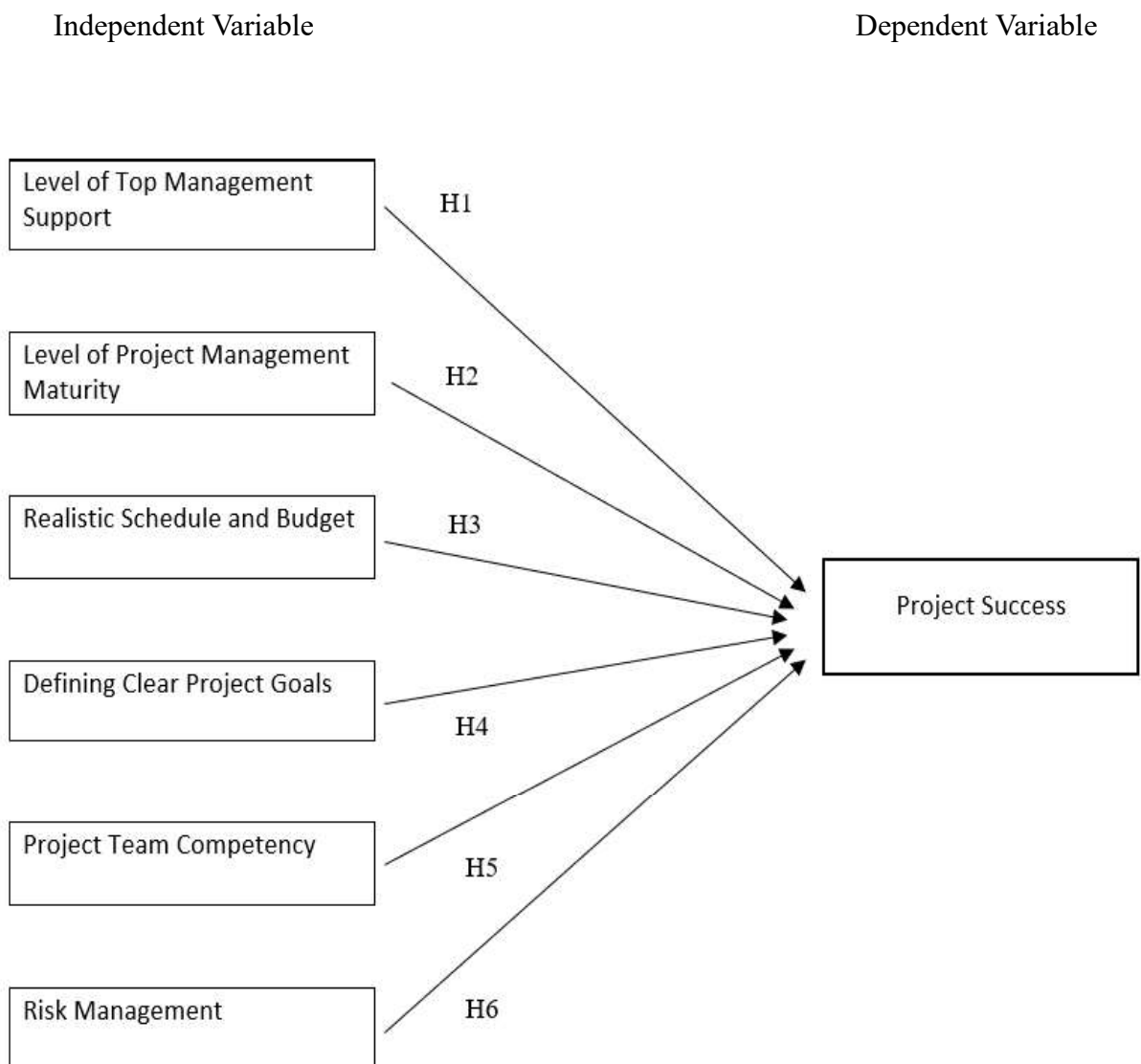


Figure 2.5: Conceptual Framework

2.8 Hypotheses Development

This study focuses on six critical factors that influence the success of a construction project. The project success factors aim to deliver the project according to timeline, within budget, and meets the necessary requirements (Kendrick, 2009). As a result, an analysis of the impact of each factor on project delivery success and, ultimately, providing the project manager with better project control.

H1: There is a positive relationship between the level of top management support and construction project success in Malaysia.

H2: There is a positive relationship between the level of project management maturity and construction project success in Malaysia.

H3: There is a positive relationship between realistic schedule and budgeting and construction project success in Malaysia.

H4: There is a positive relationship between defining clear project goals and construction project success in Malaysia.

H5: There is a positive relationship between project team competency and construction project success in Malaysia.

H6: There is a positive relationship between risk management and construction project success in Malaysia.

The study will examine the following independent variables: the degree of top management support, the maturity of project management, realistic scheduling and budgeting, the definition of clear project goals, the competence of the project team, and risk

management. Regarding the dependent variable, the purpose of the paper is to examine the project performance success.

Table 2.3 shows the relationship between the research objectives, research question and the hypothesis. Each research objective is aimed at exploring a specific factor that might influence the performance of construction projects in Malaysia. The hypotheses directly correspond to these objectives by proposing a positive relationship between each factor and project success. The research questions are designed to probe the specifics of each relationship being studied. The hypotheses provide a testable statement that can be examined through empirical research to answer these questions.

Table 2.3 : Table summarising the research objectives, research questions and hypothesis

Research Objective	Research Question	Hypothesis
1. To investigate the relationship between the level of top management support and the performance of construction projects in Malaysia.	1. How does the level of top management support affect the performance of construction projects in Malaysia?	H1: There is a positive relationship between the level of top management support and construction project success in Malaysia.
2. To assess the impact of level of project management maturity and the performance of construction projects in Malaysia.	2. How does the level of project management maturity affect the performance of construction projects in Malaysia?	H2: There is a positive relationship between the level of project management maturity and construction project success in Malaysia.

Table 2.3: continued

3. To analyse the association between realistic scheduling and budgeting to the performance of construction projects in Malaysia.	3. What is the relationship between realistic scheduling and budgeting and the performance of construction projects in Malaysia?	H3: There is a positive relationship between realistic scheduling and budgeting and construction project success in Malaysia.
4. To determine the influence of defining clear project goals on the performance of construction projects in Malaysia.	4. How does defining clear project goals correspond to the performance of construction projects in Malaysia?	H4: There is a positive relationship between defining clear project goals and construction project success in Malaysia.
5. To evaluate the impact of project team competency towards the performance of construction projects in Malaysia.	5. What is the relationship between project team competency and the performance of construction projects in Malaysia?	H5: There is a positive relationship between project team competency and construction project success in Malaysia.
6. To examine the influence of risk management on the performance of construction projects in Malaysia.	6. What is the relationship between risk management and the performance of construction projects in Malaysia?	H6: There is a positive relationship between risk management and construction project success in Malaysia.

2.8.1 Level of Top Management Support

As stated by Kuratko, Hornsby, and Covin (2014), top management is essential to project implementation and goal achievement. For projects to be successfully completed, top

management serves as a vital conduit between the executive or strategic levels of the company and project managers (Too & Weaver, 2014). It is suggested by Tesch and Kloppenborg (2015), that organisations must select senior management who has a stake in the project's success and serve as sponsors to increase the project's chances of success. Over the course of the project, a project sponsor serves as a crucial connection between the project manager and upper management by taking on a range of responsibilities and activities (Kloppenborg, Debbie Tesch, & Manolis, 2014). These studies review existing research on top management support and proposes a multi-dimensional framework encompassing resources, communication, structural arrangements, expertise, and power. Lack of commitment or misalignment with operational goals from top management were identified as major barriers to success (Hotlan et.al,2022). The strategy needs to be realigned and reevaluated from the perspective of the most pertinent stakeholders to ascertain the significance of top management support and what constitutes effective top management support (Young & Jordan, 2008). The degree to which the project team is given sufficient authority, that the resources required for the projects are obtained, that management members share responsibility for the construction project's success with the project team, and that the project team is supported during times of crisis are all indicators of the top management's support. Even if the research may not be specifically focused on top management support, they nevertheless emphasise the significance of organisational elements that might affect project success and offer insightful background information for comprehending the function of top management. As a result, the first hypothesis focuses on how top management support levels affect the success of building projects.

H1: There is a positive relationship between the level of top management support and construction project success in Malaysia.

2.8.2 Level of Project Management Maturity

A project's maturity is a wide term that may be measured to show how well it performs in several managerial domains. From this perspective, a project is deemed mature when it reaches a certain competence level and can continue to follow a consistent approach (Hartono et al. 2019). In addition to giving an accurate representation of the organization's capabilities, maturity models give a methodical and disciplined way to benchmark and enhance the processes (Kwak & Ibbs, 2002). In order to provide rigorous recommendations for improvement, the current status of a specific project's snapshot can be compared with the best in class to detect significant gaps (Fahrenkrog et al. 2003; Hartono et al. 2019).

Maturity models consist of multidimensional measures reflecting a broad concept, and each dimension is itemized to represent specific aspects of maturity. These multidimensional measures are commonly known as knowledge areas, and the items are the different capabilities of a given knowledge area (Crawford, 2014; Project Management Institute, 2013). The mean score of fixed-capability items under a given knowledge area defines the overall maturity level of the specific knowledge area.

According to several studies (Anantatmula & Rad, 2018; Brookes et al., 2014; Pretorius et al., 2012; Sanchez et al., 2020; Willis & Rankin, 2012), there is a positive relationship between project management maturity and project performance. This suggests that organisations can gain a competitive edge by implementing project management maturity models. Since project management organisational maturity has an impact on project success, this leads to the second study hypothesis.

H2: There is positive relationship between the level of project management maturity and construction project success in Malaysia.

2.8.3 Realistic Schedule and Budgeting

The process of finding, creating, and arranging each subsidiary work item and plan, then combining them into a comprehensive plan that incorporates the project budget and timeline, is known as project planning (PMI, 2017). The quality of deliverables and the significance of project planning have been recognised as critical components of any successful construction project (Dvir & Lechler, 2004). Project timelines and budgets, as outputs of project planning, have become a standard of measurement. The team uses a realistic project plan as a guide as they strive to complete the project successfully. This plan contains realistic scheduling and budgeting (Dvir, Rax, & Shenhar, 2003). Seven factors were employed, as was covered in the earlier part, to determine the level of realistic planning or quality. In a study by Zwika, K., & Auerbach, H. (2017), focused on the construction sector and the challenges of dealing with unanticipated events during project execution, a framework was developed for creating a scheduling system that is more flexible and able to handle changes. These resources offer insightful information about how project planning is changing and how important it is to evolve with the times. They stress that in order to guarantee project success in a changing environment, practical assumptions, adaptable approaches, and continual monitoring and modification are essential.

H3: There is positive relationship between realistic schedule and budgeting and construction project success in Malaysia.

2.8.4 Clear Project Goals and Construction

A study by Zainol et al. (2018) investigated how project manager leadership contributed to team cohesion and project goals in Malaysian construction projects. Effective leadership behaviours, such as goal-setting, communication, and motivation, were found to have a substantial impact on team alignment and commitment to project goals. In order to save time, the project manager might reduce the scope of the work and rationalise operations with the help of specific targets. The impact of shared aims and collaborative practices on the success of building projects in Malaysia was examined in a study by Ismail et al. (2021). They found that shared and well-defined goals fostered a sense of shared responsibility and commitment among team members, leading to improved communication, coordination, and diligent execution of project tasks. Clearer and more specific the goals increases the odds of the project to be successful, particularly in the perspective of end-user. Zwika, K., and Auerbach, H. (2017) highlights the benefits of involving client in defining project goals and developing adaptable schedules. Its findings on collaborative goal setting and managing uncertainties resonate with the importance of early engagement and clear objectives. As a result, the fourth hypothesis is

H4: There is positive relationship between defining clear project goals and construction project success in Malaysia.

2.8.5 Project Team Competency and Construction

The performance of construction employees is regarded as an important factor in determining the success of the construction organisation. To improve project performance, it is necessary to understand the relationship between the project manager's and team

members' competencies and their employees' performance at work. Project management competences enhance project performance, and the body of research supports the notion that project management is the job of the future. The project management profession is under increasing pressure to identify and improve the project management competencies required to continuously improve project execution (Soótyisik et al., 2020). This is because there is a positive correlation between project management competencies and performance. Irfan et al.'s (2021) quantitative research involving project engineers based in Pakistan supported that human-centered project management competencies are critical in driving project success since stakeholder involvement is improved. Xue et. al (2020) examined the competencies of project managers, assuming that their primary role was to encourage innovation. Project management competencies, which take behavioural, attitude, and personality factors into account, are the abilities, know-how, and skills required to accomplish project success. Supporting evidence for the idea that project management skills could enhance project circumstances and produce creative and sustainable project outcomes came from a quantitative correlation research.

The awareness of the human components of the discipline appeared to have expanded with the maturity of project management experience. Unqualified project managers typically concentrated on technical project management skills, such as triple constraint management. Efficiency as a measure of project success, showing that project management skills have a beneficial influence on project success (Badewi, 2016). Therefore, enhancing project team abilities that enhance project performance and organisational competency ought to be a primary focus of research in Malaysia's construction industry. Hence, the fifth hypothesis

H5: There is positive relationship between project team competency and construction project success in Malaysia.

2.8.6 Project Risk Management

Examples of risk management include the following processes: risk identification, risk management planning, risk and impact analysis, alternative action formulation, planning for contingency, risk monitoring and control, and construction project management. The construction business is growing, and understanding risk management methods is necessary to position it to best meet client expectations (Augustine et al., 2013). To ensure that project clients and contractors receive value for their money, project managers must put into place efficient risk management methods (Serpell et al., 2017). As many researchers have shown, the first, most important, and riskiest step in risk management processes is identifying the risk. According to PMI (2017), developing a risk management strategy is necessary prior to classifying and identifying risks and their origins, as it is necessary to organise the risk management procedure comprehensively. The goal is to maintain their competitive advantage in the market, however today's construction project leaders confront several problems due to the growing complexity of building projects. A few of the difficulties are caused by problems like rapid advances in technology, rising costs for raw materials, unstable world economies, a lack of well-defined performance standards, and project risk management. Practices for risk management in Malaysian building projects: pinpointing areas that need improvement. Better risk identification, communication, and integration into project planning and control procedures are required, according to a study by Goh B.H. et al. (2019). Poor risk management can result in rigid timetables and detrimental effects for project stakeholders, according to a study by Zwika et al. (2021) that emphasises the

significance of modifying project plans to address unforeseen events. Thus, the sixth hypothesis is

H6: There is positive relationship between risk management and construction project success in Malaysia.

2.9 Chapter Summary

To summarise, this chapter thoroughly examined the body of research in order to pinpoint and evaluate the variables affecting project performance in the Malaysian construction sector. This literature review's main goal was to offer a theoretical framework and empirical findings that would help shape future methodology and the creation of hypotheses. This chapter methodically reviewed pertinent research findings and theoretical frameworks in order to be in line with the study objectives of identifying the elements that have the greatest influence on project performance in the Malaysian construction sector. The goal of the literature review was to clarify the fundamental ideas and important variables influencing project performance results in this particular situation.

The theoretical insights from Chapter 2 will be expanded upon in Chapter 3, "Methodology," which describes the research approach used to accomplish the study's goals. Complete discussion of a number of methodological issues, such as the criteria used to select the intended respondents, how the questionnaire was created, what research design was chosen, how the sample plan was implemented, how research instruments were created, and how data collection techniques were applied, will be covered in the next chapter. In order to ensure the validity and robustness of the study strategy, Chapter 3 will offer insights into the reasoning behind each methodological choice. This chapter will lay the groundwork for

Chapter 4's empirical analysis and interpretation of the results by providing a detailed description of the methodology.

In conclusion, the purpose of this chapter was to provide a foundation for empirical research by consolidating the body of information and theories that are pertinent to project performance in the Malaysian construction industry. In Chapter 3, the methods used to experimentally test the assumptions and accomplish the study objectives will be explained, building on this foundation.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The research methodology and the intended target group will be presented in this chapter. The study used quantitative methods with one (1) dependent variable and six (6) independent factors found by meta-analysis. The goal of this study is to determine the relationship between the single dependent variable, the success of a construction project, and the six influencing factors. The results of this study will give organisations the tools they need to concentrate their limited resources on the most important aspects of projects being undertaken and raise the possibility that building projects will be successful. This chapter discusses targeted respondents, questionnaire formulation, and data gathering methods.

3.2 Research Design

According to Creswell & Plano Clark (2007), research design refers to the "procedures for collecting, analysing, interpreting and reporting data in research studies." It is the general approach for connecting the appropriate (and practicable) empirical research to the conceptual matters. In other words, the study design establishes how data will be gathered, how it will be analysed, and how it will be used to the research (Grey, 2014). In this study, relationship between project success and identified influencing factors will be investigated using a qualitative research approach by using questionnaire as the primary data collection instrument. This study's research design is causal and explanatory.

The main goal of causal research is aimed at relationships between different factors. As a result, causal research always includes one or more independent variables (or hypothesised causes) and their relationships to one or more dependent variables (or outcome variables). There could also be 'mediating' variables that represent the causal mechanism or process between the independent and dependent variables. The objective of causal descriptive research is to determine how the independent variable(s) affect the dependent variable. According to Shadish, Cook, and Campbell (2002), causal explanatory research tries to explain how an independent variable affects an outcome variable, which includes theorising and the use of abstractions, or constructs. In addition to using parallels or models from other fields, causal explanatory research can also involve the creation of fresh concepts and insights based on literature study, participant observation, focus groups, and other types of data collecting.

Because it aligns with the methodology characteristics, priorities, and aims of this study, coupled with hypothesis validation, quantitative methodology was specifically chosen for it. Williams (2011) defines quantitative research as the collection of data for the purpose of quantifying information and subjecting it to statistical analysis to support or reject alternative knowledge claims. Williams (2011) explains that developing a problem statement, a hypothesis or research question, analysing the appropriate literature, and quantitatively analysing the data are the first steps in performing quantitative research.

3.3 Target Population

According to Cooper and Schindler (2011), the term "population" refers to the total group of individuals, occasions, or objects of interest that the researcher desires to study. The major goal of this study is to identify the variables that influence construction project success. Project managers from the G7 category of construction companies in Malaysia are the population of interest given that they are ranked at the highest level in CIDB registration and usually obtain big contracts. The goal of this study is to identify the variables that affect construction project performance and offer prospective project managers important guidelines to guarantee the success of similar construction initiatives. The targeted respondents will be the project managers/directors due to their close relation and involvement with the projects and firm's capability. The targeted respondents were also identified as the individuals who were familiar with information on the desired study area. These project managers will be chosen for the reason that they possess sufficient and an immense knowledge of project management practices and very familiar about project performance of the companies.

From information derived from the Construction Industry Development Board (CIDB) Centralized Information Management System (CIMS), Table 3.1 below shows the number of G7 active contractors by state in Malaysia as of the year 2020.

Table 3.1 : Number of Sample of G7 Active Contractors by State

State	Number of G7 Contractor
Johor	432
Pulau Pinang	378
Sarawak	469
Wilayah Persekutuan Kuala Lumpur	1,563
Total	2,842

Construction Industry Development Board (CIDB, 2020)

3.4 Sampling Design

3.4.1 Sampling Technique

Scholars (Neumann, 2003; Sekaran, 2000; Zikmund, 2003) concur that sampling is the process of choosing the appropriate sampling units, such as communities, organisations, or individuals. Following analysis of the data received from the selected survey groups, statistical tests are created. Results of statistical tests that are drawn at the sample level reflect the behaviour of the population. Snowball, purposive, quota, and convenience sampling are the four primary non-probability sampling techniques. (Sekaran & Bougie, 2016). The sampling strategy used for this study mixes quota and purposeful sampling. Quota sampling makes sure that representatives of all project leaders or project managers from the graded G7 firms are present for this test in the major states of Malaysia (Kuala Lumpur, Pulau Pinang, Johor, and Sarawak). On the other hand, purposive sampling guarantees that the sample unit's basic requirements are achieved.

3.4.2 Sampling Frame

Cavana, Delahaye, and Sekaran (2001, p252) discovered that the sample design refers to the listing of all units in the population from which the sample is drawn. For the purpose of this study, the sampling population was generated through various channels which included generating a list of contacts through various directories and company registration agencies in Malaysia. Personal contacts and referrals from study participants were also used to further enhance the sampling population. The sample frame in this scenario are construction firms registered with G7 grade listed in the directory of the Construction Industry Evolution Board (CIDB) listed in the directories of their respective corresponding associations.

3.4.3 Target Population

It is generally acknowledged by researchers (Neumann, 2003; Sekaran, 2000; Zikmund, 2003) that sampling is a technique for choosing the appropriate sampling units, such as groups, individuals, or communities. Once the selected survey group's data has been collected, statistical tests are generated through analysis. The behaviour of the population is reflected in the findings of statistical tests at the sample level.

Each component of the population has an equal and independent chance of being chosen as a subject in the proposed study because it uses the stratified random sampling technique (Kumar, 2011; Sekaran & Bougie, 2013). Four states which will be discussed in section were included in the sampling frames that were chosen. Stratified sampling is applied based on the possible heterogeneity and degree of variability of the sample population with respect to industries (Kumar, 2011). Thus, stratified sampling involves gathering a simple

random sample within each subgroup after dividing the sampling frame into strata, or homogenous, non-overlapping subgroups (Bhattacharjee, 2012).

However, the sample size has to be reduced because of the large number of contractors, by concentrating only on those registered under Class G7 from the states of Sarawak, which represents Malaysia's Borneo state, Pulau Pinang or Penang, which represents Malaysia's northern region, Johor, which represents Malaysia's southern region, and Kuala Lumpur, which represents Malaysia's central region. These states were chosen because it is believed that they meet the criteria for a representative sample of the total Malaysian construction industry. As a result, the total number of G7 active contractors from Sarawak, Johor, Kuala Lumpur, and Pulau Pinang was subsequently reduce to 2,842.

Since the proposed study will be employing probability types of sampling, Mark Irwin's article on stratified sampling states that the more separated the strata are in terms of strata means, the better proportional sampling will do. This implies that a smaller sample size, such as 5%, can still provide accurate results (Irwin,2001). In the non-proportionate stratified random sampling, all of the stratum will have the similar sampling fraction (Explorable, 2009). Table 3.2 shows the number of sample size of 5% were taken from each selected states (Johor, Pulau Pinang, Sarawak and Wilayah Persekutuan Kuala Lumpur) Stratified sampling approach was used to select a broadly representative sample. A non-proportionate stratified random sampling will be chosen because the number of elements from each stratum is in relation to its proportion of the total population. Whereby, a disproportionate sampling decision are not being considered due to the strata are not too small or too large and there is not so much variability suspected within a particular stratum (Sekaran & Bougie, 2013). Whereas simple regression analysis needs at least 50 samples and generally 100 samples for

most research situations (Hair et al., 2018). An absolute minimum of 200 samples are required for Pearson Correlation analysis (Guilford, 1954).

Table 3.2: Sample size based on 5 % from each of the four selected states

State	Number of G7 Contractor	Sample Size (%)	Sample Size (no. of firm)
Johor	432	5 %	36
Pulau Pinang	378	5 %	28
Sarawak	469	5 %	36
Wilayah Persekutuan Kuala Lumpur	1,563	5 %	124
Total	2,842		224

3.4.4 G-Power Analysis

First, with the help of G-Power analysis, the minimum sample size is established. Recent discoveries suggest that scientists determine sample size by power analysis (Kline, 2016; Hair et al., 2017; Hair et al., 2018; Hair et al., 2019; Ringle et al., 2018; Uttley, 2019). Power analysis estimates the smallest sample size by considering the section of the most predictor-induced model (Hair et al., 2014; Roldan & Sánchez-Franco, 2012). It requires information on power, effect size, and meaning to compute the minimal sample size required (Hair et al., 2018). Power ($1-\beta$ error probability) is the "capacity of a statistic to accurately reject the null hypothesis" (Burns & Burns, 2008, p. 244). Appropriate power in social science research is 80 percent or greater (Cohen, 1988; Hair et al., 2017; Uttley, 2019). The impact size measures the effect on the dependent variable of individual independent variables (Murphy & Myers, 2004; Sullivan & Feinn, 2012). For attaining statistical power of 80 percent or more, the sample size calculation should know the amount of the effect.

Effect sizes provided in past studies might be valuable for setting a benchmark for similar issues. As a general rule, 0.02, 0.15, and 0.35 values should be considered small, medium, and large (Cohen, 1988). The significance level (α) concerns the likelihood of rejecting the null hypotheses. Significance is widely recognized in social and behavioral sciences at 0.05 (5 percent) (Hair et al., 2010). The program G*Power 3.1.9.7 is used for power analysis. The snapshot of the minimal sample size computation using G*Power 3.1.9.7 is shown in Figure 3.1.

G*Power (Faul et al., 2007; Faul et al., 2009) is generally the first choice for business and social sciences (Hair et al., 2014; Hair et al., 2017). The capacity of G* to determine a minimum study sampling size (depending on the number of latent and observable variables) is considered superior to other online sample size calculators. Power analysis may be accounted for in any research design, irrespective of whether the investigation employs a probability or non-probability data-gathering technique. The few research that applies Several studies, including Valaei and Jiroudi (2016), Balaji and Roy (2017), Dedeoglu et al. (2018), Yadav et al. (2019), and Kuvas et al. (2020), have performed a-priori sample size estimations in their structural equation models. G*Power determines that 98 is the minimum sample size (see Figure 3.1).

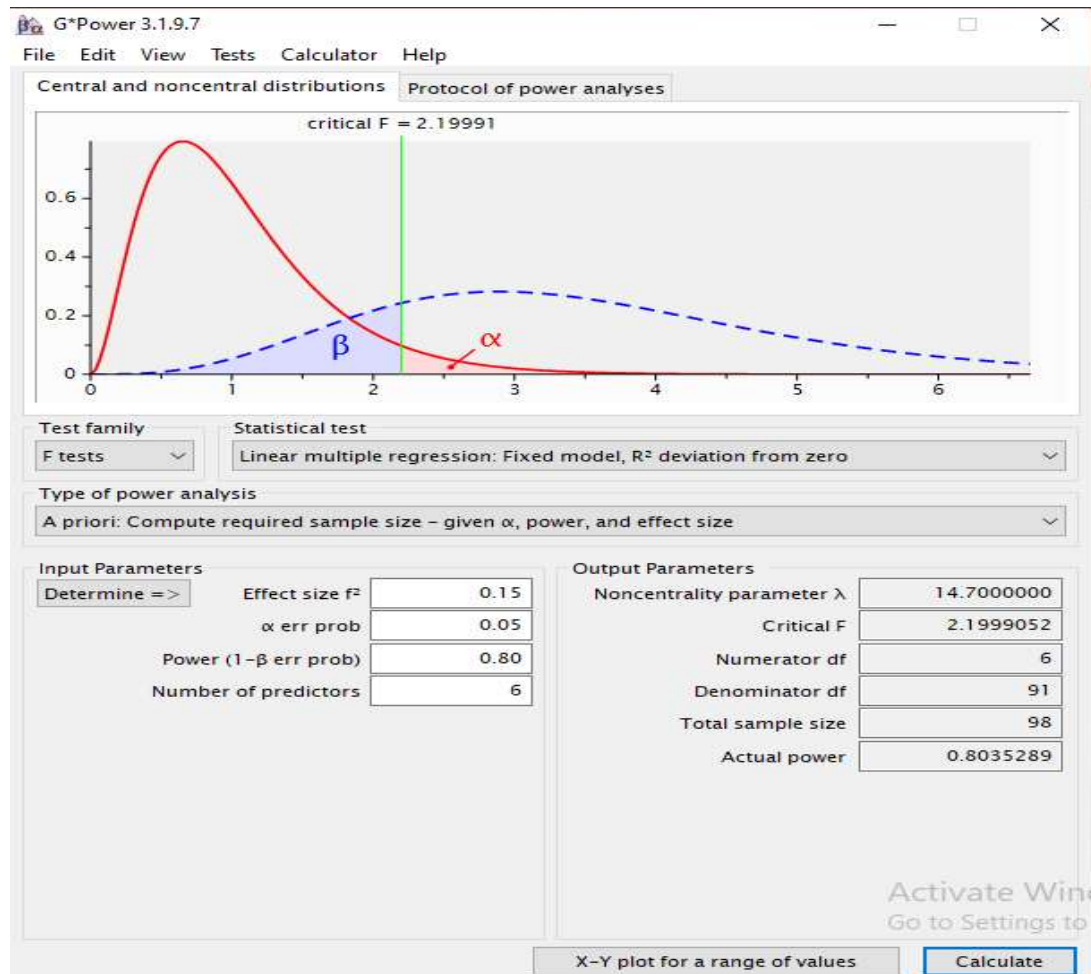


Figure 3.1: G Power Input

3.4.5 Unit of Analysis

The study's goal is to determine how various factors associated to the construction project company may affect the project performance. Individuals working in Malaysia's construction industry make up the study's unit of analysis. Malaysia's economy depends heavily on the construction industry, which is one of the country's core industries. The project, contract, account and finance department as well as human resource, purchasing/procurement, and safety and health department are some of the departments

which is hoped to receive responses. All age groups, genders, and managerial positions up to the top management are represented among the participants.

The purpose of choosing employees from of managerial positions or designations is to realise the main objective which focuses on the study of factors influencing project performance from various areas. Therefore, it would be more suitable for individuals from this level within the organisation hierarchy to allow collection of precise and honest responses as these individuals are responsible for critical and holistic decision-making within their organisation. Questions derived are also, much more suited for individuals from this level.

3.5 Instrument Development

It is important to ensure that the data collected has validity and dependability while using a quantitative technique. The questionnaire used to gather data is one of the key components of the study because it is utilising this method. The creation of the questionnaire required careful consideration, critical evaluation through a pilot study, and input from academics and experts in the study's subject. The questionnaire was created with consideration for the respondents and their level of comprehension so that they could grasp the questions and give accurate answers that could be translated into the necessary statistical data that is generally understood by all. Most of the questions were developed using past research and questionnaires based on the same areas of study.

This study adopted the survey used in Oren. A (2008) altered for the Malaysian context in conjunction with additional items relevant to the sample approached was used to collect data on the variables as discussed. The scale used to measure independent variable of

top management support were adopted from Holt et.al (2012). The measurement scale to measure the variable risk management, defining clear goals and realistic schedule and budgeting was adopted from Joyce et.al. (2011). Items for project team competency scale were adopted from Verburg et.al. (2013). Meanwhile the measurement scale to measure the project performance success were adopted from Karen et.al (2010)

After the necessary data has been gathered, a questionnaire was created to collect two different types of information: demographic information about all respondents while consent was being sought; and actual information about the study's variables, which was measured using a Likert scale from 1 (strongly disagree) to 6 (strongly agree). The questionnaire's objective is to collect information on respondents' most recent successful projects that involved both dependent and independent variables. The types of questions asked will depend on whether the variable available is an objective fact or a subjective emotion. As a result, the questions that earlier researchers asked about each relevant variable were modified in order to lower the amount of error caused by leading or emotive inquiries.

Eight sections of the questionnaire were used to gather information on demographics, six independent variables, one dependent variable, and a cover letter describing the study's goals and providing comments on the respondent's most recent project that they had successfully finished. The demographic information of the respondents is gathered in section 1. The dependent variable is the subject of 5 questions in Section 2 that examine the results of the most recent project. Each of Sections 3 to 8, has 5 to 7 questions asking respondents about their involvement in the same recently finished project. The layout of the questionnaire is shown in Table 3.3 below.

Table 3.3: Structure of Questionnaire

NO	Section	No of Questions
1	Section 1 Demographics	5
2	Section 2 Project Outcome (i) On Schedule (ii) Within Budget (iii) Comply with Technical and Scope (iv) Level of client's satisfaction (v) Quality of Project Output	5
3	Section 3 Organizational Project Management Maturity (i) Documentation standards (ii) Information of project status (iii) Roles and responsibilities of project team members (iv) Understanding of project team on the roles (v) Results of meeting were well published and distributed (vi) Source of project template/documents (vii) Discussion on outcome of project review	7
4	Section 4 Top Management Support (i) Top management response to request (ii) Authority by top management (iii) Project continuous review with top management (iv) Sharing of responsibility by top management (v) Top management support during project crisis	5

Table 3.3 continued

5	Section 5 Project Risk Management (i) Establishment of Risk assessment (ii) Contingency plan (iii) Conduct and update of risk assessment (iv) Discussion on project limitation (v) Client knowledge on their input	5
6	Section 6 Realistic Schedule and Budget (i) Detail plan and budget (ii) Comparison between project actual timeline and baseline (iii) Regular meeting and monitoring (iv) Input solicited from project team (v) Projects subject to realistic deadlines and targets	5
7	Section 7 Defining Clear Project Goals (i) Clear project basic goals (ii) Project goals clearly defined (iii) Sharing of project goals to all team members (iv) Sharing of project goals to clients/stakeholders (v) Adequate presentation of project	5
8	Section 8 Project Team Competency (i) Status of project team movement/replacement (ii) Level of competency of project team member (iii) Commitment of project team members (iv) Ownership of project team members (v) Participation of project team members in decision making	5

3.5.1 Operationalisation of Constructs

Zikmund (2003) described that the purpose of an appealing survey question structure is to reduce the finishing frequency, the participants' exhaustion, the acquisition of correct information, and the maintenance of the participants' benefit during the research procedure. He asserts that the form's interface and structure should be concise, accurate, appealing, clean, and sequential. Simplistic and easy-to-understand survey layouts empower participants to complete the questionnaire by submitting all necessary data for the objective analysis (Salant & Dillman, 1994; Malhotra et al., 1996). Besides, Dillman et al. (2009) assert that the questionnaire structure needs to be comprehensible, including several easily understood and navigable parts. Table 3.4 shows the source document for the final questionnaire from Section 2 to Section 7 since section 1 is on respondent's demographic. (see appendix 'A' for the final questionnaire).

Table 3.4: Source Document for Questionnaire

Section 2: Project Success		
Questions Adapted	Question After Adaptation	Source and Author
Are projects typically completed on time?	This project was completed on schedule	"Factors affecting project success: An empirical study in the construction sector in Egypt" by Ahmed, S., Aziz, R. F. A., & Samsuri, A. (2013).
Do projects usually stay within the allocated budget?	This project was completed within budget	"Factors affecting project success: An empirical study in the construction sector in Egypt" by Ahmed, S., Aziz, R. F. A., & Samsuri, A. (2013).
To what extent do projects meet the technical requirements and scope outlined at the beginning? during the execution phase?	Technical requirements specified at the beginning of execution phase were met	"Critical success factors for different project objectives" by Munns, A. K., & Bjeirmi, B. F. (1996).
How satisfied are clients with the overall project outcome?	Project clients and/or product users were satisfied with the project outputs	"Measuring client satisfaction with construction projects in Libya" by Sherif, A. S., & Abdelazim, S. M. (2006).

Table 3.4 continued

Questions Adapted	Questions Adapted	Questions Adapted
How would you rate the quality of the final project deliverables?	There were no quality issues related to project output	"Measuring client satisfaction with construction projects in Libya" by Sherif, A. S., & Abdelazim, S. M. (2006).
Section 3: Top Management Support		
Questions Adapted	Question After Adaptation	Source and Author
Top management response to request	Top management is responsive to our requests for additional resources if the need arises	"Factors affecting project success: An empirical study in the construction sector in Egypt" by Ahmed, S., Aziz, R. F. A., & Samsuri, A. (2013).
Authority granted by top management	Top management has granted us the necessary authority and will support our decisions concerning the project	"Factors affecting project success: An empirical study in the construction sector in Egypt" by Ahmed, S., Aziz, R. F. A., & Samsuri, A. (2013).
Project continuous review with top management	That project was continually or constantly being review to re-evaluate the viability and potential success by management	"Critical success factors for different project objectives" by Munns, A. K., & Bjeirmi, B. F. (1996).

Table 3.4 continued

Questions Adapted	Questions Adapted	Questions Adapted
Sharing of responsibility by top management	Top management share the responsibility with the project team for ensuring project's success	Critical success factors for different project objectives" by Munns, A. K., & Bjeirmi, B. F. (1996).
Top management support during project crisis	Top management was supporting you in crisis	Critical success factors for different project objectives" by Munns, A. K., & Bjeirmi, B. F. (1996).
Section 4: Level of Project Management Maturity		
Questions Adapted	Question After Adaptation	Source and Author
Documentation standards are being used regularly in your project	Documentation standards were used (progress/status reports, and time sheets, others.)	"Factors affecting project success: An empirical study in the construction sector in Egypt" by Ahmed, S., Aziz, R. F. A., & Samsuri, A. (2013).
Information on project status were well stipulated	Information on successful/unsuccessful project was readily available	Crawford, L., Pollack, J., & England, D. (2006). Uncovering the trends in project management: Journal emphases over the last 10 years. International Journal of Project Management, 24(2), 175-184.

Table 3.4 continued

Questions Adapted	Questions Adapted	Questions Adapted
Roles and responsibilities of project team members were briefly informed	Job description for team roles have been made available to the team personnel in writing	"Critical success factors for different project objectives" by Munns, A. K., & Bjeirmi, B. F. (1996).
Understanding of project team roles is well discussed in the organisation among every team member	Project team personnel understand their role on the project team?	Critical success factors for different project objectives" by Munns, A. K., & Bjeirmi, B. F. (1996).
Source of project templates/documents are adapted from previous project managers	You use project template or project documents created by others (previous) project leaders	Kerzner, H. R. (2013). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. John Wiley & Sons.
Discussion on outcome of project review is being conducted	Project review outcome become part of a discussion in project meeting	Kerzner, H. R. (2013). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. John Wiley & Sons.

Table 3.4 continued

Section 5: Realistic Schedule and Budgeting		
Questions Adapted	Question After Adaptation	Source and Author
The project plan includes detailed schedules and budgets.	Detail plan and budget for the project are available	“Enhancing Project Performance through Realistic Schedule and Budgeting Practices: A Case Study of the Manufacturing Industry”, Brown. A (2020)
Progress against the project plan is regularly monitored and compared.	Actual project progress is regularly compared with the project baseline	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)
Meetings are held regularly to review progress and provide feedback	Regular meetings to monitor project progress and provide feedback to the project team are conducted	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)
Input from project team members is sought when adjustments to the schedule or budget are needed.	When the budget or schedule requires revision, input is solicited from the project team.	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)

Table 3.4 continued

Section 6: Defining Clear Project Goals		
Questions Adapted	Question After Adaptation	Source and Author
Are the basic goals of the project clearly communicated to the project team?	The basic goals of the project are made clear to the project team	“Enhancing Project Performance through Realistic Schedule and Budgeting Practices: A Case Study of the Manufacturing Industry”, Brown. A (2020)
Are project goals clearly defined at the beginning of the project?	Project goals are clearly defined at start-up	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)
Are project goals effectively communicated to all project participants?	Project goals are made clear to all participants	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)
Have potential stakeholders or clients been informed about the project's usefulness?	Potential stakeholders / clients have been contacted about the usefulness of the project	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)
Has an appropriate project presentation been prepared for clients or stakeholders?	An adequate presentation of the project has been developed for clients or stakeholders	“Benchmarking Realistic Schedule and Budgeting Practices in Project Management”, Chen et. Al (2017)

Table 3.4 continued

Section 7: Project Team Competency		
Questions Adapted	Question After Adaptation	Source and Author
Did the project team experience any significant personnel losses or transfers during the project?	The project team did not experience any significant personnel losses or transfers during the project's development	"Impact of Team Stability on Project Success" Lee et al., (2018)
Are the technical members of the project team considered competent?	The project technical people are competent	"Assessing Competency in Project Teams" Smith, J., (2017)
Are project team members committed to achieving project goals?	Project team members are committed to the achievement of project goals	"Enhancing Team Commitment in Project Management" Johnson et al., (2019)
Do project team members take ownership of project goals?	Project team members takes ownership of project goals	"Enhancing Team Commitment in Project Management" Johnson et al., (2019)
Do project team members actively participate in decision-making related to project goals?	Project team members actively participate in decision-making regarding the achievement of project goals	"Enhancing Team Commitment in Project Management" Johnson et al., (2019)

Table 3.4 continued

Section 8: Project Risk Management		
Questions Adapted	Question After Adaptation	Source and Author
Were risk assessment procedures established for the project?	Risk assessment procedures were established	"Establishing Risk Assessment Procedures in Project Management" Chen et al., (2019)
Are there contingency plans in place if the project goes off schedule or budget?	There are contingency plans in case the project is off schedule or off budget	"Establishing Risk Assessment Procedures in Project Management" Chen et al., (2019)
Does the project team conduct and update risk assessments throughout the project?	Project team conduct and update risk assessment on project along the progress	"Continuous Risk Assessment in Project Management" Wang et al., (2020)
Were the limitations of the project discussed with clients at the outset?	The limitation of the project had been discussed with the clients at the initial stage or starting of project	"Continuous Risk Assessment in Project Management" Wang et al., (2020)
Were clients informed if their input was incorporated into the project plan?	The clients were told whether or not their input was assimilated into the project plan	"Continuous Risk Assessment in Project Management" Wang et al., (2020)

3.6 Data Collection

Primary data and secondary data are the two types of data that have been collected. Compared to primary data, which is information collected directly from respondents through interviews or questionnaires made specifically for a certain purpose, secondary data consists of findings acquired or summarised by other researchers in books, journals, or other sources. (Cooper & Schindler, 2011). This study gathered primary data for analysis to produce accurate and trustworthy results. The survey questionnaire approach was employed in this study to get the necessary data from the intended respondents since it proved simple to administer and transform the information into statistical data.

Both qualitative and quantitative techniques can be used to collect primary data (Zikmund, 2013). In this study, the quantitative method is applied. Standardised questionnaires are frequently used to gather quantitative information from a group of respondents in order to determine the frequency of various points of view. Respondents must fill out a written questionnaire as part of the survey. When the researcher is clear on the specifications and the most effective method to measure the variable, data collection is easier (Sekaran & Bougie, 2016). Project managers or specific project leaders are the target responders in this descriptive study. This study is concerned in predefined variables, as Chapter 2 has demonstrated. In order to collect data effectively, a questionnaire has been implemented in this study to assess the importance of the variables that influence the success of construction projects.

3.7 Secondary Data Collection

Through literature review, the study has acquired secondary data from earlier investigations and research projects. The information and analysis acquired during the review phase is documented throughout the work, particularly in chapter two, which contains the systematic literature review that served as the foundation for this investigation. The overview of previous studies addressing the six variables shown to enhance project success is presented in Table 3.4.

Table 3.5: The Summary of Past Research related to the 6 factors influencing the Project Performance

	Level of Top Management Support	Level of Project Management Maturity	Realistic Schedule	Defining Clear Project Goals	Project Team Competency	Risk Management
Muhammad Zul and Khai Loon,2022	/					
Ahmad et.al,2016	/		/			
Molders et. Al,2019	/					
Scott and Young,2008	/					
Kuensten,2013	/					
Sperber & Linder,2016	/					
Musambayi,2018	/					
Haque & Anwar,2012	/					/

Table 3.5 continued						
	Level of Top Management Support	Level of Project Management Maturity	Realistic Schedule	Defining Clear Project Goals	Project Team Competency	Risk Management
Milosevic and Patanakul, 2005		/				
Chen et. Al,2019		/				/
Yazici,2010		/				
Rad and Lavin,2003		/				
Latanio and Garcia,2007		/				
Chan,2009		/		/		
Jia, Chen, Xue, Chen, Cao, and Tang, 2011		/		/		
Husen,2009			/			
Dvir & Lechler, 2004			/			
Nasir and Sahibuddin,201				/		
Xia et. al.,2013				/		
Samari et. al,2013					/	
Mohammad Mirghasemi et al, 2014					/	
Steinford.P,2011					/	
Atika,2011						/
Bakker, Boonstra, and Wortmann (2012)						/
Jiang, Wu, and Liang, 2009						/

3.8 Primary Data Source

3.8.1 Pre-testing

Pre-testing the questionnaire is crucial to ensure that respondents understand the questions and that there are no errors or problems with the wording or measurement. A small sample of participants is employed in the pilot data test to assess the applicability of the questions and the level of participant comprehension. This enables any errors to be fixed before the questionnaire is sent to a large number of respondents (Sekaran & Bougie, 2011).

To find any deceptive questions, biases in perception, or issues with the questionnaire's phrasing, a pilot test for this study will be carried out on 10 respondents who represent the sample population. The supervisor and academics in the area of study will also receive the questionnaire at the same time for their input. After the pilot data has been gathered, it will be tested using SmartPLS's measurement model for individual reliability (to test the loading of each item), internal constancy reliability (to test how well the constructs are measured), and conversion validity (to check whether the indicators are measuring the intended variables).

3.8.2 Primary Data Collection

While qualitative and quantitative methods can be used to obtain primary data (Zikmund, 2013), a quantitative approach was used in this study. Standardised questionnaires are often used to gather numerical data from a group of respondents in order to ascertain the prevalence of various points of view. Respondents must fill out a written questionnaire as part of this. It is easier to collect data when the researcher is clear on the requirements and the best way to measure the variable (Sekaran & Bougie, 2011). Individual

project leaders or project managers are the target respondents in this descriptive study. As shown in Chapter 2, this study is interested in predetermined variables. In order to collect data effectively, a questionnaire was adopted in this study to assess the significance of the variables that influence the success of construction projects.

A link including an electronic survey form along with a brief explanation and the researchers' contact information will be included in the questionnaire survey that will be distributed. Through local directory resources, internet company registers, and personal connections in the industry, the database of businesses was created. Either a company contact point, a referral source, or directly has been used to contact the respondents.

3.9 Statistical Technique

The data was analysed using the Partial Least Squares and Structural Equation Modelling (PLS – SEM) module of the SmartPLS software. The software can simultaneously estimate the association between indicators and their respective latent constructs, as well as the relationship between constructs and constructs, according to Duarte and Raposo (2010) and Lohmoller (1989). PLS is the recommended tool to utilise because the research is testing hypotheses (Henseler et al., 2009; Hair et al., 2011). The graphical interface of the software is highly user-friendly and facilitates effortless navigation, hence enhancing its effectiveness for moderators (Temme et al., 2010). Spreadsheet software will be used to filter and clean the data according to demographic and descriptive information before it is processed by SmartPLS.

Structural equation modelling (SEM) integrates various multivariate processes into a single framework. Through the use of measurement theory, factor analysis (latent variables), path analysis, regression, and simultaneous equation, SEM integrates and

integrates psychology, statistics, epidemiology, biology, and econometrics, offering a potent research tool. SEM has been more and more well-liked in the behavioural and social sciences throughout time, articulating a study's theoretical notions by linking them and offering crucial details about their interactions (Bollen, 1989). The SEM variants known as composite based SEM and covariance-based SEM were also identified by Joreskog (1971), Wood (1982), and Tenenhaus et al. (2005). These variations have proven useful in the social and behavioural sciences.

Henseler and Sarstedt (2013) concluded that, when employing path models in partial least square – SEM with simulated data, a goodness-of-fit (GoF) index validation of the models is not a suitable approach, since it will yield deceptive findings. Moreover, Hair et al. (2013) proposed that it is impossible to distinguish between valid and incorrect models. Because SEM may correct errors, it is valuable when analysing complex multiple models that are measured with errors. Since the structural model cannot be examined until the measurement model offers the appropriate steps to proceed, the PLS-SEM analysis will begin with the measurement model (Hair et al., 2017). Considering the opportunities and limitation, the study followed a two-step process to evaluate the model (Henseler et al., 2009).

In SmartPLS the measurement model was used to test each item and four different measurements were used in the software:

1. Individual item loadings and reliability – This is the first section of the measurement analysis. Reliability, according to Urbach and Ahleman (2010), verifies that the variables and items measure the intended things. Researchers have recommended a variety of appropriate loading indicators. Making sure the AVE is unaffected and kept at 0.5

and above is crucial. If not, your notions do not meet the Fornell and Larcker criteria for convergent validity. In light of this, different researchers have established a loading range of 0.4 to 0.9 (Hamid et al., 2017). The range is also supported by others, including Cokluk et al. (2018), Wulferth (2013), and Tabachnick and Fedell (2007). Hair et al. (2006) produced a table in which they stated that loadings ranging from 0.3 to 0.75 might be taken into consideration, with a minimum sample size of 350 needed to accept 0.3. In order to compute and assess the individual reliability, SmartPLS needs that outer loading be run for each construct (Hair et al., 2012 and Hair et al., 2014).

2. Assessment of internal consistency reliability – This is the second phase in the measurement model analysis, and it's done to make sure the instrument is measuring what it's supposed to be measuring and within its range (Salkind, 2010). According to De Vaus (2002), in order to ensure consistency, individual replies are measured using the scale of other items. Another approach that is frequently used to assess the reliability of internal consistency using unweighted items is Cronbach alpha (Peterson & Kim, 2013 and McNeish, 2017). Sijtsma (2009) asserts that, under the assumption that all variables are measured as standard by all indicators, Cronbach's alpha typically overestimates the internal consistency reliability, producing less trustworthy measures (Gortz et al., 2010). Since each item is measured separately depending on the outer loadings of each construct, composite reliability was employed in SmartPLS to measure the internal consistency reliability for the purposes of this study (Hair et al., 2017).

3. Validity convergence (AVE) – The third step will be to evaluate the convergent validity. The metric that is employed is called average variance extracted (AVE) (Hair et al., 2013). Item unidimensionality in measuring targeted variables and correlation with all items and latent variables are checked for convergent validity (Urbach & Ahlemann, 2010; Sarstedt

et al., 2014; Henseler et al., 2016). Table 4.6 in chapter 4, illustrates how Hair et al. (2019) and Hair et al. (2013) indicate that the approved AVE value should be 0.50 and above. The fact that all of the AVE values are greater than 0.5 indicates convergent validity.

4. Discriminant validity – As the last evaluation derived from the measurement model analysis, discriminant validity tests if a construct is unique and distinct from other constructs (Duarte & Raposo, 2010). The test for discriminant validity is the Heterotrait - Monotrait (HTMT) ratio (Henseler et al., 2015). In contrast to convergent validity, discriminant validity, according to Urbach and Ahlemann (2010), measures one concept to another while ensuring that they don't inadvertently measure each other.

To determine the degree of correlation between the indices, collinearity was also examined. A collinearity problem is indicated by an outside VIF less than 5, according to Hair et al. (2011). Chapter 4 records and discusses all of the findings and analysis.

Next, utilising the software's structural modelling features and the five criteria measurements employed by Vinzi et al. (2010), Kay Wong (2013), and Hair et al. (2019), the structural model will be evaluated in the manner described below. Initially, tests were conducted to determine the association and relationship (positive/negative impact or direction) between the variables. T statistics were used for this, and if the T statistic is higher than 1.96, a relationship is shown. What will determine the hypothesis is the P value. Secondly, the predicted variance between the dependent and independent variables was examined using the coefficient of determination (R^2). A rating of 0.67 indicates strength or substantiality. It is faint at 0.19 and moderate at 0.33. The impact of the independent variable on the dependent variable was the third metric. According to the findings, the effect is little if it is less than or equal to 0.03, medium if it is larger than or equal to 0.15, and large if it

measures or equals 0.35. The predictive significance of the independent variable was the subject of the fourth test. For the independent variables to have predictive power or relevance for the dependent variable (i.e., to anticipate or predict future trends), the result must be greater than 0. For this, smartPLS results should be as follows; the T statistic should be greater than 1.96 to show a relationship, if F square is below or equal to 0.03 the effect is weak. All the results and analysis are recorded and discussed in Chapter 4.

3.10 Summary

After evaluating the research methodologies and consideration to the implementation and administration of methods of data collection, research methodology, research hypothesis and design are selected. The chosen research method and design have limitations, considering the procedures that were passed through to reach at its final selection. Low response rates, might have had an influence on sampling error. Participants who respond to the survey might already be engaged in the topic and have a positive bias.

The purpose of this study Is to Investigate the relationship between project success and (dependent variable) and possible influencing factors (independent variable). Project managers with experience in construction projects are the target respondents with questionnaires and a quantitative approach are used to collect data. This chapter provides an overview of the research project's methods. It includes the research population and sample size, the study location, the research design, the sampling strategy, data gathering strategy, and data analysis procedures. The respondents have to be working in the Malaysia construction industry with companies with CIDB grade G7. The statistical techniques employed here are the partial least square, structural equation modelling (PLS-SEM) software, and SPSS to analyse the conclusion information.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the data analysis and summarizes the empirical findings of the study. It specifically underlines the key steps involved in data analysis: descriptive analysis, measurement model assessment, structural model assessment, and mediation analysis. The collected data of the 224 respondents were analyzed using the SmartPLS 3.0 software to test the hypotheses set out in Chapter 2. The chapter proceeds with interpreting the measurement and structural models of the study following the commonly accepted reporting style of PLS-SEM suggested by Chin (2010) and Hair et al. (2017). Then it summarizes the analysis of the data and the results; the findings are presented as tables, figures, and charts. All analyses were conducted using the software package SmartPLS 4.0. PLS-SEM in this study is deemed suitable as it simultaneously evaluates several relationships between independent and dependent variables (Hair et al., 2011). PLS-SEM, a variance-based soft modelling technique, offers several advantages. Firstly, it provides flexibility regarding assumptions on multivariate normality. Secondly, it allows for the utilization of both formative and reflective constructs. Third, it has the capacity to examine complex models with small sample size. Fourth, it provides improved formative construct estimation accuracy and has the potential to be a predictive tool to support theory construction (Nair et al., 2018). PLS-SEM is widely used in many domains, including business and management research, to analyse data and estimate complex correlations between components (Ahammad et al., 2017, West et al., 2016). Additionally, PLS-SEM enables the analysis of both indirect and total influences,

concurrently assessing correlations between constructs made up of several items and lowering the total model error (Astrachan et al., 2014).

4.2 Data Collection

Data was collected through an online survey circulated among the selected respondents. Chapter 3 section 3.3 details the respondent selection process. The questionnaire was circulated among 300 prospective respondents. All fields in the questionnaire were marked as 'required' to avoid the issue of missing data.

To ensure the relevance of respondents to the research, the questionnaire asked two filter questions:

1. Are your company a registered CIDB Grade 7 (G7) contractor?
 - ii. Are you the Project Manager of the CIDB Grade 7 (G7) contractor?

These questions allowed the researcher to distil from all the respondents those who understand the themes of factors influencing the performance of projects in Malaysia, and were qualified enough to understand the questionnaire items. After filtering out the responses that did not pass the above questions, 224 responses were processed.

4.3 Data Screening

Errors are a possibility in survey research even with thorough investigation design, execution of error-prevention strategies, and conduct. The goal of data screening is to identify errors or reduce their influence on the outcomes (Van den Broeck et al., 2005).

Descriptive statistics, multivariate normality, missing values, and common method variance are checked for during the data screening process.

4.3.1 Descriptive Analysis

The descriptive statistics for the 224 cases in the data set are presented in Table 4.1. Because Google Forms was used to collect the data, there are no missing values in the data set. The skewness and kurtosis values for SEM are well within the +10, -10 and -3, +3 threshold limits, respectively (Brown, 2015).

The data set's 224 cases' descriptive statistics are displayed in Table 4.1. Because Google Forms was used to collect the data, the data set has no missing values. According to Brown (2015), the skewness and kurtosis values for SEM are well within the threshold levels of -3, +3, and +10, -10, respectively. The data set's 224 cases' descriptive statistics are displayed in Table 4.1. As Google Forms were used to collect the data, the data set has no missing values. According to Brown (2015), the skewness and kurtosis values for SEM are well within the threshold levels of -3, +3, and +10, -10, respectively.

Table 4.1 : Descriptive Analysis

Description		N	Min	Max	Mean	Std. Deviation	Skewness	Excess Kurtosis
Top Management Support	tms_1	224	1	5	3.93	1.029	-1.212	1.437
	tms_2	224	1	5	3.98	1.059	-1.429	1.825
	tms_3	224	1	5	4.00	.921	-.740	.110
	tms_4	224	1	5	3.99	1.124	-1.147	.811
	tms_5	224	1	5	4.02	1.009	-1.077	.894

Table 4.1 continued								
Description		N	Min	Max	Mean	Std. Deviation	Skewness	Excess Kurtosis
Project Management Maturity	pmm_1	224	1	5	4.10	.831	-.991	1.299
	pmm_2	224	1	5	4.16	.862	-1.284	2.243
	pmm_3	224	1	5	4.14	.822	-1.141	2.034
Project Management Maturity (Continued)	pmm_4	224	1	5	4.14	.817	-1.008	1.424
	pmm_5	224	1	5	4.11	.861	-1.101	1.540
Realistic Schedule and Budgeting	rsb_1	224	1	5	4.00	.916	-.822	.638
	rsb_2	224	1	5	4.00	.906	-.849	.609
	rsb_3	224	1	5	4.00	1.044	-.820	-.035
	rsb_4	224	1	5	4.04	.900	-1.159	1.714
	rsb_5	224	1	5	4.08	.956	-.775	.025
Clear Project Goals	cpg_1	224	1	5	4.13	.940	-1.208	1.458
	cpg_2	224	1	5	4.06	1.000	-1.157	1.132
	cpg_3	224	1	5	4.04	.917	-.739	.240
	cpg_4	224	1	5	4.17	.870	-1.316	2.243
Project Team Competency	ptc_1	224	1	5	3.85	.961	-.861	.778
	ptc_2	224	1	5	3.88	.990	-1.146	1.482
	ptc_3	224	1	5	3.87	.859	-.656	.604
	ptc_4	224	1	5	4.01	1.016	-1.055	.903
	ptc_5	224	1	5	4.10	.979	-1.239	1.612
Project Risk Management	prm_1	225	1	5	4.24	.833	-1.419	2.919
	prm_2	225	1	5	4.27	.814	-1.438	3.192
	prm_3	225	1	5	4.10	.925	-1.185	1.538
	prm_4	225	1	5	4.07	.845	-1.426	3.032
	prm_5	225	1	5	4.06	.933	-.756	.134

Table 4.1 continued								
Description		N	Min	Max	Mean	Std. Deviation	Skewness	Excess Kurtosis
Project Performance Success	PPS_1	224	1	5	4.33	.931	-1.636	2.651
	PPS_2	224	1	5	4.18	.963	-1.155	.820
	PPS_3	224	1	5	4.14	.912	-1.003	.792
Project Performance Success	PPS_4	224	1	5	4.09	.889	-1.336	2.298
	PPS_5	224	1	5	4.01	.913	-1.051	1.014

4.3.2 Multivariate Normality

In this study, Mardia's test (Mardia, 1970) was adopted to check the data's multivariate normality. Mardia's multivariate skewness and kurtosis are based on the third and fourth moments (Kankainen et al., 2003). Web application helped the researcher to calculate multivariate normality. The multivariate skewness and kurtosis of the latent variables show a high level of skewness and kurtosis, as shown in Table 4.2 below.

Table 4.2: Mardia's Test of Multivariate Normality (Output of Skewness and Kurtosis)

	b	z	p-value
Skewness	22.43365	837.52276	0.000
Kurtosis	95.39213	21.59475	0.000

Note: The data set is non-normal as the p-values are close to zero.

4.3.3 Missing Values

To prevent missing values, all of the replies are gathered online using Google forms (refer to Appendix B). The survey was constructed in a way that prevented respondents from moving on to the following section unless they had finished the preceding item in its entirety. A process like this made sure the data set had no missing values.

4.4 Common Method Bias

Since data was collected through a self-report questionnaire, common method bias could seep into the data (Jordan & Troth, 2020). To rule out this possibility, researchers used single factor method proposed by Podsakoff et al. (2003). The variation explained by a single factor was retrieved and calculated by the researcher using the single factor approach. To avoid the risk of CMB, the variance explained by a single factor must be less than 50%. The results depict that 44.108 % variance as shown in table 4.3 is explained by a single factor which is very good and reject the chance of CMB.

Table 4.3: Total Variance

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.548	50.685	50.685	3.088	44.108	44.108
2	.986	14.081	64.766			
3	.751	10.726	75.492			
4	.567	8.100	83.592			
5	.501	7.152	90.744			
6	.371	5.303	96.047			
7	.277	3.953	100.000			

4.5 Demographic Analysis

A sum of 224 responses was received, which were all retained for analysis in the study. The sample profile was analyzed using several demographic characteristics as shown in Table 4.4.

Table 4.4: Demographic Analysis

Description	Frequency	Percentage (%)
Firm Location		
Johor	37	16.5
Kuala Lumpur	120	53.6
Penang	17	7.6
Sarawak	50	22.3
Gender		
Female	72	32.1
Male	152	67.9
Age		
21-30 years	40	17.8
31-40 years	110	49.1
Age		
41-50 years	71	31.7
50-60 years	3	1.3
Education		
Bachelor's Degree	169	75.4
Diploma	30	13.4
Masters	24	10.7
Phd	1	0.4

Table 4.4 continued

Description	Frequency	Percentage (%)
Experience		
< 2 years	10	4.5
> 20 years	7	3.1
> 20 Years	1	0.4
14-19 years	58	25.9
2-7 years	22	9.8
8-13 years	126	56.3
CIDB Score		
1 Star	21	9.4
2 Star	63	28.1
3 Star	60	26.8
4 Star	11	4.9
5 Star	3	1.3
Non-star Rated	66	29.4

The majority of responders, or nearly 49.1% of the sample size, were between the ages of 31-40 years. Additionally, the majority held a bachelor's degree; these qualifications comprised 75.4 % of the sample size. Collinearity was also tested to check the level of correlation between indicators. According to Hair et al. (2011) an outer VIF < 5 presents a collinearity issue. Table 4.5 shows the results and all outer VIF values are within limits.

Table 4.5 : Collinearity Assessment

Constructs	Items	VIF
Project Performance Success	PPS_1	1.6
	PPS_2	1.593
	PPS_3	1.885
	PPS_4	2.14
	PPS_5	1.895
Clear Project Goals	cpg_1	1.518
	cpg_2	1.527
	cpg_3	1.431
	cpg_4	1.67
Project Management Maturity	pmm_1	1.691
	pmm_2	1.427
	pmm_3	4.968
	pmm_4	4.737
	pmm_5	1.587
Project Risk Management	prm_1	1.523
	prm_2	1.797
	prm_3	1.486
	prm_4	1.638
	prm_5	1.373
Project Team Competency	ptc_1	1.832
	ptc_2	1.878
	ptc_3	1.995
	ptc_4	2.405
	ptc_5	2.387
Realistic Schedule and Budgeting	rsb_1	1.305
	rsb_2	1.676
	rsb_3	1.641
	rsb_4	1.412
	rsb_5	1.379
Top Management Support	tms_1	1.736
	tms_2	1.632
	tms_3	1.661
	tms_4	1.492
	tms_5	1.482

4.6 Measurement Model - PLS-SEM Analysis

Subsequent to the demographic analysis, the measurement model was analyzed to ascertain the validity and reliability of the study. In PLS-SEM, assessing the measurement model requires examining indicator reliability, internal consistency, convergent validity, and discriminant validity.

4.6.1 Outer Loadings, Composite Reliability, and Convergent Validity

The internal reliability of the constructs is evaluated through outer loading. Outer loading of all manifest variables on their respective variables should be above 0.5 when the sample size exceeds 200 (Hair et al., 2010), as in this case. In this study, the reliability of all reflective constructs in the model was judged via CR, and the convergent validity of all reflective constructs was calculated via AVE. The threshold value for CR is 0.7 or above, and the threshold value of AVE is 0.5 or above (Hair et al., 2017). The outer loadings, composite reliability, and AVE values in Table 4.6 meet the required threshold values, explained by Hair et al. (2018) and discussed in Chapter 3.

Table 4.6: Outer Loadings, Composite Reliability, and Average Variance

Constructs	Items	Outer-Loadings	Composite Reliability	Average Variance Extracted
Top Management Support	tms1	0.812	0.888	0.613
	tms2	0.762		
	tms3	0.742		
	tms4	0.711		
	tms5	0.727		

Constructs	Items	Outer-Loadings	Composite Reliability	Average Variance Extracted
Project Management Maturity	pmm1	0.797	0.894	0.629
	pmm2	0.742		
	pmm3	0.847		
	pmm4	0.844		
	pmm5	0.728		
Realistic Budgeting and Scheduling	rsb1	0.688	0.848	0.529
	rsb2	0.746		
	rsb3	0.707		
	rsb4	0.785		
	rsb5	0.705		
Clear Project Goals	cpg1	0.775	0.856	0.598
	cpg2	0.769		
	cpg3	0.722		
	cpg4	0.825		
Project Risk Management	prm1	0.587	0.811	0.518
	prm2	0.328		
	prm3	0.779		
	prm4	0.724		
	prm5	0.761		

Table 4.6 continued				
Constructs	Items	Outer-Loadings	Composite Reliability	Average Variance Extracted
Project Team Competency	ptc1	0.766	0.907	0.662
	ptc2	0.803		
	ptc3	0.781		
	ptc4	0.855		
	ptc5	0.859		
Project Performance Success	PPS_1	0.761	0.888	0.613
	PPS_2	0.763		
	PPS_3	0.784		
Project Performance Success	PPS_4	0.814	0.888	0.613
	PPS_5	0.789		

Table 4.7 : Discriminant Validity via HTMT Ratios

	PP	cpg	pms	prm	ptc	rsb	tms
Project Performance Success - PPS							
Clear Project Goals-cpg	0.744						
Project Management Maturity-pmm	0.465	0.401					
Project Risk Management-prm	0.126	0.224	0.11				
Project Team Competency-ptc	0.56	0.748	0.448	0.166			
Realistic Schedule and Budgeting-rsb	0.746	0.827	0.432	0.226	0.658		
Top Management Support-tms	0.544	0.809	0.47	0.126	0.584	0.681	

Table 4.8: Fornell and Larcker Criteria

	PPS_	cpg_	pmm_	prm_	ptc_	rsb_	tms_
Project Performance Success - PPS	0.783						
Clear Project Goals-cpg	0.606	0.773					
Project Management Maturity-pmm	0.397	0.329	0.793				
Project Risk Management-prm	0.122	0.22	0.077	0.658			
Project Team Competency-ptc	0.489	0.623	0.392	0.162	0.814		
Realistic Schedule and Budgeting-rsb	0.62	0.643	0.355	0.197	0.55	0.727	
Top Management Support-tms	0.459	0.646	0.396	0.097	0.508	0.552	0.752

4.7 Structural Model Analysis

Following the evaluation of the measurement model through the four steps of measuring individual loadings, internal consistency reliability, convergent validity (AVE), and discriminant validity, the structural model needs to be evaluated. This will provide the relationships and associations between the independent and dependent variables while also examining the hypotheses. There are five steps to assess the structural model using PLS-SEM (Hair et al., 2014, 2019). According to Hair et al., (2012, 2014) bootstrapping was

applied using 5,000 samples and 557 samples from the data gathered to assess the path coefficient / significance. Figure 4.1 shows the structural model that will be assessed following the five steps and evaluating two main components (i) the structural model and(ii) hypothesis testing and presenting the findings (Mohammed et al., 2018):

1. Collinearity assessment via inner VIF values
2. Significance of Structural relationships
3. Assessing the level of R²
4. Assessing the value of f²
5. Predictive relevance Q²

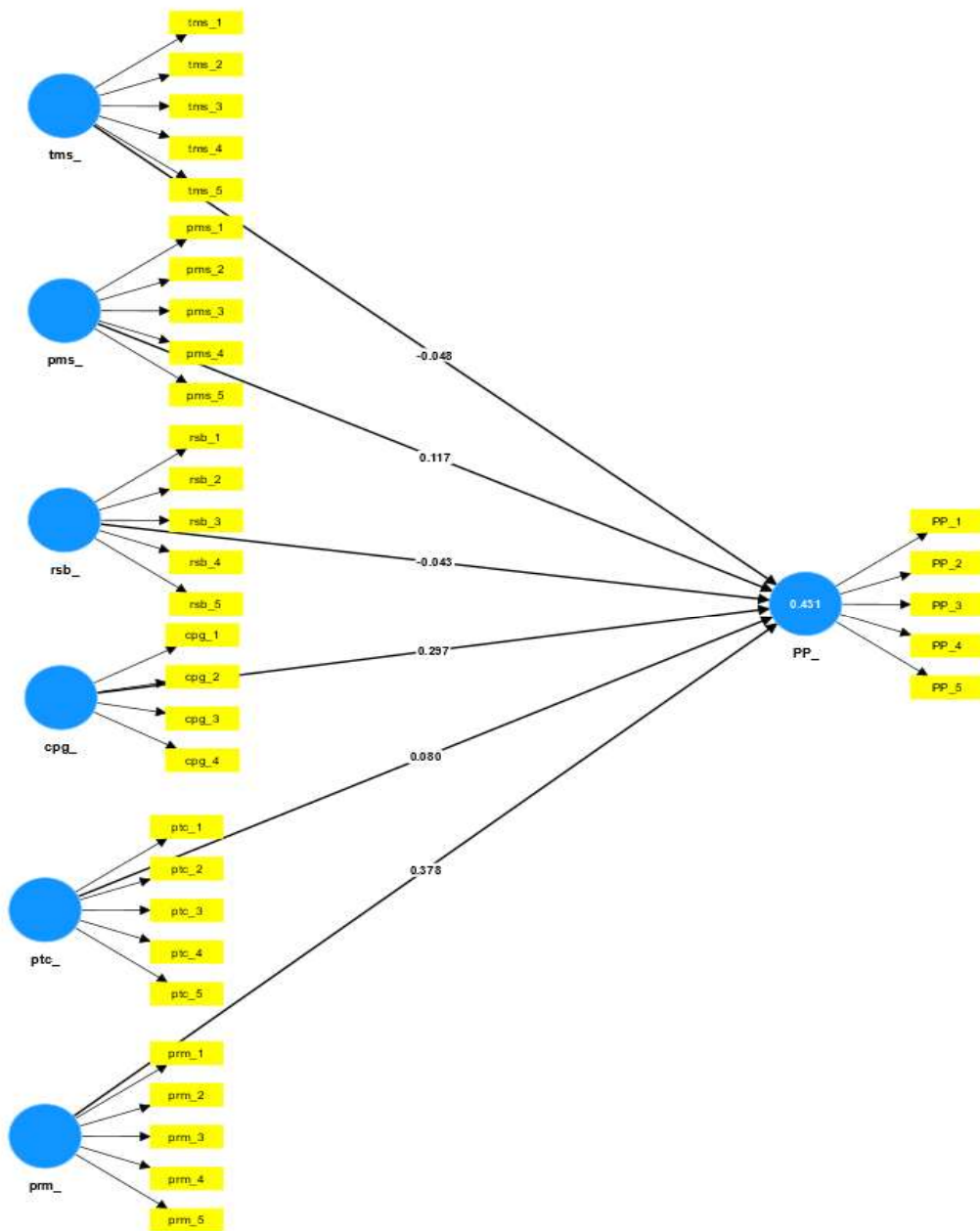


Figure 4.1: PLS-SEM Structural Model

4.7.1 Collinearity Assessment

Collinearity was assessed using the inner VIF values. As indicated in Table 4.9 below, the inner VIF values were below the threshold of 5.0 (Hair et al., 2016), indicating no collinearity among constructs.

Table 4.9 : Collinearity Inner Model

	VIF
Clear Project Goals -> Project Performance Success (cpg_ -> PPS_)	2.477
Project Management Maturity -> Project Performance Success (pmm_ -> PPS_)	1.273
Project Risk Management -> Project Performance Success (prm_ -> PPS_)	1.064
Project Team Competency -> Project Performance Success (ptc_ -> PPS_)	1.84
Realistic Schedule & Budgeting -> Project Performance Success (rsb_ -> PPS_)	1.928
Top Management Support -> Project Performance Success (tms_ -> PPS_)	1.932

4.7.2 Assessment of Structural Relationship

The conditions for confirming or rejecting hypotheses were based on t-values (greater than or equal to 1.96), and the absence of “0” in the confidence interval. H2, H3 and H4 are supported while the study’s findings rejected H1, H5 and H6. Table 4.10 below shows that six hypotheses relate to the direct relationship. Four hypotheses were rejected, and the rest were supported at a significance level of ($p \leq 0.05$). All the hypotheses were directional, therefore one-tailed tests were used to assess the structural relationships’ significance.

Hypothesis 1 proposed that top management support has an impact on project performance in Malaysia construction was not supported ($\beta = -0.023$, $t = 0.337$, $p < 0.736$). The insignificant also shows that, there are no role between top management support and project success in the Malaysian construction industry.

Hypothesis 2 proposed positive and significant impact of project management maturity on project success was supported ($\beta = 0.165$, $t = 3.01$, $p < 0.003$). The positive and significantly high impact of project management maturity level of a project team on project success signifies it is important to the project success for construction industry in Malaysia.

Hypothesis 3 proposed that realistic schedule and budgeting has an impact on project performance in Malaysia construction was supported ($\beta = 0.323$, $t = 4.781$, $p < 0.000$). The significant shows that, there are strong impact between realistic schedule and budgeting and project success in the construction industry in the Malaysia.

Hypothesis 4 proposed that clear project goals have an impact on the project success in Malaysian construction industry was supported ($\beta = 0.323$, $t = 4.23$, $p < 0.000$). The positive and significant impact of clear project goals signifies that clear project goals are vital to the project success in the Malaysia construction industry.

Hypothesis 5 proposed positive and significant impact of project team competency on project success was not supported ($\beta = 0.064$, $t = 0.975$, $p < 0.331$). The relationship between project team competency and project success is insignificant depicting that project management competency has no role in the project success in the construction industry in Malaysia.

Hypothesis 6 proposed positive and significant impact of project risk management on project success was supported ($\beta = -0.06$, $t = 1.208$, $p < 0.228$). The positive and significantly high impact of project risk management on project success signifies managing risk management is vital to the project success for construction industry in Malaysia.

Table 4.10: Assessment of Structural Relationships

	Beta Coefficient	Standard Error	t-Value	p-Value	95.0% Confidence Interval		Decision
					5.0 %	95.0 %	
H1: Top Management Support -> Project Success	-0.023	0.062	0.337	0.736	-0.144	0.102	Non-Supported
H2: Project Management Maturity -> Project Success	0.165	0.06	3.01	0.003	0.062	0.297	Supported
H3: Realistic Schedule and Budgeting -> Project Success	0.323	0.071	4.781	0	0.199	0.478	Supported
H4: Clear Project Goals -> Project Success	0.323	0.095	4.23	0	0.216	0.592	Supported

Table 4.10 continued							
H5: Project Team Competency -> Project Success	0.064	0.06	0.975	0.331	-0.06	0.178	Non-Supported
H6: Project Risk Management -> Project Success	-0.06	0.058	1.208	0.228	-0.185	0.044	Non-Supported

4.7.3 Assessing the Level of R^2

The most common measure used to evaluate a structural model is the coefficient of determination (R^2 value); it represents the exogenous latent variables' combined effects on the endogenous latent variable. It also describes the amount of variance in the endogenous constructs explained by all the exogenous constructs linked to it. R^2 values range from 0 to 1—as a rule of thumb that 0.75 is substantial, 0.50 is moderate, and 0.25 is weak (Chin, 1998; Henseler et al., 2009; Hair et al., 2012). Table 4.11 below shows the R^2 level for the endogenous variables which is the project success in the study. It shows that the R^2 range are moderate, hence establishing the in-sample predictive power of the model.

Table 4.11: Results of Coefficients of Determination R^2

Constructs	R^2	Adjusted R^2
Project Success	0.484	0.47

4.7.4 Assessing The f^2 Effect Size

The majority of marketing research studies, according to Sullivan and Feinn (2012), only provide the p-values that support the hypothesis. The P-value does not indicate the effect size, but it can tell us about the statistical significance. Therefore, it is crucial to disclose both the p-value and the effect size (f^2) when analysing research. The change in the R^2 value caused by the removal of an external component from the model is explained by f^2 . Cohen (1988) suggests that a f^2 value of 0.02 indicates a moderate impact size, whereas values of 0.15 and 0.35 indicate medium and high effect sizes, respectively. A significant p-value is more likely to appear with the comparatively bigger sample size. According to Sullivan and Feinn (2012), study comprehension may be halted if one were to base analysis solely on the provided p-values. All factors have small effect sizes, as Table 4.12 shows, but realistic schedule and budgeting has the largest effect size on project performance.

Table 4.12 : Results of Coefficients of Determination f^2

Item	f^2
Clear Project Goals -> Project Performance Success (cpg_ -> PPS_)	0.081
Project Management Maturity -> Project Performance Success (pmm_ -> PPS_)	0.039
Project Risk Management -> Project Performance Success (prm_ -> PPS_)	0.002
Project Team Competency-> Project Performance Success (ptc_ -> PPS_)	0.003
Realistic Schedule & Budgeting -> Project Performance Success (rsb_ -> PPS_)	0.123
Top Management Support -> Project Performance Success (tms_ -> PPS_)	0.001

4.7.5 Predictive Relevance Q^2

Stone-Geisser Q^2 is used through SmartPLS to test the predictive relevance of the inner model through a non-parametric test (Chin, 1998). According to Hair et al. (2017) the predictive capacity of the research model will be tested. The study used the bindfolding technique through SmartPLS to estimate the Q^2 value. The suggested setting for the D value is between 5 to 12, which omits every D^{th} point of data from the items of the dependent variable and evaluates it with the data points (Henseler et al., 2009; Hair et al., 2017). The omitted values are considered as missing and the data is replaced by the mean values, then the difference between the missing data and the replacement data are used as the Q^2 measure (Hair et al., 2017, 2014). According to Henseler et al. (2009), if the Q^2 value is greater than zero, then the independent variables have a predictive relevance for the dependent constructs. Table 4.13 shows the results from the Q^2 test ran to test the cross-validated redundancy.

Table 4.13: Results of Predictive Relevance Q^2

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Project Success	1150	832.569	0.276

4.8 Importance Performance Map

According to Fornell et al. (1996), an importance-performance map compares the performance of exogenous variables with their average latent variable scores, which indicate the exogenous constructions' relevance in producing a particular endogenous target construct. Slack (1994) asserted that the basis of IPMA analysis is the total effects of exogenous constructs. IPMA aims to detect those exogenous variables with comparatively

high importance in forming an endogenous construct, exogenous constructs with a robust total effect, but with a low score on the performance axis and small average latent variable scores. The IPMA combines these two aspects graphically by contrasting the (unstandardized) total effects on the x-axis with the latent variable scores, rescaled from 0 to 100 on the y- axis. To interpret the results, researchers focus on constructs in the lower right area of the importance-performance map; that is, project risk management have high importance for the target construct but show a lower performance. Table 4.14 reflects the results of IPMA analysis. It is evident from Table 4.14 that the two most crucial antecedent variables for project performance are clear project goals and project risk management.

Table 4.14 : IPMA Matrix

Constructs	Importance	Performance
Clear Project Goals	0.322	77.616
Project Management Maturity	0.16	78.182
Project Risk Management	-0.035	77.313
Project Team Competency	0.054	73.737
Realistic Schedule and Budgeting	0.35	75.717
Top Management Support	-0.03	74.602

Note: The above table shows the results of the importance-performance map analysis

The results of Table 4.14 are supplemented by Figure 4.2, which shows that the construct of clear project goals occupies the top slot with the highest scores both on the importance and performance axes on the importance-performance axes.

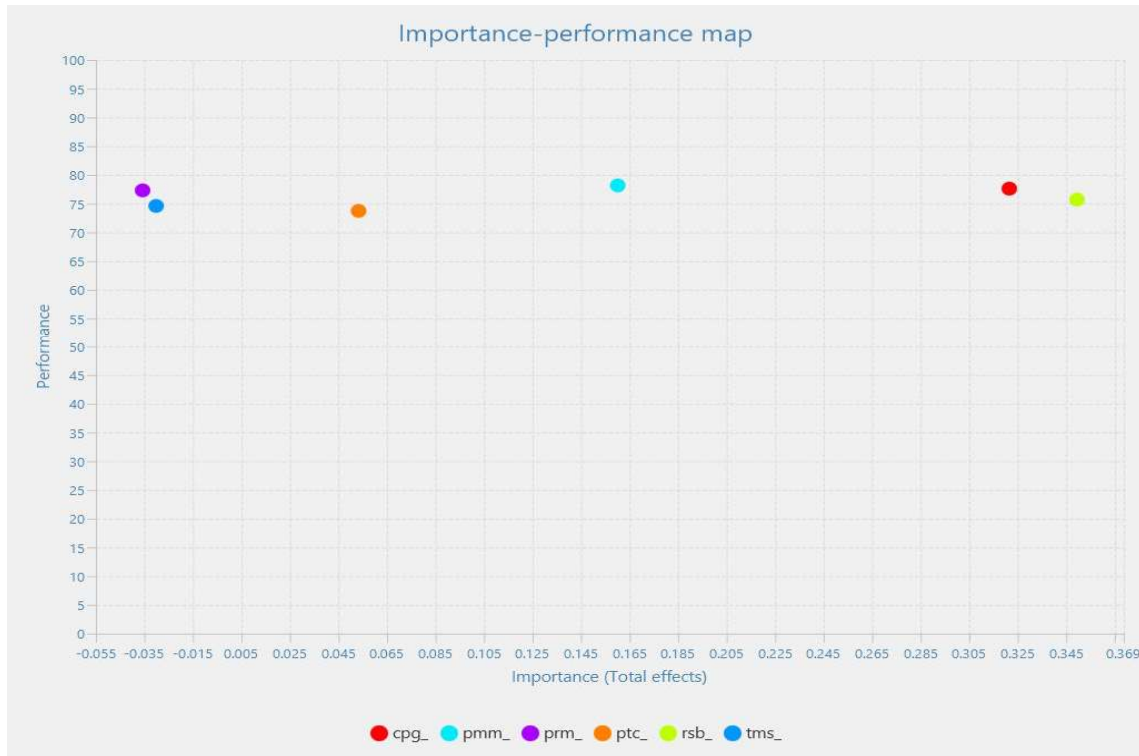


Figure 4.1 : Result of the IPMA Map

Note: The importance-performance values of antecedent constructs for the goal construct of brand loyalty are displayed in the above table. For performance values, SmartPLS automatically rescales data from 0 to 100. The significance of every antecedent construct is illustrated by the non-standardized total effects.

4.9 Discussion

This study aims to enhance comprehension regarding the interplay between several aspects, such as project management aspect comprising clear project goals, project management maturity, project team competency, realistic schedule and budgeting, top management support, project risk management and how it influences project performance, within the context of the Malaysian construction sector. This study demonstrated a notable impact of many elements on project management and its influence on employee performance. A total of six hypotheses were examined. The subsequent sections present the

principal outcomes pertaining to each hypothesis, together with the rationales elucidating the support for certain hypotheses and the lack thereof for others.

The first objective of the study was to investigate the correlation between the level of top management support and its impact to the performance of construction projects in Malaysia.

The top management is considered as a senior-level person which possess leadership and management skills. The role of the top management is to provide their employees with a great working environment and facilities as well as their responsibility to provide support to employees during project implement. Top management should provide encouragement as it is critical in determining the success of the project (Ahmed et al., 2016; Sperber & Linder, 2016). According to recent study, it considered top management support is essential to that project's success. Top management, consisting of individuals who serve as chief executive officers and a single or a team of managers which meets the required standards to lead a company (Ong & Bahar, 2018).

However, the first important finding of this study indicate that level of top management support has a weak negative and statistically insignificant impact on project performance success, hence Hypothesis 1 was rejected. The test results from the data gathered for this research differ from those of previous research in that they indicate a positive correlation between top management support and building project success. With a coefficient of -0.023, it demonstrates that there is a negative relationship between top management support and the success of construction projects. This indicates that the degree of top management support has a negative influence on Malaysian construction projects' success.

Research by Zin et al. (2018), which examined 123 construction companies in Malaysia and tested the relationship between top management support, collaborative team, and project performance, shows that while most previous studies show a positive relationship between top management support and project success, there are also results from prior studies that indicate top management support has no significant influence on construction project performance in Malaysia. Several factors could be attributed to this insignificant impact. First, it could be due to regulatory environment. The regulatory environment in Malaysia, including government policies, laws, and regulations, can influence project performance. Projects may be subject to various restrictions or requirements that could impact their success, regardless of the support provided by top management. The construction industry is heavily regulated and stringent regulations or bureaucratic hurdles might limit the scope of management's influence on project outcomes. The study by Ali et al. (2019) analyses the impact of regulatory risk on construction project performance in Malaysia. The findings highlight the significant challenges posed by regulatory uncertainties, delays in approvals, and inconsistent interpretations by authorities, all of which can undermine top management's ability to influence project outcomes. One of the real-world examples of regulatory hurdles hindering top management influence in Malaysia construction projects is the Kuala Lumpur-Singapore High-Speed Rail (HSR) Project. This high-profile project faced delays and uncertainties due to complex land acquisition processes, lengthy environmental approvals, and disagreements between the Malaysian and Singaporean governments. These regulatory challenges hindered the project's progress, leading to cost overruns and delays. Top management's influence was limited in overcoming these bureaucratic hurdles, highlighting the significant impact of regulations. Another example is the Pan Borneo Highway Project where this large-scale infrastructure project

encountered delays and challenges due to land disputes, environmental concerns, and issues with contractor performance. These regulatory hurdles highlighted the complexities of managing major projects within a challenging regulatory environment, limiting the effectiveness of top management interventions. (Kelvin et al., 2023). In term of internal factors, project complexity and nature could also interrupt the influence of top management involvement or support to project performance. Some projects might be so technically complex or unique that the role of top management becomes secondary to technical expertise and ground-level project management (Zairy et al., 2021). Finding from this study supports the notion that project complexity moderates the relationship between top management involvement and performance. When projects are highly complex, the direct involvement of top management may not be as effective as empowering project teams and providing them with the necessary resources.

In summary, the test results indicate that there is a negative relationship between top management support and construction project performance. However, it should be noted that top management support is also important for project success in and of itself. Additionally, it demonstrates that the majority of projects that are ongoing in the Malaysian industry embrace strong backing from upper management, which provides ample resources and authority. However, the likelihood of a construction project achieving success isn't improved by this support (Elbanna & Newman, 2022).

The second objective was to study the connection between the level of project management maturity and the performance of construction projects in Malaysia.

The Organisational Project Management Maturity Model (OPM5, 2018) describes the maturity of an organization's project management system as a measurement tool for

evaluating the implementation and application of formal project management practices within the organisation.

Hypothesis 2 proposed results revealed a statistically positive significant impact of transformational leadership on work engagement. The t-value (3.01) represents the positive impact of project management maturity on the success of construction projects. The findings match the past researchers' results (Brookes et al, 2016), Gorecki, 2015). They suggested that the project management maturity levels are influenced by the maturity of the organization's structure. Large organizations, according to the studies, have a more mature structure, leading to higher levels of project management maturity. Large organizations also have a functional (Gorecki, 2013), standardized, and formalized project management structure. This study found that respondents rate their project management's efficiency using these mature structures. Backlund and Sundqvist Backlund et al. (2015) also discovered that a mature organizational structure has more flexibility, allowing it to bring in more personnel when needed to successfully complete the project. Respondents tend to perceive high maturity due to the organizational structure's maturity. The literature also indicated that the current state of an organization's structure could determine its project management maturity implementation. Additionally, similar research indicate that the degree of project management methodology applied, along with the implementation of standardised project management practices, will improve project performance, which in turn will lead to project success. Research supports the notion that greater project success is associated with higher organisational project management maturity levels (using project management best practices). According to this study, formal project management practices, organisations that support project management standards, and practitioners who advance their own expertise

by earning project management certification all have a major impact on the success of projects.

The third objective was to analyse the association between realistic scheduling and budgeting to the performance of construction projects in Malaysia.

Scheduling is the process of providing the resources, relationships, and schedule of the tasks to calculate the completion time (Kanit, 2021). The schedule of the construction is based on the task, material, labour, and the time needed for completing the project. There are many ways to create a schedule which includes curve S, network planning, the scheduling linear, etc. The construction planning and the scheduling are to improve the work efficiency of the project. Effective material management and proper distribution of the material or the resources reduce the cost of the project and reduce the lifetime of the project. Site planning is a task that is done step by step on the site (Hasan, 2019)

Hypothesis 3 proposed that there is a positive and statistically significant impact of realistic scheduling and budgeting was rejected. The significant impact shows that realistic scheduling and budgeting has a positive influence to construction project success. The current study's findings match the previous studies where researchers posited that realistic scheduling and budgeting significantly influences project performance success. Study conducted by Aftab & Ismail (2021) on time and cost performance in construction projects in southern and central Regions of Peninsular Malaysia revealed that proper planning and cost estimation, good coordination among project stakeholders, and effective supervision can significantly improve project performance. Research done by Shahid and Zaigham (2019) which examined the influence of scheduling practices on client satisfaction in Malaysian construction also found that projects with realistic schedules led to higher client

satisfaction scores due to reduced delays and improved predictability. Before construction activities begin, proper planning entails thorough project scheduling, resource allocation, and risk assessment. Precise cost assessment reduces the possibility of budget overruns during construction by guaranteeing that the project is sufficiently funded. The Kuala Lumpur International Airport 2 (KLIA2) project serves as an illustration of the need of careful planning and cost estimation. Sufficient planning and cost management enabled the project to be completed successfully by staying within its allocated budget and schedule (Nor Azlina et al., 2016).

The fourth objective was to determine the influence of defining clear project goals to the performance of construction projects in Malaysia.

Defining a clear project brief at an early stage is critical for the project success. A lack of project brief clarity can cause design and construction changes or errors throughout project delivery, which ultimately leads to project time and cost overruns. Initial project aims and clear definition is essential to the project's success. and construction modifications during project delivery, which eventually drives up project costs and duration. The fourth hypothesis, which stated that establishing specific project goals has a positive relationship with construction project success in Malaysia, was found to be valid. These results are consistent with other research that has shown that projects have a higher likelihood of success, especially when it comes to the client or project owner, when their goals are more explicit and well-defined (Dvir, Rax, & Shenhar, 2016). Xia et al. (2015) also discussed that a clear project brief can directly impact project performance. They evaluated the causal relationship between briefing and project performance quantitatively. It was also concluded that a clear project brief causes higher project design quality, which can ultimately improve project performance.

The fifth objective was to evaluate the impact of project team competency towards the performance of construction projects in Malaysia.

According to previous studies, a competent project team consists of a project manager and members who have been appointed, trained, and equipped with the necessary knowledge, skills, and experience to meet the demands of the project. The team members' capacity to convince others and present the project's advantages to clients is crucial to ensuring that the project is quickly approved by them after it is finished and presented to them (Chan, Zailan, & Fernando, 2019). Therefore, previous researches indicate that project team competency has positive influence on the project performance success. However, based on this study, the direct impact of project team competency on project success was insignificant, hence Hypothesis 5 was rejected.

While project team competency is widely recognized as a key factor influencing project success, its significance can be tempered by various internal and external factors in the Malaysian construction industry. One of the internal factors that may cause this is lack of training and development programs. Research by Othman et al. (2021) highlights the limited investment in training and development programs for construction professionals in Malaysia. This hinders the acquisition of skills and knowledge needed for effective project management and team performance. This lack of training also hinders the ability of team members to adapt to new technologies, methodologies, and regulations. It also limits their ability to solve complex problems, make informed decisions, and collaborate effectively.

Another internal factor that could influence weak significance impact of project team competency towards project success is poor communication and collaboration. According to Mohd Nor et al. (2018), ineffective communication and collaboration among

team members often hinders project progress and hinders knowledge sharing. Poor communication hinders knowledge sharing, coordination, and teamwork. This can lead to misunderstandings, duplication of efforts, decreased morale, and ultimately, reduced team efficiency. Meanwhile one of the external factors towards this is the competitive bidding environment in Malaysia construction industry. The intense competition for construction projects in Malaysia often leads to low-ball bidding, which can constrain resources and compromise team quality as highlighted by Kamaruddeen et al. (2022). Low-ball bids often restrict the ability to invest in skilled personnel, training programs, and necessary equipment. This can lead to a team with limited capabilities and inadequate resources to deliver successful projects. These elaborated findings further emphasize the complex interplay between internal and external factors that can weaken the significance of project team competency in the Malaysian construction industry.

The sixth, and final, objective was to determine the influence of risk management to the performance of construction projects in Malaysia.

Risk management is becoming very prevalent in numerous corporations. Countless companies apply risk management in projects to increase productivity and profits as to improve business performance (Ahmadi et al., 2017). However, Hypothesis 6 was rejected, which proposed there is a positive relationship between project risk management and construction project success in Malaysia. The findings of this study are consistent with the previous research by Adam et al. (2019) which found that that risk management has weak influence to construction project success in Malaysia, which is due to this is a new concept in the Malaysian construction industry and has not been widely implemented in the country.

The degree of risk management practice in the Malaysian construction industry was examined in a different study by Manal et al. (2019) from a knowledge-based perspective. The study discovered that the theories and models currently in use on risk management in construction projects have drawbacks and don't offer a methodical way to implement risk management techniques in Malaysian construction projects. According to Hamza et al. (2015), not every construction company created a risk management department. Consequently, these studies indicated that in order to enhance the performance of clients, contractors, and consultants, it is imperative to implement a knowledge-based strategy. This will enable them to apply their own expertise and understanding for a more structured and methodical approach to risk management.

4.10 Chapter Summary

Table 4.15 presents a summary of the hypotheses derived from the analysis of the measurement model and structural model using SmartPLS.

Table 4.15: Summary of Hypotheses

Hypothesis	Statement	Findings
H1	Top Management Support has a weak negative effect on project performance success	Not Supported
H2	Project Management Maturity has a positive effect on project performance success	Supported
H3	Realistic Schedule and Budgeting has a positive effect on project performance success	Supported
H4	Clear Project Goals has a positive effect on project performance success	Supported
H5	Project Team Competency has a negative effect on project performance success	Not Supported
H6	Project Risk Management has a negative effect on project performance success	Not Supported

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Overview

In this last chapter, the study findings are discussed from a wide theoretical and practical perspective, after which a summary of the research topics and hypothesis testing results is provided. It provides a synopsis of the conclusions that can be drawn from the empirical data gathering findings. References to prior research are included, and the discussions are structured to represent the main ideas found in each of the study's objectives and to place them within the context of the body of literature. Towards the close of the chapter, together with some closing thoughts and possible avenues for further research, come a discussion of the limitations and theoretical and practical consequences of this work.

5.2 Research Summary

The primary objective of this study was to identify the variables affecting project performance success in the construction sector in Malaysia. The first chapter, which highlights the importance of the research and its motivation, lays the groundwork for this study. This chapter provides a succinct summary of the research addressing the six criteria that affect project performance success. These conclusions are the result of a thorough evaluation of the body of prior research on the topic. The chapter then explores the theoretical framework that serves as the foundation for the research, combining three theoretical vantage points: the theory of change, the goal-setting theory, and the theory of triple constraint. These theories were chosen based on how well they explained the current phenomenon. With an emphasis on top management support, realistic scheduling and

budgeting, project risk management, project management maturity, and project team competence, they are used in this study to analyse and discuss the factors influencing project performance in the Malaysian construction industry. A brief summary of the research approach and anticipated contributions is provided at the end of this chapter.

5.3 Theoretical Contributions

According to Bernath and Vidal (2007), a theory is defined as a knowledge unit composed of assumptions, hypotheses, and facts. This study employs the broad and simple conceptual definition of theory proposed by Gioia and Pitre (1990), which describes a theory as a statement of ideas and their interrelationships that explain how and why things happen. Testing new variables within an existing theoretical framework is essential for advancing theory, as Whetten (1989) suggests. He states that new theoretical understanding is generated when "the inclusion of a new variable (construction) substantially changes our knowledge of the phenomena by restructuring its causal maps" (Whetten, 1989, p. 493). Despite the abundance of theoretical considerations, determining the amount of additional knowledge necessary to expand the theoretical understanding remains challenging. Smith (1997) asserts that the ultimate test of a study's value is its ability to move scholars and expand their existing theoretical understanding.

This study aims to investigate and determine the best strategies to enhance project performance in the Malaysian construction sector. The theoretical contributions of this research are rooted in several key theories: Theory of Change (ToC), Resource Advantage Theory (RAT), Goal Setting Theory (GST), and the Theory of Triple Constraints. By examining these theories in the context of Malaysian construction projects, this study offers valuable insights and advances our understanding of project management practices.

5.3.1 Theoretical Contributions to Theory of Change (ToC)

The dissemination of change management theory served as the foundational framework for this investigation. According to Kenny (2003), the philosophy of change can encompass project management. Bourne and Walker (2003) emphasize that project managers are responsible for successfully executing the plans developed by construction businesses. The findings of this study, which highlight the importance of top management support, efficient communication, realistic budgeting, and addressing project problems, align with the principles of change management. This study confirms and extends the Theory of Change by demonstrating how managing uncertainty and addressing resource constraints can enhance project performance. It provides empirical evidence that supports the integration of risk management into the change management framework, thereby enriching the ToC by linking it with practical project risk management strategies (Bevilacqua et al., 2009; Rand, 2000).

5.3.2 Theoretical Contributions to Resource Advantage Theory (RAT)

Barney (1991) proposed the Resource Advantage Theory (RAT), which posits that the unique combination of resources within an organization determines its competitive advantage. This study's analysis of project management maturity levels and the clear definition of project goals contributes to RAT by illustrating how effective resource management leads to better project outcomes. The findings suggest that companies with mature project management practices and clearly defined goals are better equipped to leverage their resources for competitive advantage. This supports the Resource Based View (RBV) by demonstrating that internal competencies, such as project management maturity and goal clarity, are critical for project success (Das and Teng, 2000; Haron et al., 2021).

5.3.3 Goal Setting Theory (GST)

The Goal Setting Theory (GST) introduced by Locke and Latham (2006) posits that clear, specific, and challenging goals lead to higher performance. This study supports GST by showing that projects with well-defined goals at the start are more likely to succeed. The research highlights the necessity of clear communication of project goals to all stakeholders and the importance of stakeholder engagement in the goal-setting process. By doing so, it adds to the body of knowledge on GST by providing evidence of its applicability in the construction sector, particularly in the context of complex projects where goal clarity can significantly impact outcomes.

5.3.4 Theoretical Contributions to Theory of Triple Constraints

The Theory of Triple Constraints, as outlined by the Project Management Institute (PMI, 2015), involves managing project scope, time, and cost to achieve success. This study's findings emphasize the critical role of realistic scheduling and budgeting in project success. By integrating the Triple Constraints framework with practical insights from the Malaysian construction industry, this research extends the theory by highlighting the interdependence of these constraints and their collective impact on project performance. It reinforces the need for continuous monitoring and adaptive management practices to maintain balance among the constraints (PMI, 2015; Fortune et al., 2006).

In conclusion, this study makes significant theoretical contributions by integrating and extending established theories within the context of the Malaysian construction industry. It offers empirical support for the Theory of Change, Resource Advantage Theory, Goal Setting Theory, and the Theory of Triple Constraints, demonstrating their relevance and applicability in enhancing project performance. By addressing key factors such as top

management support, project management maturity, clear project goals, and risk management, this research provides a comprehensive framework for understanding and improving project outcomes. The findings not only validate existing theoretical models but also offer new insights that can guide future research and practice in project management.

5.4 Practical Contribution

5.4.1 Introduction

According to Davis (1971), a key factor setting great research apart from others is not necessarily the validity of the ideas, but rather the significance and value of the hypotheses. According to Rynes (2002), a study's value is determined by "the common sense" and how it is expected to affect "people in the street," not by prior research.

Kilduff (2006) further states that "a theory succeeds when it provides practical implication with meaningful, important, and innovative ideas" (p. 252). Furthermore, Bennis and O'Toole (2005) contend that a theory is worthless if it has no application. The purpose of this section is to illustrate the study's broad practical consequences. In light of this, the following real-world applications are anticipated from the study's findings:

5.4.2 Guiding Principles for Project Performance Monitoring

It is important to note that over the past few decades, government agencies and legislators have worked diligently to improve the performance of projects awarded to contractors for either public or private undertakings. Examples of these agencies and authorities include the Public Works Department (PWD) and the Construction Institute Development Board (Board).

The application of project management for construction companies in Malaysia is primarily linked to the practical implications of the current study. The research findings can be used by authorities, such as PWD, to include requirements for contractors bidding on contracts to submit their project management maturity level score and detailed project risk management planning in their tender documents during the pre-bidding phase. The government might put emphasis on relevant organisations, like the CIDB, to concentrate on enhancing the contractor's project management abilities in addition to their technical skill growth.

5.4.3 Practical Implications for Industry Professionals

The study's findings and analysis will give practitioners a better understanding of the variables that may affect a project's performance. The scale is a tool that project managers can use to assess the ground realities of a building project's enabling variables. Project managers can allocate resources wisely and optimally to those aspects that will ultimately result in a project that performs satisfactorily based on the results. With the use of this scale, project managers would be able to pinpoint the various objectives and driving forces of both direct and indirect stakeholders, which would include the local government and the community in which the project is being implemented, as well as clients, consultants, and contractors.

5.4.4 Contribution to Academic and Training Programs

This research aspires to serve as a torchbearer, guiding academicians, future researchers, and trainers in construction project management towards a brighter future for the Malaysian industry. By shedding light on the six key factors influencing project success,

this study offers a valuable roadmap for advancing knowledge, refining practices, and empowering future generations of construction professionals. This research provides a springboard for further theoretical exploration within the context of Malaysian construction. By delving deeper into the mechanisms of each identified factor such as risk management strategies, or team competency development models, academicians can refine existing project management theories and develop more nuanced frameworks specifically tailored to the Malaysian landscape. The six factors identified in this study serve as a launchpad for future research endeavours. Researchers can explore each factor in greater detail, investigating its specific impact on different project types, procurement methods, and stakeholder dynamics within the Malaysian context. This can lead to the development of targeted interventions and practical solutions for addressing the unique challenges faced by the industry.

For future researchers, as this study identifying practical tools and strategies for implementing the six key factors, this research paves the way for future researchers to bridge the gap between academic theory and practical application. This can involve developing training programs, best practice guides, and decision-support tools based on the research findings, directly impacting the success of construction projects in Malaysia. Besides that, this study can also contribute in developing contextually relevant case studies. The specific examples provided in the results discussion in this research, such as the Kuala Lumpur-Singapore High-Speed Rail (HSR) Project can be further developed into detailed case studies for training purposes. These case studies can be adapted to various project types and contexts within Malaysia, providing trainees with practical insights and real-world learning experiences.

By serving as a torchbearer for academicians, future researchers, and trainers, this research has the potential to significantly impact the Malaysian construction industry. By promoting knowledge creation, methodological innovation, and practical application, this study can contribute to a future where construction projects in Malaysia are not only successful but also sustainable, collaborative, and beneficial to the communities they serve.

5.5 Limitation and Recommendations

During the entire research procedure, this study found certain limitations. Although every effort has been made to ensure that this study is generalized and sanctified using maximum available resources and the latest versions of accessible software, the study results remain subject to certain restrictions. This study's limitations are described for future studies to be developed and for future researchers to be torch-bearers. The revelation of these restrictions is likely to provide future researchers with a chance for further research. Some of these constraints and its recommendations for future research are:

5.5.1 Sample Technique

Similarly, this study employs a non-proportionate stratified random sampling which shows that the population elements were randomly picked within four states in Malaysia, as such, the level to which sample size characterizes the entire population was selected randomly. Hence, future studies might go further by investigating more than a state in Malaysia

5.5.2 Research Setting

This study uses purposeful quota sampling and a self-administered survey-based questionnaire to obtain data from grade G7 companies in four states in Malaysia. While a

combination of purposive and quota samples is an appropriate strategy, it might be argued that the context of this study cannot be extended to other CIDB grade companies (Grade G6 and below). Including respondents from diverse grades (cross-cultural research) and a comparative study could improve the generalization of this study. Participants from different countries and construction industry backgrounds may also have distinct attitudes, practices, or behaviours. Therefore, this issue can be addressed in future studies by conducting a comparative survey of respondents from two or more regions.

5.6 Conclusion

This study has identified and analyzed the key factors that influence project success within the Malaysian construction industry. Projects have specific sets of factors that, if focused on, can significantly enhance the likelihood of success. Conversely, neglecting these factors can lead to project failure. Understanding and prioritizing these factors is crucial for improving productivity and achieving successful project outcomes in the construction industry. The present study investigated the impact of six critical factors on project success in the context of Malaysia's construction sector. The findings revealed significant positive relationships between defining clear project goals, realistic scheduling and budgeting, and improving project management maturity levels with project success. These factors emerged as vital contributors to successful project outcomes, highlighting their importance in the construction industry.

Defining clear project goals ensures that all team members understand the project's objectives, which is essential for cohesive and focused efforts towards project completion. Developing detailed plans and budgets, regularly comparing actual progress with baselines, and conducting frequent progress meetings are crucial for maintaining project alignment and

addressing issues promptly. The implementation of standardized processes and continuous improvement practices enhances project efficiency and effectiveness, leading to higher success rates. The study also examined the negative relationships between project success and factors such as project risk management, top management support, and project team competency. These findings suggest that while these factors are critical, their current implementation in the Malaysian construction industry may not be as effective, warranting further attention and improvement.

Success and its interpretations vary across different countries and contexts. While this study is focused on the Malaysian context, some lessons learned can be generalized. However, it is essential to explore other factors in greater detail that may influence project success in the construction industry in Malaysia. Further research should investigate additional variables and their impacts to provide a more comprehensive understanding of project success factors. The construction industry should take proactive steps to enhance the knowledge and skills of managers and employees regarding project success. This could include targeted training programs, workshops, and continuous professional development initiatives to promote best practices and improve project outcomes.

In conclusion, defining clear project goals, establishing realistic schedules and budgets, and improving project management maturity levels are the most important factors affecting the performance of the construction industry in Malaysia. By focusing on these key areas, the industry can achieve greater project success and contribute to overall sector growth and development.

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APPENDICES

Appendix A: Questionnaire

Dear Potential Participant,

My name is Mark Anak Selat, a postgraduate student in Doctor of Business Administration (DBA), Faculty of Economics & Business, University of Malaysia Sarawak and currently conducting research entitled "**Factors Influencing the Performance of Projects in The Malaysian Construction Industry**". The target respondents for this study are **ONLY** for *Project Managers working with CIDB Grade 7 contractor*.

I seek your cooperation in answering this survey. All information recorded would be used for academic purposes only and will be kept strictly confidential. Your cooperation and participation in this study will be of help to achieve the objective of this study. The questionnaire consists of 9 parts: Section 1 (Demographic Factors of Respondent), Section 2-7 (Question related to the factors influencing the recent completed project) and Section 8 (Project Performance). This survey will take approximately 8 to 10 minutes to complete. If you have any inquiries regarding this study, please do not hesitate to contact me at 014-5079481 or email me at Markselat88@gmail.com

Thank you for your time and cooperation.

Mark Anak Selat

Faculty of Economic and Business, UNIMAS

(Proceed to Section 1)

Section 1: Demographic Factors

Please fill in the necessary information or tick (✓) in the appropriate boxes.

1. Please state your firm's location:

WP Kuala Lumpur () Johor () Penang () Sarawak () Other: _____

2. Please state your gender:

() Male () Female

3. Please state your age:

() < 21 years () 21 - 30 years () 31 - 40 years () 41 - 50 years () 51-60 years

4. Please indicate your highest level of education completed:

() Diploma () Bachelor's Degree () Masters () Phd () Other: _____

5. Working experience:

() < 2 years () 2 - 7 years () 8 - 13 years () 14 -19 years () > 20 years

6. Please state the CIDB score rating of your company:

() 1 star () 2 star () 3 Star () 4 Star () 5 Star

Section 2: Project Success

Thinking back to your Last Completed Project, to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	
1	This project was completed on schedule						
2	This project was completed within budget						
3	Technical requirements specified at the beginning of execution phase were met						
4	Project clients and/or product users were satisfied with the project outputs						
5	There were no quality issues related to project output						

Section 3: Top management support

Thinking back to your Last Completed Project (same completed project), to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	
1	Top management is responsive to our requests for additional resources if the need arises						
2	Top management has granted us the necessary authority and will support our decisions concerning the project						
3	That project was continually or constantly being review to re-evaluate the viability and potential success by management						
4	Top management share the responsibility with the project team for ensuring project's success						
5	Top management was supporting you in crisis						

Section 4: Level of project management maturity

Thinking back to your Last Completed Project (same completed project), to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	
1	Documentation standards were used (progress/status reports, and time sheets, others.)						
2	Information on successful/unsuccessful project was readily available						
3	Job description for team roles have been made available to the team personnel in writing						
4	Project team personnel understand their role on the project team?						
5	Top management was supporting you in crisis						
6	You use project template or project documents created by others (previous) project leaders						
7	Project review outcome become part of a discussion in project meeting						

Section 5: Realistic scheduling and budgeting

Thinking back to your Last Completed Project (same completed project), to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	
1	Detail plan and budget for the project are available						

2	Actual project progress is regularly compared with the project baseline						
3	Regular meetings to monitor project progress and provide feedback to the project team are conducted						
4	When the budget or schedule requires revision, input is solicited from the project team.						
5	Projects are subject to realistic deadlines and targets						

Section 6: Defining clear project goals

Thinking back to your Last Completed Project (same completed project), to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	
1	The basic goals of the project are made clear to the project team						
2	Project goals are clearly defined at start-up						
3	Project goals are made clear to all participants						
4	Potential stakeholders / clients have been contacted about the usefulness of the project						
5	An adequate presentation of the project has been developed for clients or stakeholders						

Section 7: Project team competency

Thinking back to your Last Completed Project (same completed project), to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	

1	The project team did not experience any significant personnel losses or transfers during the project's development						
2	The project technical people are competent						
3	Project team members are committed to the achievement of project goals						
4	Project team members takes ownership of project goals						
5	Project team members actively participate in decision-making regarding the achievement of project goals						

Section 8: Project Risk management

Thinking back to your Last Completed Project (same completed project), to what extent:

	Attribute	Level of Agreement					
		1	2	3	4	5	
1	Risk assessment procedures were established						
2	There are contingency plans in case the project is off schedule or off budget						
3	Project team conduct and update risk assessment on project along the progress						
4	The limitation of the project had been discussed with the clients at the initial stage or starting of project						
5	The clients were told whether or not their input was assimilated into the project plan						

End of questionnaire.

Appendix B: Google Form Image of the Questionnaire



**Doctor of Business Administration (DBA)
Study on "Factors Influencing the
Performance of Projects in The
Malaysian Construction^s Industry"**

Dear Potential Participant,

My name
is Mark Anak Selat , a postgraduate student in Doctor of Business Administration
(DBA), Faculty of Economics & Business, University of Malaysia Sarawak and
currently conducting research entitled "**Factors Influencing the Performance of Projects in
The Malaysian Construction Industry**". The target respondents for this study are **ONLY** for
Project Managers working with CIDB Grade 7 contractor.

I seek your cooperation in answering this survey. All information recorded would be used
for academic purposes only and will be kept strictly confidential. Your cooperation and
participation in this study will be of help to achieve the objective of this
study. The questionnaire consists of 9 parts: Section 1 (Demographic Factors of
Respondent), Section 2-7 (Question related to the factors influencing the
recent completed project) and Section 8 (Project Performance). This survey will
take approximately 8 to 10 minutes to complete. If you have any inquiries
regarding this study, please do not hesitate to contact me at **014-5079481** or
email me at **Markselat88@gmail.com**

*Thank you for your time and
cooperation.*

Mark Anak Selat

Faculty of Economic and Business,
UNIMAS

markselat88@gmail.com [Switch account](#)

 Not shared 