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**PROJECT MANAGEMENT LEADERSHIP TRAITS AND COVID-19
IMPLICATIONS ON MALAYSIAN CONSTRUCTION INDUSTRY**

SYEREEN-ZAHRA BINTI SHORBAINI



MASTER OF SCIENCE (PROJECT MANAGEMENT)

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**PROJECT MANAGEMENT LEADERSHIP TRAITS AND COVID-19
IMPLICATIONS ON MALAYSIAN CONSTRUCTION INDUSTRY**

By

SYEREEN-ZAHRA BINTI SHORBAINI



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Master of Science (Project Management)



Kolej Perniagaan
(College of Business)
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: **Assoc. Prof. Dr. Mohamad Faizal bin Ahmad Zaidi**

Tandatangan
(Signature)

Pemeriksa Dalam
(Internal Examiner)

: **Assoc. Prof. Dr. Mohamad Faizal bin Ahmad Zaidi**

Tandatangan
(Signature)

Pemeriksa Dalam
(Internal Examiner)

: **Dr. Chong Khai Lin**

Tandatangan
(Signature)

Tarikh: **04 April 2024**

Date:

Nama Pelajar
(Name of Student) : Syereen-Zahra binti Shorbaini

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(Name of Supervisor/Supervisors) : Assoc. Prof. Ts. Dr. Faizatul Akmar binti Abdul Nifa



Tandatangan

Nama Penyelia/Penyelia-penyelia
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ABSTRACT

The COVID-19 pandemic presented unprecedented challenges to Malaysia's construction industry – disrupting project timelines, supply chains, and financial stability. Effective project management leadership emerged as a critical factor in navigating these challenging times. This study was guided by two objectives: (1) to identify the pandemic's impact and strategies in Malaysia's construction sector and (2) to determine project management leadership traits during the pandemic. A qualitative research approach was employed, involving thematic and content analysis of data collected through semi-structured interviews with industry professionals. The study's findings revealed significant disruptions across various aspects of the construction industry, including supply chain management, workforce safety concerns, financial implications, regulatory hurdles, and technological integration. Essential leadership traits identified included effective communication, adaptability, strategic decision-making, empathy, and resilience. Based on the findings, recommendations were provided to fortify the resilience and preparedness of Malaysia's construction industry. These included diversifying supply chains, prioritizing workforce safety, bolstering financial risk management, embracing technological integration, fostering collaboration, cultivating leadership resilience, and prioritizing continuous learning and adaptation. Implementation of these recommendations could enhance project management practices and ensure continuity amidst disruptions. In conclusion, this research provide evidence on the profound impact of the COVID-19 pandemic on Malaysia's construction industry and offered practical recommendations to navigate uncertainties effectively. By fostering adaptive leadership and implementing robust strategies, construction firms could emerge stronger from the crisis and drive sustainable success in the post-pandemic era.

Keyword : *Project Manager, Covid-19, Leadership Traits, Impact towards construction industry*

ABSTRAK

Pandemik COVID-19 telah membawa cabaran yang belum pernah terjadi sebelumnya kepada industri pembinaan Malaysia – mengganggu jadual projek, rantai bekalan, dan kestabilan kewangan. Kepimpinan pengurusan projek yang berkesan muncul sebagai faktor penting dalam mengharungi masa yang penuh cabaran ini. Kajian ini dipandu oleh dua objektif: (1) untuk mengenal pasti impak dan strategi pandemik dalam sektor pembinaan Malaysia, dan (2) untuk menentukan ciri-ciri kepimpinan pengurusan projek semasa pandemik. Pendekatan kualitatif digunakan, melibatkan analisis tematik dan kandungan data yang dikumpulkan melalui temu bual separa berstruktur dengan profesional industri. Hasil kajian menunjukkan gangguan yang signifikan di pelbagai aspek industri pembinaan, termasuk pengurusan rantai bekalan, kebimbangan keselamatan pekerja, implikasi kewangan, halangan regulasi, dan integrasi teknologi. Ciri-ciri kepimpinan penting yang dikenal pasti termasuk komunikasi yang berkesan, adaptabiliti, pembuatan keputusan strategik, empati, dan ketahanan. Berdasarkan hasil kajian, cadangan telah diberikan untuk memperkukuh ketahanan dan kesediaan industri pembinaan Malaysia. Ini termasuk mengkayakan rantai bekalan, memberi keutamaan kepada keselamatan pekerja, memperkukuh pengurusan risiko kewangan, merangkumi integrasi teknologi, memupuk kerjasama, menumbuhkan ketahanan kepimpinan, dan memberi keutamaan kepada pembelajaran dan penyesuaian berterusan. Pelaksanaan cadangan ini dapat meningkatkan amalan pengurusan projek dan memastikan kesinambungan di tengah-tengah gangguan. Kesimpulannya, kajian ini membuktikan impak mendalam pandemik COVID-19 terhadap industri pembinaan Malaysia dan menawarkan cadangan praktikal untuk mengemudi ketidakpastian secara berkesan. Dengan memupuk kepimpinan adaptif dan melaksanakan strategi yang kukuh, firma pembinaan dapat muncul lebih kuat dari krisis dan memacu kejayaan yang mampan dalam era pasca-pandemik.

Kata kunci : *Pengurus Projek, Covid-19, Ciri-ciri Kepimpinan, Kesan industri pembinaan*

DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and any editorial work, paid or unpaid, carried out by a third party is acknowledged.



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LIST OF ABBREVIATIONS

CIMP	– Construction Industry Master Plan
COVID-19	– Corona Virus Disease
HRM	– Human Resource Management
PMBOK	– Project Management Body of Knowledge
PMI	– Project’s Management Institute
PRINCE2	– Project in Controlled Environment
WHO	- World Health Organization



CHAPTER ONE

INTRODUCTION

1.1 Introduction

In this chapter, an overview of the study will be provided. Through an examination of issue statements, research objectives, and research questions, it provides justification for carrying out this study. There is also discussion on the study's importance and contribution. Additionally, this chapter offers a brief summary of important terms and ideas associated with the subject of study. Finally, it describes the study's organisational framework.

1.2 Background of the Study

Amidst the relentless waves of the COVID-19 pandemic, the Malaysian construction industry faces unprecedented challenges that reverberate across every aspect of its operations. Project timelines, once carefully planned and executed, are now in disarray. Financial stability, once considered a cornerstone of the industry, is now under threat. The seamless flow of supply chain operations, crucial for project continuity, has been disrupted. The gravity of these challenges is underscored by statistics from authoritative sources.

The Malaysian Institute of Economic Research (MIER) delivers sobering news, reporting a staggering 17.5% plunge in the construction industry's contribution to Malaysia's Gross Domestic Product (GDP) in 2020. This sharp decline is directly attributed to the relentless onslaught of the pandemic, which has left no sector untouched. Similarly concerning, the Construction Industry Development Board

Malaysia (CIDB) sheds light on the severity of the situation, noting a 30% decrease in construction project approvals in the same year compared to its predecessor. This decline signals the industry's struggle against the pandemic-induced slowdown, indicating a bleak outlook for future construction endeavors.

A telling survey by the Master Builders Association Malaysia (MBAM) adds weight to these statistics, revealing the profound impact of the pandemic on project execution. An alarming 70% of construction companies reported project delays directly linked to the pandemic's disruptive force. These delays, averaging six to twelve months, not only pose logistical challenges but also inflict significant financial strain on companies already grappling with uncertainty. They underscore the urgent need for strategic interventions and research initiatives to bolster the industry's resilience and mitigate the adverse effects of the ongoing crisis.

In light of such formidable challenges, understanding the nuanced dynamics of project management leadership traits amidst the pandemic becomes paramount. While empirical studies specifically addressing these traits in the Malaysian context are limited, broader research sheds light on their significance.

Studies by Haider et al. (2022), Timilsina et al. (2021), and others elucidate the significant impacts on construction projects, ranging from delays and failures to disruptions in the supply chain. This underscores the critical importance of resilient crisis management plans, effective implementation of standard operating procedures, and the identification of causes of cost overruns during the pandemic.

Moreover, corporate governance and financial management have emerged as critical considerations amidst the crisis. Research by Maruhun et al. (2022) and Abdullah et al. (2022) emphasizes the pivotal role of governance mechanisms, financial transparency, and performance evaluation in ensuring sustainable industry performance.

Given these challenges, there's a pressing need for comprehensive research to delve into the nuanced dynamics of project management leadership traits amidst the pandemic within the Malaysian construction industry. By examining various factors such as technology adoption, leadership strategies, sustainable practices, and financial risk management, researchers can gain essential insights to enhance industry resilience and efficiency in the face of ongoing challenges. Only through such concerted efforts can the industry emerge stronger and more resilient in a post-pandemic era.

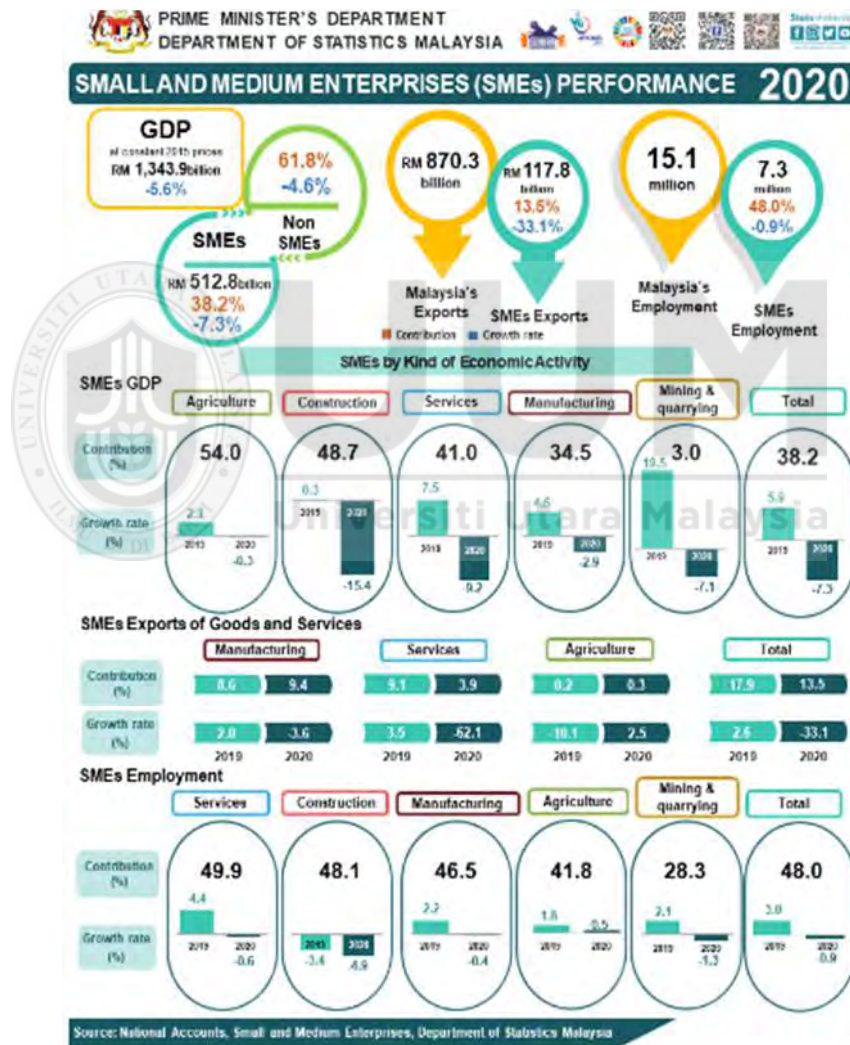
1.3 Problem Statement

Amidst the relentless challenges posed by the COVID-19 pandemic, Malaysia's construction industry finds itself at the epicentre of a perfect storm, grappling with an array of issues that have cast a long shadow over its operations. From the daunting spectre of project delays and financial instability to disruptions in the supply chain and the pressing imperative of ensuring worker safety, the sector navigates uncharted waters. In this explosive environment, effective project management leadership emerges as a necessity and a beacon of hope, offering a steady hand to guide the industry through the tumultuous seas of uncertainty.

The impact of the pandemic on Malaysia's construction landscape is profound and multifaceted, resonating across every facet of the industry's ecosystem. Official data

reveals substantial project approvals, GDP contribution, and overall productivity downturns. What was once a thriving engine of economic growth is now trapped in a labyrinth of uncertainties, with project timelines thrown into disarray and stakeholders besieged by unprecedented challenges. Moreover, safety hazards, worker well-being, and job security concerns further compound the industry's tribulations.

Figure 1.1 SMEs Performance 2020



In 2020, (based on figure 1.1), Malaysia's construction sector faced significant challenges attributed to the COVID-19 pandemic, as reflected in various economic indicators. Notably, the GDP growth rate for SMEs in the construction sector plummeted by 15.4%, contrasting starkly with the 0.3% growth recorded in the previous year. This decline was compounded by disruptions across all sub-sectors within construction, underscoring the widespread impact of the pandemic on industry performance. Furthermore, the contribution of SMEs GDP to Malaysia's overall GDP also saw a notable reduction, dropping to 38.2% from 38.9% in the preceding year.

Export performance of SMEs in the construction sector mirrored the broader economic downturn, with a significant decrease in exports by 33.1% in 2020. This decline was primarily driven by decreases in both services and manufacturing sectors, highlighting the interconnectedness of construction with other economic activities. Moreover, SMEs employment in construction registered a decline for the second consecutive year, with a negative growth rate of 4.9% in 2020, exacerbating the sector's challenges.

The decline in SMEs' labor productivity further compounded the sector's woes, with a significant drop of 11.1% in construction sector productivity, the largest among all economic sectors. This decline underscores the operational difficulties faced by SMEs in construction amidst the pandemic, as disruptions to supply chains, labor shortages, and regulatory hurdles took their toll on productivity levels. Overall, the performance of SMEs in Malaysia's construction industry in 2020 reflects the profound impact of the COVID-19 pandemic, highlighting the sector's vulnerability to external shocks and the urgent need for targeted interventions to support recovery and resilience efforts.

While scholarly research has shed light on various dimensions of the pandemic's impact on construction, a significant gap persists in comprehending its ramifications for project management leadership in Malaysia. The necessity for adaptive and resilient leadership amidst crises has never been more pronounced.

For instance, the seminal work of Pamidimukkala & Kermanshachi (2021) meticulously catalogued seventeen distinct challenges confronting construction workers during the pandemic. Their exhaustive research underscored the imperative of addressing workforce well-being and safety concerns, shedding light on issues such as the absence of a secure work environment, burdensome workloads, and palpable anxieties surrounding job security, all contributing to adverse mental health outcomes among construction workers. Their findings underscore the critical importance of prioritizing worker welfare as a cornerstone of crisis management in the construction sector.

Meanwhile, the groundbreaking study by Li et al. (2022) delved into the labyrinthine complexities of COVID-19's impact on construction project management life cycles. Advocating for agile and adaptive strategies, they meticulously identified eleven key construction activities profoundly influenced by the pandemic, accentuating the imperative of embracing new paradigms and cultivating resilience to navigate disruptions successfully. Their research offers invaluable guidance on recalibrating project management strategies to ensure seamless continuity amidst unprecedented uncertainty.

Additionally, the intelligent inquiry by Ahmad & Akintoye (2021) unraveled the pandemic's ramifications on construction project timelines and cost overruns. By accentuating the imperative of proactive risk management and contingency planning, they underscored the pivotal role of robust risk mitigation strategies in safeguarding project outcomes amidst the tempest of disruptions. Their findings underscore the urgency of implementing proactive measures to fortify project resilience in the face of adversity.

Furthermore, the pioneering research by Tan & Ming (2022) elucidated the transformative potential of digital innovation in mitigating disruptions precipitated by the pandemic in Malaysian construction projects. By championing the strategic adoption of transformative technologies such as the Internet of Things (IoT), artificial intelligence, and data analytics, their study heralds a new frontier in leveraging technological prowess to navigate challenges and propel project success to new heights.

Meanwhile, the seminal contribution of Araya & Sierra (2021) shed light on the holistic impact of the pandemic on project stakeholders. By accentuating the pivotal importance of understanding stakeholder needs as a linchpin of effective management, their research underscores the paramount significance of fostering robust stakeholder engagement and communication strategies to sustain project momentum amidst the turbulence of uncertainty.

Lastly, the seminal work of Iqbal et al. (2021) provided a roadmap for navigating the labyrinthine complexities of the pandemic's impact on the construction industry. By championing the adoption of emergent safety practices and crisis management

frameworks, their research offers invaluable insights and strategic imperatives for construction professionals grappling with the shifting sands of the industry landscape.

However, despite these laudable contributions, a significant lacuna persists in understanding how the pandemic has sculpted project management leadership traits in Malaysia. The exigency for nuanced insights into the interplay between the pandemic and leadership qualities, decision-making processes, and project outcomes within the Malaysian construction context remains palpable.

Hence, the overarching objective of this research endeavor is to unravel the intricate symbiosis between the COVID-19 pandemic and project management leadership traits in Malaysia's construction industry. This entails a comprehensive examination of how the pandemic has reverberated across the tapestry of leadership qualities, decision-making dynamics, and project outcomes, with a view to identifying strategic imperatives for fortifying resilience and charting a course towards sustainable success.

To achieve this, the research will embark on a multidimensional exploration of project management leadership traits amidst the COVID-19 pandemic in Malaysia. By undertaking a meticulous analysis and synthesizing insights from diverse scholarly perspectives, the aim is to decipher the underlying dynamics of leadership resilience, agility, and adaptability in navigating the labyrinth of pandemic-induced challenges within the construction industry.

Moreover, the research endeavors to bridge the chasm in existing literature by proffering pragmatic recommendations for enhancing project management leadership

effectiveness in the post-pandemic epoch. By distilling empirical evidence and industry best practices, the objective is to furnish stakeholders, policymakers, and researchers with a roadmap to navigate the confluence of challenges confronting project management leadership amidst the crucible of ongoing global exigencies.

In summary, this research project aims to shed light on how the COVID-19 pandemic has impacted project management leadership in the Malaysian construction industry. By exploring the complex dynamics of leadership resilience, adaptability, and decision-making, the goal is to provide industry stakeholders with actionable insights and strategic imperatives to confidently navigate the post-pandemic era. Given the multitude of challenges posed by the pandemic in the Malaysian construction industry, a comprehensive research approach is crucial. This involves examining the nuances of leadership traits in the face of the pandemic, addressing critical issues such as project delays, financial instability, safety concerns, and adaptive strategies. Through this research, invaluable insights can be provided to guide stakeholders, policymakers, and academics in navigating the ever-changing landscape with agility and expertise.

1.4 Research Questions

In this subsection, the research questions guiding the study are reframed to provide a focused exploration into the impact of the COVID-19 pandemic on the construction industry in Malaysia and the critical leadership traits demonstrated by project managers during times of crisis. These questions serve as the cornerstone for understanding the complexities of the construction landscape amidst the unprecedented challenges posed by the global health crisis.

1. What are the impact and strategies of the Covid-19 Pandemic on the Construction Industry in Malaysia?

2. What are the key traits of effective leadership demonstrated by project managers in the Malaysian construction industry during the COVID-19 pandemic?

Together, these reframed research questions lay the groundwork for a rigorous exploration into the intersection of crisis management and leadership within the Malaysian construction industry. By systematically analyzing the impact of the COVID-19 pandemic and elucidating the key leadership traits essential for navigating such challenges, this study contributes valuable insights to the ongoing discourse surrounding resilience, adaptability, and effective leadership in the face of adversity.

1.5 Research Objectives

The aim of this research was to assess project management leadership in crisis and emergency response within the Malaysian construction industry. This study was guided by specific research objectives:

1. To identify the Impact and Strategies of the COVID-19 Pandemic on the Construction Industry in Malaysia.

2. To determine the Project Management Traits of Leadership during the COVID-19 Pandemic on the Construction Industry in Malaysia.

By adhering to these objectives, the research endeavored to offer valuable insights into the dynamic interplay between crisis management, leadership, and project management within the Malaysian construction industry context. Through a rigorous analysis of the pandemic's impact and the leadership traits essential for effective response and resilience, the study aimed to contribute to the ongoing discourse surrounding crisis management strategies and leadership effectiveness in the construction sector.

1.6 Scope and Limitation of the Study

1.6.1 Scope:

This research aims to investigate the critical role of project management leadership in navigating the challenges posed by the COVID-19 pandemic within the Malaysian construction industry. The study will focus on assessing the effectiveness of leadership strategies employed by project managers in mitigating the impact of the crisis on construction projects. Key areas of exploration include decision-making processes, communication strategies, resource allocation, and adaptation of project timelines. The research will adopt a qualitative approach, utilizing in-depth interviews, surveys, and case studies to gather data from project managers, construction professionals, and relevant stakeholders.

Furthermore, the study will consider the influence of contextual factors such as project size, type, and geographical location on the applicability and success of leadership approaches. The research will provide insights into best practices and lessons learned, contributing to the development of a framework for effective project management leadership in crisis situations within the Malaysian construction sector.

1.6.2 Limitations

Despite its significance, this research has some inherent limitations. The study's focus is limited to the Malaysian construction industry and may not be directly applicable to other sectors or countries with distinct contextual factors. Additionally, the research will primarily rely on self-reported data, potentially introducing response bias. The scope may be further restricted by the availability and willingness of industry professionals to participate in the study. The dynamic nature of the crisis may also pose challenges in capturing real-time data. Despite these limitations, the research endeavours to provide valuable insights and contribute to the literature on project management leadership in crisis contexts within the construction industry.

1.7 Significance of the study

The outcome of this research provided valuable insights into the impact of the COVID-19 pandemic on the Malaysian construction industry and the project management leadership traits essential for navigating crisis situations. By identifying the challenges faced by construction projects and the strategies employed to overcome them, this research contributed to a deeper understanding of crisis management within the industry. Additionally, the analysis of leadership traits exhibited by project managers offered actionable insights for enhancing resilience, adaptability, and effectiveness in project management practices.

Furthermore, the findings of this research contributed to the body of knowledge on crisis response and project management leadership, particularly in the context of the construction industry. By highlighting the importance of effective communication,

strategic decision-making, adaptability, empathy, and collaboration, the research provided practical guidance for construction professionals facing similar challenges in crisis situations. Moreover, the identification of specific strategies and best practices enabled industry stakeholders to proactively address future crises and mitigate their impact on construction projects.

Overall, the outcome of this research served to inform construction industry stakeholders, policymakers, and academia about the critical role of project management leadership in crisis response and emergency management. By leveraging the insights gained from this study, stakeholders could develop targeted interventions, policies, and training programs to strengthen project management practices and enhance the industry's resilience in the face of future crises.

1.8 Definition of Key Terms

Definition of key terms refers to a detailed explanation of the technical terms and measurements used during data collection. The operational definitions that follow in this study were identified through the review of the literature and the dictionary definitions of the terms. Based on the objective of this study, the following variables or constructs are defined as follows:

1.8.1 Covid-19 Pandemic

The definition of the COVID-19 pandemic referred to the global outbreak of the novel coronavirus, officially named SARS-CoV-2, which began in late 2019 and led to widespread illness, mortality, and socio-economic disruptions worldwide. In the context of this study, the COVID-19 pandemic specifically pertained to its impact on

the construction industry in Malaysia, encompassing disruptions to supply chains, workforce safety concerns, financial implications, regulatory hurdles, adaptive strategies, collaboration dynamics, technological integration, and resilience-building measures within the construction sector.

1.8.2 Construction Industry in Malaysia

The definition of the construction industry in Malaysia referred to the sector involved in the planning, design, development, construction, and maintenance of physical infrastructure and built environment within the geographic boundaries of Malaysia. This included various sub-sectors such as residential, commercial, industrial, and infrastructure construction, as well as related activities such as architectural design, civil engineering, project management, and construction materials manufacturing.

1.8.3 Project Management Leadership Traits

The definition of project management leadership traits encompassed a set of characteristics, behaviors, and competencies exhibited by individuals in leadership positions within construction projects. These traits included effective communication and collaboration, adaptability and flexibility, strategic decision-making and problem-solving skills, empathy and supportive leadership, and resilience and perseverance. Within the context of this study, project management leadership traits were examined in relation to their manifestation and effectiveness during the COVID-19 pandemic in the Malaysian construction industry.

1.9 Organization of the Thesis

The research comprised five chapters, each addressing specific aspects of project management leadership in crisis and emergency response within the Malaysian construction industry.

Chapter 1 served as the introduction, setting the stage by providing an overview of the research topic. It emphasized the importance of effective project management leadership in navigating crises and emergencies within the Malaysian construction industry. This chapter introduced the research problem, objectives, questions, scope, and limitations, providing a roadmap for the thesis.

Chapter 2 was dedicated to the literature review. Here, existing scholarship on project management leadership, crisis management, and emergency response was explored, with a focus on the Malaysian construction industry. The chapter synthesized key findings and identified gaps in the literature, laying the groundwork for the empirical investigation.

Chapter 3, the methodology chapter, outlined the research methodology employed in the study. It described the research design, data collection methods, sampling strategy, data analysis techniques, and ethical considerations. This chapter provided transparency regarding the research approach and ensured the validity and reliability of the study.

In Chapter 4, the focus shifted towards the empirical analysis using thematic analysis of the impact that occurred in the construction industry during Covid-19 and the project

management leadership in crisis and emergency response within the Malaysian construction industry. The analysis aimed to delve into the data collected through the chosen research methodology outlined in Chapter 3.

Lastly, Chapter 5, the conclusion, and recommendations chapter, wrapped up the thesis. It summarized the key findings, contributions to knowledge, practical implications, limitations of the study, and recommendations for future research. This chapter provided closure to the research journey and offered actionable insights for practitioners and policymakers in the Malaysian construction industry.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In chapter two, the literature review embarked on a comprehensive exploration, delving into two primary objectives. Firstly, it sought to identify the impact of the COVID-19 pandemic on Malaysia's construction industry, encompassing supply chain disruptions, workforce safety concerns, financial implications, regulatory hurdles, adaptive strategies, collaboration and partnership dynamics, technological integration, and resilience and adaptability measures. Secondly, the review aimed to determine the leadership traits exhibited by project managers during the pandemic within Malaysia's construction sector, focusing on effective communication and collaboration, adaptability and flexibility, strategic decision-making and problem-solving skills, empathy and supportive leadership, and resilience and perseverance. Through an exhaustive search and analysis of scholarly literature, the chapter synthesized insights to provide a holistic understanding of the challenges faced by the industry and the strategies employed to navigate them effectively..

2.2 Challenges brought upon by COVID-19 Pandemic to the Construction Industry in Malaysia

The COVID-19 pandemic has brought unprecedented challenges to the construction industry in Malaysia, profoundly impacting various facets of the sector. This literature review aims to provide insights into the multifaceted effects of the pandemic on the

construction industry, encompassing supply chain disruptions, workforce safety concerns, financial implications, regulatory hurdles, adaptive strategies, collaboration dynamics, technological integration, and resilience-building measures.

The table below presents a tally analysis of the themes discussed by various authors in relation to the impact and strategies employed within the construction industry in Malaysia amidst the COVID-19 pandemic. Each theme is represented by a letter code for easy reference:

A. Supply Chain Disruptions

B. Workforce Safety Concerns

C. Financial Implications

D. Regulatory Hurdles

E. Adaptive Strategies

F. Collaboration and Partnership

G. Technological Integration

H. Resilience and Adaptability

This analysis provides insights into which authors have contributed to each theme, offering a comprehensive overview of the multifaceted challenges and strategies adopted by the construction industry in Malaysia during these unprecedented times.

Table 2.1 : List of Journals associated with Impact and Strategies of Covid-19 to Construction Industry in Malaysia

Authors	A	B	C	D	E	F	G	H
Abdillah et al. (2022)			✓					
Abdullah et al. (2022)							✓	
Alakrash & Razak (2022)		✓				✓	✓	
Alaloul et al. (2020)	✓							
Alhasan et al. (2021)							✓	
Amde et al. (2020)			✓					
Amoah & Simpeh (2020)		✓						
Chen et al. (2023)							✓	
Cherian et al. (2022)								✓
Cherian et al. (2022)								✓
Farooq et al. (2022)		✓	✓					
Gamil & Alhagar (2020)		✓	✓					
Haider et al. (2022)				✓				
Handfield et al. (2022)				✓		✓		
Hatoum et al. (2021)		✓						
Huang et al. (2021)							✓	
Husien et al. (2021)		✓						✓
Jiang et al. (2022)								✓
Kopishynska & Umaieva (2022)							✓	
Kumar et al. (2020)			✓					
Lavassani & Movahedi (2021)						✓		
Leow et al. (2023)								✓
Lim & Al-Gburi (2022)								✓
Lim & Kang (2021)					✓			
Mohamed@Arifin et al. (2022)	✓			✓				
Najafi et al. (2022)			✓					
Ng et al. (2022)								✓
Ojo et al. (2021)								✓
Oo & Lim (2021)		✓				✓		
Pamidimukkala & Kermanshachi (2021)	✓							
Rodríguez et al. (2023)						✓		
Shibani et al. (2020)					✓			
Singh et al. (2020)	✓							
Suresh et al. (2022)								✓
Tan & Abdul-Samad (2022)						✓		
Tan & Abdul-Samad (2022)						✓		
Tan & Chong (2023)							✓	
Teo et al. (2023)							✓	
Wong et al. (2022)							✓	
Yang et al. (2021)								✓
Yusuf et al. (2021)								✓

2.2.1 Supply Chain Disruptions

The disruptions in the supply chain caused by the COVID-19 pandemic have had profound implications for the construction industry in Malaysia, affecting various aspects of project management and operations. These disruptions have been characterized by delays in material procurement, shortages of essential supplies, logistical challenges, and increased costs, posing significant challenges for construction companies and project stakeholders. To understand the full extent of these disruptions and their impact on the construction industry, it is essential to delve deeper into the underlying causes, consequences, and potential solutions.

Farooq et al. (2022) highlighted the profound impact of these disruptions on material procurement processes, where delays in shipments and shortages of essential supplies have become prevalent issues. This situation has led to a domino effect, causing project delays, cost overruns, and financial strains for construction companies (Gamil & Alhagar, 2020). As a result, construction projects have faced unprecedented logistical complexities, hindering progress and jeopardizing project outcomes. Amidst these challenges, Huang et al. (2021) underscored the critical importance of resilience and agility in supply chain management practices within the construction sector. The study emphasized that traditional supply chain models were ill-equipped to cope with the dynamic and unpredictable nature of the pandemic-induced disruptions. Therefore, construction companies needed to adopt innovative strategies to adapt to the evolving landscape. Cherian et al. (2022) echoed this sentiment by highlighting the necessity for proactive risk mitigation strategies to navigate supply chain disruptions effectively. Their research emphasized the need for construction firms to diversify their supplier

base, optimize inventory management, and establish collaborative relationships to enhance supply chain resilience.

Furthermore, Handfield et al. (2022) emphasized the need for a holistic approach to supply chain management, encompassing proactive risk management, collaboration with suppliers, and investment in technology-enabled solutions. Their research highlighted the importance of building strong relationships with suppliers and fostering open communication channels to address challenges collectively. By adopting a multifaceted strategy, construction companies could enhance their resilience and agility in the face of unprecedented disruptions, ensuring the continuity of operations and safeguarding project success.

In addition to delays and shortages, construction companies in Malaysia have grappled with logistical complexities resulting from supply chain disruptions. Huang et al. (2021) highlighted the challenges of coordinating material deliveries, managing inventory, and navigating transportation constraints amidst the pandemic-induced disruptions. The fragmented nature of the construction supply chain has further complicated logistics management, making it difficult for companies to maintain operational efficiency and meet project deadlines. Furthermore, Cherian et al. (2022) emphasized the need for construction firms to adopt agile and flexible supply chain strategies to adapt to changing market conditions and mitigate logistical challenges effectively.

In conclusion, the disruptions in the supply chain caused by the COVID-19 pandemic have had far-reaching implications for the construction industry in Malaysia, affecting

various aspects of project management and operations. These disruptions have been characterized by delays in material procurement, shortages of essential supplies, logistical challenges, and increased costs, posing significant challenges for construction companies and project stakeholders. To address these challenges effectively, construction firms must adopt innovative supply chain strategies, leverage digital technologies, and foster collaboration with suppliers to enhance resilience and agility in the face of unprecedented disruptions. By doing so, construction companies can mitigate the impact of supply chain disruptions on project outcomes, ensure the continuity of operations, and position themselves for long-term success in the post-pandemic landscape.

2.2.2 Workforce Safety Concern

Ensuring the safety and well-being of construction workers amidst the COVID-19 pandemic is paramount for the construction industry in Malaysia. Pamidimukkala & Kermanshachi (2021) underscored the multifaceted nature of these challenges, highlighting the lack of a secure work environment, burdensome workloads, and anxieties surrounding job security. Addressing these concerns has become imperative to protect the workforce during these uncertain times.

Oo & Lim (2021) shed light on the specific challenges faced by women in the construction workforce during the pandemic, emphasizing the disproportionate impact on female construction workers. This highlights the urgency of implementing gender-sensitive policies and support mechanisms to cater to the diverse needs of construction workers in Malaysia, ensuring comprehensive protection for all. Meanwhile, Amoah & Simpeh (2020) stressed the importance of implementing COVID-19 safety measures at

construction sites to safeguard the health and well-being of workers. Their study emphasized the critical role of safety protocols such as social distancing, personal protective equipment (PPE) usage, and hygiene practices. These measures are vital not only for protecting individual workers but also for preventing the spread of the virus within construction sites and the broader community.

Further, Hatoum et al. (2021) examined the regulatory challenges faced by construction companies in Malaysia in implementing COVID-19 safety protocols. Their research highlighted the complexities of navigating regulatory requirements and ensuring compliance with evolving guidelines. Addressing these challenges is crucial for regulatory authorities to provide clear guidance and support to construction companies, facilitating the effective implementation of safety measures and minimizing risks for workers. Next, Jiang et al. (2022) explored strategies developed by construction companies in Malaysia to manage the pandemic's impact on workforce management and productivity. Their research emphasized the importance of adopting flexible work arrangements, providing mental health support services, and enhancing communication channels. These strategies not only protect the well-being of construction workers but also contribute to maintaining productivity levels and ensuring project continuity amidst challenging circumstances.

Finally, Husien et al. (2021) identified resilience and adaptability as key traits for construction companies to thrive in the post-COVID era. Their research emphasized fostering a culture of resilience and adaptability within construction firms to effectively navigate pandemic challenges. By promoting resilience and adaptability, construction

companies can proactively respond to changing circumstances, protect the well-being of their workforce, and ensure business continuity amidst uncertainty. In conclusion, addressing the safety and well-being of construction workers during the COVID-19 pandemic requires a comprehensive approach encompassing regulatory compliance, technological innovation, collaboration, and a focus on resilience and adaptability. Implementing effective safety measures, navigating regulatory hurdles, fostering collaboration, integrating technology, and promoting resilience are essential for protecting the workforce and ensuring business continuity amidst unprecedented challenges posed by the pandemic.

2.2.3 Financial Implications

The financial strains resulting from the COVID-19 pandemic have posed significant challenges for construction companies in Malaysia. Ahmad & Akintoye (2021) underscored the implications of the pandemic on construction project timelines and cost overruns, emphasizing the importance of proactive risk management and contingency planning. This highlights the critical need for construction firms to anticipate and mitigate potential financial risks to safeguard project budgets and timelines amidst uncertain economic conditions.

Furthermore, Kumar et al. (2020) highlighted the widespread disruptions in global supply chains due to the pandemic, leading to delays in material procurement and shortages in supplies for construction projects. These disruptions have not only impacted project schedules but have also resulted in increased costs and logistical complexities. The study underscores the urgent need for construction companies to develop robust supply chain strategies to mitigate the impact of disruptions and ensure

timely project delivery within budget constraints. Next, Singh et al. (2020) provided insights into the challenges faced by construction companies in sourcing Personal Protective Equipment (PPE) during the pandemic, exacerbating financial strains. The increased demand for PPE and disruptions in the supply chain have led to shortages and rising costs, adding to the financial burden on construction firms. Addressing these challenges requires innovative solutions to ensure the availability of essential safety gear while managing costs effectively.

Zhang et al. (2021) further emphasized the financial implications of supply chain disruptions on construction projects in Malaysia, highlighting the need for adaptive strategies to mitigate risks and enhance resilience. The study underscores the importance of diversifying suppliers, enhancing communication channels, and implementing contingency plans to address potential disruptions effectively. By proactively managing supply chain risks, construction companies can minimize financial losses and maintain project continuity amidst uncertainties. In addition to supply chain challenges, financial constraints have also affected the implementation of public health measures on construction sites, as discussed by Alakrash & Razak (2022). The study highlighted the additional costs associated with implementing COVID-19 safety protocols, such as enhanced hygiene measures and additional labor expenses. These financial burdens have further strained construction companies' budgets, necessitating careful financial planning and resource allocation to ensure compliance with safety guidelines while managing costs effectively.

Moreover, Abdillah et al. (2022) explored the impacts of the pandemic on contractor organizations in the construction industry, highlighting the financial challenges faced

by subcontractors and laborers. The study emphasized the need for tailored support measures, training programs, and policy interventions to address the specific vulnerabilities of contractor organizations. By providing targeted support to subcontractors and laborers, construction companies can enhance their resilience and ensure the sustainability of the construction supply chain. Najafi et al. (2022) examined the financial implications of workforce shortages on the healthcare industry, highlighting the importance of stability in the workforce for maintaining quality of care. The study underscored the need for competitive remuneration packages and supportive work environments to attract and retain skilled professionals in the construction sector. By investing in workforce development and retention strategies, construction companies can mitigate the financial impact of labor shortages and ensure the availability of skilled workers to support project delivery.

Amde et al. (2020) discussed the financial constraints faced by public health programs during the pandemic, emphasizing the need for sustainable funding mechanisms to support ongoing initiatives. The study highlighted the importance of securing adequate funding and resources to sustain public health interventions, ensuring the effectiveness of measures to mitigate the spread of COVID-19 on construction sites. By advocating for government support and exploring alternative funding sources, construction companies can alleviate financial pressures and prioritize worker safety and well-being amidst the ongoing pandemic. Overall, the financial implications of the COVID-19 pandemic on the construction industry in Malaysia are multifaceted, encompassing supply chain disruptions, increased costs of safety measures, workforce shortages, and constraints on public health funding. Addressing these challenges requires proactive risk management, innovative solutions, and collaboration among stakeholders to ensure

the financial sustainability of construction projects and safeguard the well-being of workers amidst uncertain economic conditions

2.2.4 Regulatory Hurdles

The emergence of the COVID-19 pandemic has led to the implementation of stringent regulations and guidelines to safeguard the health and safety of construction workers and the public. Mohamed@Arifin et al. (2022) highlighted the regulatory complexities faced by the construction industry in Malaysia, necessitating swift adaptation to changing regulatory requirements. Their research emphasized the challenges construction companies encounter in complying with evolving safety protocols and guidelines, underscoring the need for flexibility and agility to ensure regulatory compliance while maintaining project continuity.

Haider et al. (2022) further explored the financial crises induced by the COVID-19 pandemic, identifying them as significant impacts on the construction sector in Malaysia. Their study underscored how financial strains resulting from the pandemic have exacerbated regulatory hurdles, as companies must navigate budget constraints while adhering to evolving regulations and safety standards. This highlights the interconnectedness of financial challenges and regulatory compliance in shaping the operational landscape for construction firms during the pandemic. Next, Yang et al. (2021) explored the role of new technologies and safety measures in ensuring regulatory compliance in Chinese construction projects during the COVID-19 pandemic. Their research demonstrated how the adoption of innovative technologies and safety protocols has been crucial for meeting regulatory standards and safeguarding the health of construction workers. This highlights the importance of technological

innovation in enhancing regulatory compliance and ensuring workplace safety amidst the challenges posed by the pandemic.

Furthermore, Oo & Lim (2021) shed light on the specific challenges faced by women in the construction workforce during the pandemic, highlighting the need for gender-sensitive policies to address regulatory compliance issues effectively. Their research emphasized the importance of considering gender-specific needs and vulnerabilities in regulatory frameworks to ensure equitable access to safety measures and protections for all construction workers. Jiang et al. (2022) explored strategies developed by construction companies in Malaysia to manage the impact of the pandemic on regulatory compliance and project delivery. Their research highlighted the importance of adopting flexible work arrangements, providing mental health support services, and enhancing communication channels to navigate regulatory hurdles effectively. By prioritizing regulatory compliance and implementing adaptive strategies, construction companies can ensure the safety and well-being of their workforce while maintaining project continuity amidst regulatory challenges.

In conclusion, regulatory hurdles in the construction industry in Malaysia during the COVID-19 pandemic have posed significant challenges for construction companies, impacting project timelines, financial viability, and workforce safety. Addressing these challenges requires proactive risk management, flexibility, and innovation to ensure regulatory compliance while maintaining project continuity and safeguarding the health and well-being of construction workers amidst uncertain regulatory environments.

2.2.5 Adaptive Strategies

Adaptive strategies have played a crucial role in enabling construction companies in Malaysia to ensure business continuity and resilience amidst the challenges posed by the COVID-19 pandemic. Shibani et al. (2020) emphasized maintaining good relationships with suppliers and prioritizing worker well-being as key adaptive strategies. Their research highlighted the importance of collaborative relationships and a focus on employee welfare in navigating supply chain disruptions and safeguarding workforce safety during the pandemic.

Alaloul et al. (2020) underscored the adaptation of Personal Protective Equipment (PPE) and the identification of safety barriers in infrastructure projects in Malaysia as essential adaptive measures. By implementing enhanced health and safety measures and addressing safety concerns proactively, construction companies can mitigate the risk of COVID-19 transmission among workers and ensure compliance with regulatory requirements, thus enhancing resilience in project delivery. Next, Nnaji et al. (2022) provided insights into safety and health management responses in the construction industry during the pandemic. Their research highlighted the adoption of safety protocols, training programs, and risk management strategies as essential adaptive measures to protect fieldworkers and enhance project resilience in the face of evolving pandemic situations. By prioritizing safety and health management, construction companies can mitigate risks and ensure the well-being of their workforce amidst the challenges posed by the pandemic.

Abdillah et al. (2022) focused on the impacts of the COVID-19 pandemic on contractor organizations in the construction industry in Malaysia. Their study shed light on the

adaptive strategies employed by Malaysian contractors to address financial challenges, workforce shortages, and operational disruptions. By adopting agile and flexible approaches to project management and resource allocation, contractor organizations can enhance their resilience and adaptability, ensuring business continuity and project success amidst uncertainty. Moreover, Druedahl et al. (2021) emphasized the importance of collaboration in times of crisis, highlighting diverse partnerships established for COVID-19 response and recovery efforts. By fostering collaborative networks and sharing resources and knowledge, construction companies can enhance their capacity to adapt to changing circumstances, innovate solutions, and overcome challenges posed by the pandemic effectively.

Mathieson et al. (2023) showcased the significance of multi-institutional educational partnerships in prioritizing STEM workforce pathways amid macro challenges. Collaborative partnerships in education and workforce development have been instrumental in addressing skill gaps, fostering talent development, and ensuring a skilled technical workforce in the construction sector. By collaborating with educational institutions and industry stakeholders, construction companies can address workforce challenges, enhance skills development, and build a resilient workforce for the future.

Overall, adaptive strategies such as maintaining supplier relationships, prioritizing worker well-being, adopting safety protocols, fostering collaboration, leveraging digital technologies, and investing in workforce development are essential for construction companies in Malaysia to navigate the challenges posed by the COVID-19 pandemic effectively. By embracing adaptive measures and fostering a culture of resilience and

innovation, construction companies can enhance their ability to withstand uncertainties, ensure business continuity, and thrive in a rapidly changing environment.

2.2.6 Collaboration and Partnership

Collaboration and partnership within the construction industry have played a crucial role in addressing pandemic challenges and fostering innovation. Druedahl et al. (2021) highlighted the importance of collaborative networks in advancing research and innovation during the pandemic. Their research underscored the significance of partnerships in sharing knowledge, resources, and expertise to develop effective responses to COVID-19 challenges, thus contributing to industry resilience and adaptability.

Kiflee et al. (2023) emphasized the role of broadening collaboration networks and understanding emerging themes in digital technology during the COVID-19 pandemic in Malaysia. Their study highlighted the importance of collaborative efforts to leverage digital technologies in enhancing communication, project management, and operational efficiency in the construction industry. By fostering collaborative partnerships, construction companies can enhance their capacity to innovate and adapt to the evolving landscape of the industry amidst the challenges posed by the pandemic. Mathieson et al. (2023) showcased the significance of multi-institutional educational partnerships in prioritizing STEM workforce pathways amid macro challenges. Collaborative partnerships in education and workforce development have been instrumental in addressing skill gaps, fostering talent development, and ensuring a skilled technical workforce in the construction sector. By collaborating with educational institutions and industry stakeholders, construction companies can address

workforce challenges, enhance skills development, and build a resilient workforce for the future.

Rodríguez et al. (2023) demonstrated a comprehensive healthcare equity-promoting response by a civil society-public partnership to COVID-19 in Chiapas, Mexico. This partnership exemplified the power of collaborative efforts in bringing healthcare services to underserved populations and addressing health disparities exacerbated by the pandemic. Similarly, collaborative efforts among stakeholders in the construction industry can facilitate the development and implementation of equitable solutions to pandemic challenges, ensuring the well-being of workers and the sustainability of construction projects. Lavassani & Movahedi (2021) emphasized the importance of collaboration in addressing supply chain disruptions in the construction industry during the pandemic. Their research highlighted the role of collaborative efforts among stakeholders in enhancing supply chain resilience, improving information sharing, and overcoming logistical challenges. By fostering collaboration and partnership, construction companies can navigate supply chain disruptions more effectively and ensure the continuity of operations amidst the challenges posed by the pandemic.

Cherian et al. (2022) explored the collaboration and partnerships within the construction industry to enhance supply chain resilience and improve cost and delivery performance. Their research highlighted the importance of collaborative efforts in enhancing supply chain agility, building robust networks, and sharing best practices to mitigate risks and ensure project success amidst uncertainty. Collaborative networks can enable construction companies to adapt to changing circumstances, innovate solutions, and overcome challenges posed by the pandemic effectively. Meanwhile,

Tan & Abdul-Samad (2022) highlighted the role of collaboration and partnerships in addressing workforce safety concerns during the pandemic. Their research emphasized the importance of sharing best practices, resources, and information to enhance safety measures and protect the health of construction workers. Collaborative efforts among industry stakeholders can facilitate the implementation of effective safety protocols and ensure a safe working environment for construction workers amidst the challenges posed by the pandemic.

Overall, collaboration and partnership are essential for construction companies in Malaysia to address pandemic challenges, foster innovation, and ensure industry resilience. By fostering collaborative networks, sharing knowledge and resources, and leveraging technology, construction companies can enhance their capacity to adapt to changing circumstances, overcome challenges, and thrive in a post-pandemic landscape.

2.2.7 Technological Integration

Technological integration has been pivotal in enhancing operational efficiency, promoting safety measures, and ensuring project continuity in the construction industry in Malaysia during the pandemic. Alhasan et al. (2021) highlighted the role of Internet of Things (IoT) technologies in addressing COVID-19 challenges. Their study emphasized how IoT-enabled solutions such as remote monitoring and smart sensors can enhance real-time visibility into construction activities, improve decision-making, and mitigate risks associated with the pandemic, thereby contributing to the industry's resilience.

Additionally, Abdullah et al. (2022) explored the integration of Building Information Modeling (BIM) technology in construction project management during the pandemic. Their research demonstrated how BIM facilitates collaborative planning, design, and coordination among project stakeholders, enabling virtual collaboration and reducing the need for physical interaction on-site. By leveraging BIM technology, construction companies can streamline project workflows, minimize disruptions, and ensure the timely delivery of projects amidst pandemic-related challenges. Furthermore, Chen et al. (2023) investigated the adoption of Augmented Reality (AR) and Virtual Reality (VR) technologies in enhancing safety training and simulation for construction workers in Malaysia. Their study illustrated how AR and VR-based training programs can provide immersive learning experiences, simulate hazardous scenarios, and improve safety awareness among workers, thus reducing the risk of workplace accidents and injuries during the pandemic. Integrating AR and VR technologies into safety training initiatives can enhance worker competency and promote a culture of safety within the construction industry.

Moreover, Wong et al. (2022) examined the utilization of Unmanned Aerial Vehicles (UAVs), or drones, for site monitoring and inspection purposes in the construction sector. Their research highlighted how drones enable remote monitoring of construction progress, site conditions, and compliance with safety protocols, thereby reducing the need for physical site visits and minimizing potential exposure to the virus. By integrating drone technology into construction operations, companies can enhance safety, efficiency, and productivity while adhering to pandemic-related restrictions and guidelines. In addition, Lim & Kang (2021) investigated the role of robotics and automation in mitigating labor shortages and improving productivity in the construction

industry during the pandemic. Their study demonstrated how robotic systems for tasks such as bricklaying, welding, and site cleaning can augment human labor, reduce dependency on manual work, and minimize the risk of virus transmission among workers. By integrating robotics and automation, construction companies can optimize resource utilization, accelerate project timelines, and mitigate the impact of workforce disruptions caused by the pandemic.

Furthermore, Tan & Chong (2023) explored the application of Geographic Information System (GIS) technology in enhancing spatial analysis and site planning for construction projects in Malaysia. Their research highlighted how GIS enables the visualization of project data, analysis of spatial relationships, and identification of optimal site locations, contributing to informed decision-making and risk management during the pandemic. By integrating GIS technology, construction companies can optimize resource allocation, minimize logistical challenges, and ensure the efficient execution of projects amidst pandemic-related constraints. Additionally, Yusuf et al. (2021) investigated the role of Artificial Intelligence (AI) and Machine Learning (ML) algorithms in predicting project delays and cost overruns in the construction industry during the pandemic. Their study demonstrated how AI-driven predictive analytics can analyze historical project data, identify patterns, and forecast potential disruptions, enabling proactive risk management and mitigation strategies. By integrating AI and ML technologies, construction companies can anticipate challenges, optimize resource allocation, and enhance project outcomes amidst the uncertainties of the pandemic.

In conclusion, technological integration plays a pivotal role in enhancing the resilience, efficiency, and safety of the construction industry in Malaysia amidst the COVID-19

pandemic. By adopting IoT, BIM, AR, VR, drones, robotics, GIS, AI, and ML technologies, construction companies can mitigate risks, optimize operations, and ensure the continuity of projects despite the challenges posed by the pandemic. Investing in technological innovation and integration is essential for the long-term competitiveness and sustainability of the construction sector in Malaysia.

2.2.8 Resilience and Adaptability

Resilience and adaptability have been fundamental pillars in navigating pandemic challenges and ensuring the sustainability of the construction industry in Malaysia. Ojo et al. (2021) highlighted the predictors of resilience and work engagement, emphasizing the significant association between resilience and job engagement. Their study underscored the importance of fostering resilience among construction workers to maintain productivity and job satisfaction amidst the uncertainties brought about by the COVID-19 pandemic.

Moreover, Lim & Al-Gburi (2022) investigated the role of organizational resilience in mitigating the impact of the pandemic on construction companies in Malaysia. Their research identified key factors contributing to organizational resilience, including leadership effectiveness, employee empowerment, and strategic flexibility. By enhancing organizational resilience, construction firms can effectively adapt to changing circumstances, overcome challenges, and sustain performance in the face of adversity. Additionally, Leow et al. (2023) explored the resilience-building measures adopted by construction companies in Malaysia to cope with the disruptions caused by the pandemic. Their study highlighted strategies such as diversifying supply chains, enhancing digital capabilities, and strengthening financial resilience. By implementing

these measures, construction firms can minimize vulnerabilities, mitigate risks, and ensure operational continuity in the midst of crisis situations.

Furthermore, Ng et al. (2022) examined the impact of psychological resilience on the well-being of construction workers during the pandemic. Their research highlighted the protective role of psychological resilience in buffering against stress, anxiety, and depression among workers facing pandemic-related challenges. By promoting psychological resilience through support programs and interventions, construction companies can safeguard the mental health and overall well-being of their workforce, thereby enhancing organizational resilience. Moreover, Ofori et al. (2021) investigated the role of community resilience in the context of construction projects in Malaysia. Their study explored how community engagement, social cohesion, and resource mobilization contribute to building resilience against external shocks such as the COVID-19 pandemic. By fostering partnerships with local communities and stakeholders, construction projects can leverage collective strengths and resources to overcome challenges and ensure project success amidst uncertainties.

Suresh et al. (2022) examined the impact of supply chain resilience on construction project performance during the pandemic. Their research identified factors influencing supply chain resilience, including supplier collaboration, inventory management, and demand forecasting. By enhancing supply chain resilience, construction companies can mitigate disruptions, minimize delays, and maintain project timelines, thus ensuring continuity of operations despite the challenges posed by the pandemic. Additionally, Teo et al. (2023) explored the role of technology-driven resilience in the construction industry, focusing on digitalization, automation, and innovation. Their study

demonstrated how technology adoption enhances the agility and responsiveness of construction firms, enabling them to adapt quickly to changing market conditions and external shocks. By embracing technological solutions, construction companies can build resilience, drive efficiency, and sustain competitiveness in the post-pandemic landscape.

In conclusion, resilience-building measures are essential for construction companies in Malaysia to navigate the challenges posed by the COVID-19 pandemic and ensure long-term sustainability. By fostering individual, organizational, psychological, community, and supply chain resilience, construction firms can effectively respond to crises, mitigate risks, and capitalize on emerging opportunities. Investing in resilience not only strengthens the industry's capacity to withstand shocks but also fosters innovation, growth, and resilience in the face of future uncertainties.

2.3 Project Management Traits of Leadership during Covid-19 Pandemic Within the Malaysian Construction Industry

The COVID-19 pandemic has significantly impacted the construction industry in Malaysia, posing unprecedented challenges that require effective leadership traits for project management. This literature review aims to analyze key leadership traits, including effective communication and collaboration, adaptability and flexibility, strategic decision-making and problem-solving, empathy and supportive leadership, and resilience and perseverance.

By tallying the occurrences of authors across the key project management traits, we can observe which authors contribute to multiple aspects of project management leadership during the COVID-19 pandemic in the construction industry in Malaysia. This analysis provides insights into the distribution of scholarly contributions across different dimensions of leadership traits. This table provides a clear overview of which authors have contributed to each key project management trait, allowing for easy comparison and analysis of their respective contributions. Each author's name is listed alongside checkboxes representing their involvement in specific leadership traits: Effective Communication and Collaboration (A), Adaptability and Flexibility (B), Strategic Decision-making and Problem-solving Skills (C), Empathy and Supportive Leadership (D), and Resilience and Perseverance (E).



Table 2.2 : List of Journal associated with the Key Leadership Traits of Project Managers during Covid-19 to Construction Industry in Malaysia

Authors	A	B	C	D	E
Abdillah et al. (2022)		/			
Abdulkareem et al. (2021)			/		
Adhikari & Poudyal (2021)	/				
Al-Sarafi and Najeh (2022)	/				
Brown et al. (2021)				/	
Collie (2021)				/	
Ebekozien et al. (2022)			/		
Giustiniano et al. (2020)				/	
Janius & Kamaruding (2022)		/			
Leonard et al. (2022)				/	/
Markey et al. (2021)				/	
Mohamed@Arifin et al. (2022)			/		
Mukhtar et al. (2022)					/
Mustapa et al. (2022)		/			
Nnaji et al. (2022)	/				
Pai et al. (2023)					/
Pamidimukkala & Kermanshachi (2021)	/				
Parameswaran & Ranadewa (2021)					/
Peng et al. (2022)					/
Sergent & Stajković (2020)				/	
Shaffi et al. (2022)			/	/	
Shibani et al. (2020)	/				
Siami et al. (2022)				/	/
Tan & Abdul-Samad (2022)		/			
Tan et al. (2023)		/			
Zamani et al. (2021)			/		

2.3.1 Effective Communication and collaboration

Effective communication and collaboration have emerged as indispensable leadership traits for navigating the challenges posed by the COVID-19 pandemic within the Malaysian construction industry. Building upon existing research, a plethora of studies offer insights into the multifaceted nature of these traits and their profound impact on project management during times of crisis.

Pamidimukkala & Kermanshachi (2021) emphasize the pivotal role of digital technologies in facilitating effective communication among project stakeholders. Their research underscores the importance of leveraging virtual communication platforms to bridge geographical distances and ensure seamless collaboration, especially amidst travel restrictions and social distancing measures imposed during the pandemic. Al-Sarafi and Najeh (2022) contribute to this discourse by highlighting the significance of digital transformation strategies in maintaining work continuity and adhering to health guidelines. By exploring the practical implications of virtual meetings and communication tools within construction projects, their study underscores the critical role of technology in fostering collaboration and ensuring project success amid unprecedented challenges.

Adhikari & Poudyal (2021) further underscore the importance of embracing technology as a means of augmenting collaboration strategies post-pandemic. Their research focuses on the long-term implications of digital tools in enhancing information management, efficiency, and productivity in construction projects, thereby highlighting the enduring relevance of effective communication strategies in the construction sector. Nnaji et al. (2022) provide valuable insights into the practical implementation of communication and collaboration strategies to address health and safety concerns in construction projects. By emphasizing the significance of implementing measures to mitigate the spread of the virus and ensuring the well-being of fieldworkers, their study underscores the importance of clear communication of safety protocols and collaborative efforts among stakeholders.

Shibani et al. (2020) offer a broader perspective by exploring the effects of the pandemic on the construction industry in the UK. While not specific to Malaysia, their findings underscore the universal importance of effective communication and collaboration among different roles within the construction sector to address challenges posed by the pandemic and maintain operational continuity. Collectively, these studies illuminate the critical role of effective communication and collaboration, facilitated by digital technologies and strategic planning, in navigating the complexities brought about by the COVID-19 pandemic in the Malaysian construction industry. Leveraging digital tools, revising health guidelines, and fostering a culture of collaboration are identified as essential strategies for ensuring project continuity and worker safety amidst unprecedented challenges.

2.3.2 Adaptability and Flexibility

Adaptability and flexibility have emerged as indispensable characteristics for effective project management leadership amidst the unprecedented challenges posed by the COVID-19 pandemic within the Malaysian construction industry. Extending the discourse on these pivotal traits, a plethora of studies by various authors delve deeper into their multifaceted implications and practical applications in navigating the complexities of the current crisis.

Mustapa et al. (2022) and Tan & Abdul-Samad (2022) delve into the heart of the matter by highlighting the pivotal role of adaptability in responding to disruptions induced by the pandemic. Their research underscores the urgency for construction professionals to swiftly recalibrate project timelines, re-strategize resource allocation, and deploy innovative adaptive measures to confront and overcome the operational hurdles

precipitated by the pandemic, thereby ensuring the seamless continuity of construction endeavors across Malaysia. Moreover, Abdillah et al. (2022) contribute valuable insights by examining the impacts of the COVID-19 pandemic on contractor organizations operating within the construction sphere. Their study illuminates the financial constraints and project delays confronting contractors, underscoring the critical need for adaptability and flexibility in navigating the uncertainties and disruptions to safeguard project sustainability and prosperity amidst the turbulent pandemic landscape.

Janius & Kamaruding (2022) offer practical perspectives on the application of adaptability within construction projects, particularly focusing on health and safety protocols in the pandemic era. Their research underscores the imperative for nimble adaptability and flexibility in swiftly implementing evolving safety standards and protocols, effectively responding to dynamic circumstances to ensure the well-being of construction personnel and the seamless continuity of project operations. Next, Tan et al. (2023) provide a broader contextual lens by examining the post-COVID-19 repercussions on the agri-food supply chain in Malaysia. While not directly linked to the construction domain, their findings underscore the pervasive impact of the pandemic across diverse economic sectors, accentuating the universal imperative for adaptability and flexibility in navigating crisis-induced disruptions and charting resilient pathways towards recovery and growth.

Furthermore, Janius & Kamaruding (2022) underscore the importance of adaptability and flexibility in managing evolving safety requirements and guidelines amidst the pandemic, ensuring compliance and safeguarding the health and well-being of

construction personnel. Their insights shed light on the dynamic nature of the pandemic landscape, emphasizing the criticality of adaptive strategies in maintaining operational continuity and resilience within the construction industry. In summary, these scholarly contributions deepen our understanding of the indispensable role of adaptability and flexibility in project management leadership within the Malaysian construction context amidst the exigencies of the COVID-19 pandemic. By championing agile responses, proactive adjustments, and innovative solutions, project leaders can effectively steer construction endeavors through the stormy seas of uncertainty, ensuring resilience, sustainability, and success in the face of unprecedented challenges.

2.3.3 Strategic Decision-making and Problem-solving skills

Strategic decision-making and problem-solving skills stand as indispensable cornerstones for effective leadership within the Malaysian construction industry amidst the turbulent landscape of the COVID-19 pandemic. Extending the discourse on these critical traits, a multitude of studies by various authors offer profound insights into their pivotal significance and practical applications in confronting the myriad challenges precipitated by the ongoing crisis.

Shafii et al. (2022) and Mohamed@Arifin et al. (2022) provide seminal contributions by shedding light on the paramount importance of strategic decision-making amidst the pandemic-induced complexities. Their research underscores the imperative for construction leaders to adopt a strategic outlook in navigating multifaceted challenges, ranging from the implementation of health and safety protocols to grappling with workforce shortages and financial uncertainties. By leveraging astute decision-making prowess, construction stakeholders can effectively chart resilient pathways forward,

mitigating risks, and optimizing resource utilization amidst the unpredictable pandemic landscape.

Zamani et al. (2021) further enrich the discourse by delving into the intricacies of strategic decision-making within the context of financial challenges exacerbated by the pandemic. Their study elucidates how construction leaders can harness strategic acumen to proactively identify and address financial constraints, optimize budget allocations, and mitigate revenue disruptions, thereby safeguarding project viability and sustainability in the face of economic turbulence. Additionally, Abdillah et al. (2022) contribute valuable insights by examining the impacts of the COVID-19 pandemic on contractor organizations operating within the construction domain. Their research illuminates the strategic dilemmas and decision-making imperatives confronting contractors amidst the crisis, ranging from resource allocation dilemmas to project timeline recalibrations. By embracing strategic problem-solving approaches, contractors can navigate the intricate labyrinth of pandemic-induced challenges, ensuring operational resilience and sustainable growth amidst the prevailing uncertainties.

Ebekozien et al. (2022) offer a unique perspective by exploring the transformative potential of technological innovations in enhancing strategic decision-making capabilities within the construction sector. Their study underscores the catalytic role of digital technologies, such as Building Information Modeling (BIM) and Artificial Intelligence (AI), in empowering construction leaders with data-driven insights and predictive analytics, facilitating proactive decision-making, and optimizing project outcomes amidst the pandemic-induced disruptions. Furthermore, Abdulkareem et al.

(2021) delve into the nuanced dynamics of strategic decision-making within the context of supply chain disruptions induced by the pandemic. Their research elucidates how construction leaders can deploy strategic foresight and resilience-oriented strategies to mitigate supply chain risks, identify alternative sourcing channels, and foster collaborative partnerships to ensure uninterrupted project supply flows amidst the turbulent pandemic landscape.

In conclusion, these scholarly endeavors collectively underscore the pivotal role of strategic decision-making and problem-solving skills in guiding construction leadership through the labyrinth of challenges precipitated by the COVID-19 pandemic in Malaysia. By embracing strategic foresight, leveraging technological innovations, and fostering collaborative partnerships, construction leaders can navigate the stormy seas of uncertainty, optimize resource utilization, and ensure the sustainable progression of construction endeavors amidst the unprecedented crisis.

2.3.4 Empathy and Supportive Leadership

Empathy and supportive leadership have emerged as crucial pillars for nurturing a conducive work environment, safeguarding the health and well-being of construction workers, and ensuring adherence to health and safety protocols amidst the COVID-19 pandemic in Malaysia. The scholarly discourse on this critical aspect of leadership within the construction industry offers profound insights into its profound impact on organizational resilience and employee morale during these unprecedented times.

Shafii et al. (2022) and Markey et al. (2021) have made significant contributions by highlighting the pivotal role of empathetic and supportive leadership in fostering a

culture of compliance with health and safety protocols among construction workers. Their studies underscore how leaders, by demonstrating empathy and providing unwavering support, can instill a sense of trust, security, and psychological well-being among workers, thereby enhancing their willingness to adhere to stringent safety measures and navigate the challenges posed by the pandemic with resilience and fortitude. Furthermore, Sergent & Stajković (2020) and Collie (2021) offer valuable insights into the transformative potential of supportive leadership behaviors, such as active listening, encouragement, and genuine concern for employee welfare, in fostering a positive work environment amidst the pandemic-induced uncertainties. Their research elucidates how empathetic leaders can cultivate a sense of camaraderie, belongingness, and mutual support within construction teams, thereby bolstering morale, enhancing job satisfaction, and promoting collective resilience in the face of adversity.

Additionally, studies by Brown et al. (2021) and Giustiniano et al. (2020) delve into the intricate dynamics of empathetic and supportive leadership in managing conflicts, addressing employee concerns, and fostering a culture of trust and collaboration amidst the pandemic-induced turbulence. Their research underscores how leaders who prioritize empathy, transparency, and compassion can effectively mitigate stress, alleviate anxieties, and nurture a sense of psychological safety within construction teams, thereby fostering greater engagement, productivity, and organizational cohesion. Moreover, Leonard et al. (2022) and Siami et al. (2022) provide invaluable insights into the intersection of supportive leadership, mental health, and well-being amidst the pandemic. Their studies elucidate how empathetic leaders, through effective communication, active listening, and personalized support, can mitigate the adverse

impacts of stress, anxiety, and burnout among construction workers, thereby enhancing resilience, promoting psychological well-being, and fostering a culture of mutual care and support within the construction industry.

In conclusion, these scholarly endeavors collectively underscore the transformative potential of empathy and supportive leadership in nurturing a resilient, compassionate, and high-performing workforce within the Malaysian construction industry amidst the challenges precipitated by the COVID-19 pandemic. By prioritizing empathy, fostering a culture of support, and leading by example, construction leaders can inspire trust, cultivate resilience, and navigate the uncertainties of the pandemic landscape with compassion, fortitude, and unwavering resolve.

2.3.5 Resilience and perseverance

Resilience and perseverance stand as foundational attributes indispensable for navigating the multifaceted challenges and ensuring the longevity of construction projects amid the tumultuous landscape of the COVID-19 pandemic in Malaysia. A plethora of scholarly works have shed light on the pivotal role of these traits in bolstering organizational resilience, fortifying project continuity, and fostering adaptive responses to the unprecedented disruptions precipitated by the pandemic.

Mukhtar et al. (2022) have contributed significantly to the discourse by developing a comprehensive Resilient Crisis Management Plan (CMP) tailored specifically for the Malaysian construction sector. Their research underscores the paramount importance of preparedness, proactive crisis management strategies, and adaptability in mitigating the impacts of unforeseen events like the COVID-19 pandemic, thereby safeguarding

the sustainability and viability of construction projects in Malaysia. Additionally, Parameswaran & Ranadewa (2021) offer valuable insights into resilience-building through the lens of Lean Construction principles, elucidating how lean manufacturing practices can mitigate the adverse effects of the pandemic on construction projects. Their study underscores the transformative potential of lean methodologies in enhancing efficiency, minimizing waste, and optimizing project outcomes, thereby contributing to the industry's resilience and adaptive capacity amidst the pandemic-induced disruptions.

Furthermore, Pai et al. (2023) and Peng et al. (2022) delve into the intricacies of resilient leadership and its profound impact on organizational responses to crises like the COVID-19 pandemic. Their research highlights how resilient leaders, through effective stress management, strategic decision-making, and unwavering resolve, can inspire confidence, instill trust, and galvanize collective action within construction teams, thereby fostering resilience, promoting organizational sustainability, and ensuring the successful navigation of turbulent times. Moreover, Leonard et al. (2022) and Siami et al. (2022) provide invaluable insights into the intersection of resilience, mental health, and well-being amidst the pandemic. Their studies underscore the critical role of supportive leadership, psychological safety, and employee resilience in mitigating stress, enhancing coping mechanisms, and fostering a culture of mutual care and solidarity within the construction industry, thereby bolstering organizational resilience and promoting sustained project performance amidst the challenges posed by the pandemic.

In conclusion, these scholarly endeavors collectively underscore the indispensable role of resilience and perseverance in steering construction projects through the unprecedented challenges unleashed by the COVID-19 pandemic in Malaysia. By prioritizing resilience-building strategies, fostering a culture of adaptive leadership, and nurturing a supportive work environment, construction leaders can instill confidence, inspire resilience, and navigate the complexities of the pandemic landscape with resilience, determination, and unwavering commitment to project success.

2.4 Summary

In Chapter 2, an extensive exploration was conducted to uncover the ramifications of the COVID-19 pandemic on the construction industry in Malaysia, alongside the leadership traits exhibited by project managers amidst these challenging circumstances. The literature review delved into diverse facets, encompassing supply chain disruptions, concerns regarding workforce safety, financial ramifications, regulatory complexities, adaptive strategies, collaboration dynamics, technological integration, and resilience-building measures. By synthesizing insights from scholarly research, the chapter provided a nuanced understanding of the multifaceted challenges encountered by the construction sector and the innovative strategies implemented to surmount them.

Through a meticulous analysis of effective communication, adaptability, strategic decision-making, empathy, and resilience, the review elucidated the industry's resilience and innovative responses to navigate through the uncertainties brought about by the pandemic. The literature underscored the pivotal role of leadership traits in steering construction projects amidst unprecedented challenges, emphasizing the importance of fostering collaboration, embracing technological advancements, and

prioritizing workforce well-being. By integrating these leadership qualities into their approach, project managers in Malaysia's construction industry have demonstrated remarkable adaptability and resilience, ensuring the continuity and success of projects even in the face of adversity.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

In Chapter 3, the research delved into the intricacies of the research design, analysis methods, and conceptual framework employed to investigate the impact of the COVID-19 pandemic on the construction industry in Malaysia, particularly focusing on project management leadership traits. This chapter served as a comprehensive roadmap, outlining the strategies and methodologies utilized to achieve the research objectives effectively. By employing qualitative research design and drawing upon thematic and content analysis methods, the study aimed to uncover the multifaceted realities of crisis management within the Malaysian construction sector. Additionally, operational definitions, demographic analysis of the surveyed sample, and a constructivist philosophical approach informed the study, ensuring clarity, rigor, and a nuanced understanding of the pandemic's implications for project management leadership. Through the conceptual framework presented in this chapter, the researchers provided a structured lens through which to explore the dynamic interplay between pandemic impacts and leadership dynamics, setting the stage for insightful analyses and discussions in subsequent sections.

3.2 Research Design

For this study, a 'Qualitative' research design was chosen, with several rationales guiding this decision. Firstly, it allowed for the exploration of complex phenomena in-depth, particularly crucial in understanding project management leadership during crises such as the COVID-19 pandemic in the Malaysian construction industry. Qualitative methods facilitated the capture of nuanced insights by delving into

participants' experiences, perspectives, and behaviors, enabling a deeper understanding of project managers' leadership practices and decision-making processes in crisis response (Roy, 2021).

Secondly, the chosen method was well-suited for studying phenomena within real-world contexts (Verweij, 2019), offering flexibility in responding to emergent themes and issues. This flexibility was essential for exploring the dynamic and evolving nature of crisis response in the construction industry. Additionally, qualitative methods allowed for a thorough exploration of project managers' experiences and perceptions, providing a rich understanding of their approaches to crisis management.

3.3 Aim of the Interview

The purpose of the semi-structured interviews was twofold. Firstly, the goal was to conduct a comprehensive assessment of the impact of the COVID-19 pandemic on Malaysia's construction industry. By engaging directly with industry professionals, the aim was to unravel the intricate web of challenges, disruptions, and adaptations encountered by construction projects amidst the unprecedented crisis. The objective was to gain a nuanced understanding of the pandemic's effect on various aspects of the construction landscape, including project timelines, workforce dynamics, supply chains, and financial implications.

Secondly, the interviews aimed to uncover and elucidate the project management traits that served as pillars of effective leadership in navigating crises and orchestrating emergency responses within the Malaysian construction domain. By delving into the lived experiences and insights of industry practitioners, the researchers strived to identify the leadership qualities, strategies, and best practices that had proven

instrumental in steering construction projects through the tumultuous waters of the pandemic. The exploration aimed to distil actionable lessons and insights that could inform and enhance project management practices, fostering resilience and adaptability in the face of future crises.

Overall, the interviews served as a conduit for capturing rich, qualitative data that illuminated the challenges, strategies, and leadership dynamics prevalent within Malaysia's construction industry amidst the COVID-19 pandemic. Through this exploration, the researchers aimed to glean valuable insights that contributed to a deeper understanding of the industry's resilience, innovation, and capacity for navigating unprecedented challenges. By doing so, they hoped to provide a valuable contribution to the literature on crisis management and emergency response within the construction industry.

3.4 Design of the Interview Process

The interview process was designed with great care to ensure that it aligned with the research objectives, utilizing thematic analysis to categorize information from the participants. The research team identified four key themes for data collection, which remained consistent across both methods used. The interview sessions were facilitated using a semi-structured interview schedule, outlined in detail in Appendix 1 of the thesis, which comprised three sections:

Section I – Participant Profile: This section aimed to gather essential participant information and details about their current organization. Questions covered the participant's name, job title, age, educational background, years of experience in their

current role, and the interview date and venue for record-keeping purposes. Additionally, inquiries were made about the participant's organization, including its name, nature of business, whether it was a private firm or a public agency, and the organization's establishment duration. This data was crucial for profiling participants in the qualitative data collection process and for drawing conclusions, especially if variations in opinions among participants arose. While participant and organization names were noted in the interview schedule, they were not disclosed in any analysis or within the thesis to ensure anonymity, in accordance with ethical requirements from the University.

Section II – Impact of the COVID-19 Pandemic on the Construction Industry in Malaysia (Theme 1): This section involved a series of questions concerning participants' experiences, understanding, and previous involvement in assessing the impact of COVID-19 on the construction industry. The primary objective was to gauge participants' personal insights into the challenges faced. The questions probed into the impact of the pandemic on construction projects, including timelines and schedules, labour disruptions or shortages, financial implications, specific projects affected, and strategies adopted to address supply chain challenges. The responses to these questions offered insights into participants' experiences and perspectives on the pandemic's effects on the construction sector.

Section III – Project Management Traits of Leadership during Covid-19 in Construction Industry in Malaysia (Theme 2): This segment comprised questions aimed at exploring project management leadership traits during Covid-19 in Malaysia. Participants were asked to identify essential leadership traits for managing construction projects during

crises, share examples of challenging situations faced as project managers during the pandemic, discuss the importance of communication skills, elaborate on decision-making processes during uncertainty, and provide strategies for fostering teamwork and Collaboration among project team members during crises. The responses gathered in this section shed light on effective leadership practices and strategies employed by project managers in navigating crises within the construction industry.

In summary, the interview process was meticulously crafted to capture comprehensive insights from participants regarding the impact of COVID-19 on the Malaysian construction industry and the project management traits crucial for effective crisis management and emergency response. By utilizing a thoughtful questioning approach and thematic analysis, this process aimed to generate rich qualitative data to support the research objectives.

3.5 Surveyed Sample

The surveyed sample for this research embodied a meticulously curated selection of stakeholders deeply entrenched within the Malaysian construction industry. With a focus on inclusivity and diversity, the aim was to capture a comprehensive spectrum of perspectives, insights, and experiences pertinent to the impact of the COVID-19 pandemic and the requisite leadership traits during crises and emergency responses.

Comprising individuals from various roles and positions such as project managers, site managers, contractors, engineers, and procurement specialists, each participant brought a unique expertise and viewpoint to the table. This diverse representation ensured a

holistic understanding of the challenges and opportunities encountered in navigating construction projects amidst the pandemic's disruptions.

The selection criteria prioritized active involvement in construction projects during the pandemic period, ensuring that insights gleaned from the interviews were grounded in practical, real-world experiences. By drawing upon the first-hand accounts of industry professionals grappling with the pandemic's ramifications, the qualitative data analysis gained depth and authenticity.

Moreover, efforts were made to ensure diversity not only in roles but also in organizational affiliations, project scopes, geographical locations, and project statuses. By encompassing a broad cross-section of the industry, the surveyed sample aimed to capture the nuanced intricacies inherent in the Malaysian construction landscape, thereby enriching the qualitative analysis with a multiplicity of perspectives.

For the purpose of anonymity and in line with the ethical approval requirement, the participants were labelled as Int 1, Int 2, Int 3, and so on, with the names of the firms labelled as C1, C2, C3, and so forth. The details of the sample interviewed for this research were as follows:

Table 3.1 : Detail of Interview

Organization	Participant	Work
C1	Int 1	Project Manager
C2	Int 2	Senior Manager
C3	Int 3	Director
C4	Int 4	Architect
C5	Int 5	Site Managers
C6	Int 6	Executive Director
C7	Int 7	Site Manager/Safety Officer
C8	Int 8	Chief Operating Officer
C9	Int 9	Project Manager

C10	Int 10	Project Manager
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During the data collection stage, the researcher encountered challenges in effectively communicating the main concepts of the questions to some interviewees. As a result, the researcher adopted a strategy of providing detailed explanations or descriptions of the words and concepts used in the questions whenever necessary. It's important to note that all interactions and interviews were conducted in English, which may have posed linguistic or comprehension barriers for some participants.

In response to these challenges, the researcher took proactive measures to ensure clarity and understanding during the interview process. This involved providing additional context, defining technical terms, or offering examples to elucidate complex concepts. By taking these steps, the researcher aimed to facilitate meaningful and productive dialogue with participants, thereby enhancing the quality and accuracy of the data collected.

Despite the initial difficulties, the researcher's efforts to overcome language barriers and ensure comprehension ultimately contributed to the richness and depth of the qualitative data gathered. This adaptive approach underscored the researcher's commitment to rigor and thoroughness in capturing the insights and experiences of participants within the Malaysian construction industry amidst the COVID-19 pandemic.

In essence, the surveyed sample was thoughtfully curated to encapsulate the heterogeneity and dynamism of the Malaysian construction sector. Through this inclusive approach, the research endeavored to yield findings that were insightful,

robust, and reflective of the multifaceted realities shaping the industry's response to the COVID-19 pandemic.

3.6 Analysis Method for Qualitative Data

To address the objectives of identifying the Impact and Strategies of the COVID-19 Pandemic on the Construction Industry in Malaysia and determining the Project Management Traits of Leadership during the COVID-19 Pandemic in the same industry, a combination of thematic and content analysis methods was employed. Thematic analysis, as described by Majumdar (2019), involved identifying patterns and themes within qualitative data. This method allowed for a concise interpretation of the dataset, which was crucial for understanding the impact of the pandemic on the construction industry.

Content analysis, as mentioned by Lim et al. (2022), complemented thematic analysis by focusing on secondary data related to the impacts of the pandemic on Malaysia's obesogenic environment. This approach involved collecting data from various sources such as newspapers, government statistics, and reports to gain insights into the effects of COVID-19. Similarly, Hansen et al. (2021) utilized thematic analysis through semi-structured interviews to understand Quantity Surveyors' responses to the COVID-19 outbreak, showcasing the effectiveness of this method in capturing qualitative data.

Moreover, the study by Tan & Abdul-Samad (2022) utilized a quantitative research approach via questionnaires to study the impact of COVID-19 on construction workforce productivity in Malaysia. This mixed-method approach, combining thematic

and content analysis with quantitative surveys, provided a comprehensive understanding of the pandemic's effects on the construction industry.

In addition, the research by Ari et al. (2022) focused on evaluating the effects of the COVID-19 pandemic at construction sites, highlighting the importance of considering perspectives from employers, contractors, and employees. By incorporating such diverse viewpoints into the analysis, a more holistic view of the pandemic's impact on the construction industry was achieved.

By synthesizing thematic analysis to identify key themes and patterns and content analysis to delve into specific impacts and strategies, researchers effectively addressed the objectives related to the COVID-19 pandemic's effects on the construction industry in Malaysia. This comprehensive approach allowed for a nuanced understanding of the challenges faced by the industry and the leadership traits required to navigate through these unprecedented times.

3.7 Demographic analysis

The construction industry is a dynamic and complex sector that encompasses a wide range of roles, expertise, and experiences. A thorough demographic analysis of construction industry professionals sheds light on the diverse landscape within this field. In this thesis, the interviewees are analysed as below.

Figure 3.1 : Demographic Analysis



First and foremost, our analysis reveals that age diversity is evident among the interviewees, with individuals ranging from 23 to 57 years old. This spectrum highlights the presence of both seasoned professionals with decades of experience and younger individuals who are relatively new to the industry. Such diversity in age brings forth a blend of perspectives, ideas, and approaches, enriching the overall discourse within the construction sector.

Furthermore, the educational backgrounds of the interviewees further underscore the diversity within the industry. While some hold advanced degrees such as Masters in Project Management, others have pursued diplomas or bachelor's degrees in fields like Engineering, Architecture, or Commercial Management. This variance in educational qualifications reflects the multi-disciplinary nature of the construction industry, where individuals with diverse academic backgrounds contribute their expertise to project execution and management.

Years of experience in the construction industry also varied significantly among the interviewees, ranging from 5 to 32 years. This diversity in experience levels is crucial as it brings together individuals with a wealth of knowledge and seasoned professionals alongside those who bring fresh perspectives and innovative ideas. Moreover, the range of experience also indicates opportunities for mentorship and knowledge transfer within organizations, fostering professional growth and development.

Additionally, the length of tenure in current organizations also varied, with some interviewees having spent their entire careers within a single organization, while others have joined more recently. This diversity in tenure reflects the fluidity of career

trajectories within the construction industry, where professionals may move between organizations to pursue new opportunities or advance their careers.

Furthermore, organizations within the construction industry exhibit diversity in terms of size, nature of business, and sector (public or private). From government ministries focused on defense or water and environment to private firms specializing in construction, architecture, or waste management, the range of organizations reflects the breadth of opportunities available within the industry. The size of organizations also varies from small enterprises with fewer than 30 employees to larger entities with over 150,000 employees, highlighting the presence of both small-scale operations and large-scale enterprises within the construction sector.

Lastly, the job titles and specializations of the interviewees further emphasize the diversity within the construction industry. Roles such as Project Manager, Site Manager, Safety Supervisor, Chief Operating Officer, and Director represent a wide array of functions and responsibilities within construction organizations. Specializations encompass various domains including Project Management, Architecture, Construction, Safety, Mechanical & Electrical (M&E), Contract & Procurement, among others, showcasing the diverse skill sets and expertise required to drive success in the industry.

In conclusion, the demographic analysis of construction industry professionals reveals a rich tapestry of experiences, backgrounds, and perspectives within the sector. The diversity in age, educational qualifications, years of experience, organizational characteristics, and job roles all contribute to the dynamic and multi-faceted landscape

of the construction industry. Embracing this diversity fosters innovation, Collaboration, and growth, ultimately driving the continued advancement and success of the construction sector.

3.8 Conceptual Framework

The conceptual framework for this study aims to illustrate the intricate relationship between the impact of the COVID-19 pandemic on the construction industry in Malaysia and the leadership traits exhibited by project managers during this crisis. It encapsulates two primary objectives: identifying the ramifications and strategies stemming from the pandemic within the construction sector and discerning the leadership attributes of project managers amid these challenging circumstances.

Objective 1 delves into comprehending the repercussions and responses to the COVID-19 pandemic within Malaysia's construction industry. This objective unfolds through various dimensions:

- a) Supply chain disruptions: These disruptions ripple through material procurement and logistics, affecting project timelines and financial outlays.
- b) Workforce safety concerns: The imperative to safeguard the health and safety of construction workers shapes project operations and overall productivity.
- c) Financial implications: Pandemic-induced financial challenges, such as escalated costs and revenue downturns, prompt the adoption of adaptive financial strategies.

- d) Regulatory hurdles: Evolving regulations and safety protocols pose compliance hurdles, necessitating adept navigation of regulatory frameworks by construction firms.
- e) Adaptive strategies: Construction companies deploy adaptive measures like flexible work arrangements and technology integration to counteract pandemic impacts.
- f) Collaboration and partnership: Collective crisis response is facilitated through collaboration among stakeholders, including government agencies, suppliers, and subcontractors.
- g) Technological integration: The adoption of digital tools streamlines project management processes, enhances communication, and facilitates remote work capabilities.
- h) Resilience and adaptability: Firms exhibit resilience by adapting to changing circumstances, innovating solutions, and ensuring business continuity despite adversities.

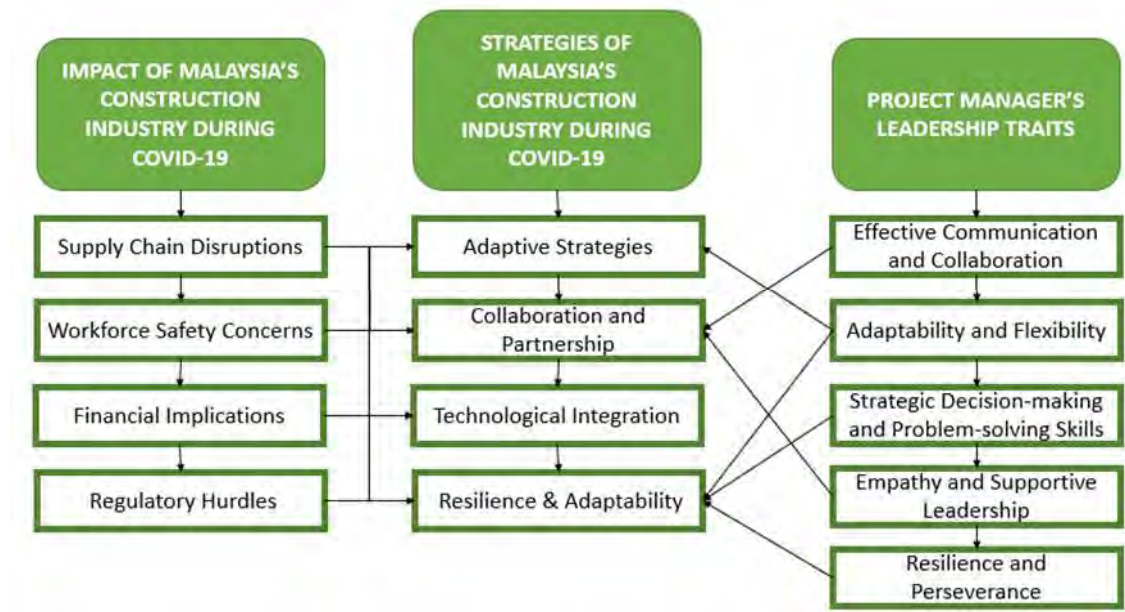
Objective 2 shifts focus to evaluating the leadership traits of project managers amidst the COVID-19 pandemic. These traits encompass:

- a) Effective communication and collaboration: Project managers adeptly communicate and foster collaboration among team members and stakeholders to navigate crisis situations.
- b) Adaptability and flexibility: Project managers demonstrate agility in responding to evolving challenges, adjusting project plans and strategies accordingly.

- c) Strategic decision-making and problem-solving skills: Decisive actions and effective problem-solving abilities enable project managers to address complex issues and ensure project success amidst uncertainty.
- d) Empathy and supportive leadership: Project managers exhibit empathy and provide support to their team members, fostering a positive work environment during challenging times.
- e) Resilience and perseverance: Project managers display resilience and perseverance, inspiring confidence and determination among team members to achieve project goals despite adversities.

The conceptual framework synthesizes insights from existing research, seamlessly integrating findings related to the impact of the COVID-19 pandemic on Malaysia's construction industry and the leadership traits of project managers during this tumultuous period. It provides a structured approach to understanding the complex dynamics at play, emphasizing the interconnectedness between external factors such as pandemic-induced disruptions and regulatory changes and internal factors including leadership behaviors and organizational strategies. This holistic perspective equips researchers and practitioners to identify pivotal areas for intervention and develop targeted solutions to enhance the resilience and effectiveness of construction project management in times of crisis..

Figure 3.2 : Conceptual Framework



3.9 Validity and Realibility

The study's validity and reliability were crucial aspects ensuring the accuracy and trustworthiness of its findings. Steps were taken to address potential biases in data collection and analysis, ensuring the study's internal validity. Robust methods such as thematic and content analysis were employed, and transparency was maintained in the procedures to mitigate these threats. The findings consistently aligned with the research objectives and were supported by evidence from interviews with industry professionals, further enhancing internal validity.

Regarding external validity, caution should be exercised when extrapolating the findings to other countries or industries. However, the thorough demographic analysis provided insight into the characteristics of the interviewees, enhancing the understanding of the sample's representativeness and relevance to the broader population.

Construct validity was ensured through a well-defined conceptual framework, linking the constructs of the COVID-19 pandemic's impact and project management leadership traits. This clarity ensured that the study measured what it intended to measure. Additionally, the research objectives were clearly defined and aligned with the constructs under investigation, further contributing to construct validity.

Reliability was maintained through consistency in data collection using semi-structured interviews and thematic and content analysis methods. Procedures were transparent and consistently applied throughout the research process, enhancing the reliability of the study. Continuous vigilance in addressing potential biases and ensuring consistency in data collection and analysis were essential for maintaining the credibility and trustworthiness of the findings.

3.10 Summary

In Chapter 3 of this study, we delved into the intricacies of the research design, analysis methods, and conceptual framework employed to investigate the impact of the COVID-19 pandemic on the construction industry in Malaysia, particularly focusing on project management leadership traits. This chapter served as a roadmap, outlining the strategies and methodologies utilized to achieve the research objectives effectively.

The research design adopted for this study was qualitative in nature, chosen for its ability to delve deeply into complex phenomena and capture nuanced insights. This decision was underpinned by the recognition of the need to understand project management leadership amidst crises, such as the ongoing pandemic, within the

Malaysian construction context. Drawing on the works of Roy (2021) and Verweij (2019), the qualitative approach was deemed suitable for exploring real-world contexts and emergent themes, providing flexibility in data collection and analysis.

Operational definitions played a crucial role in ensuring clarity and precision in data collection. In this chapter, key terms such as the COVID-19 pandemic, the construction industry in Malaysia, and project management leadership traits were defined, laying a solid foundation for subsequent discussions. These definitions were informed by a comprehensive review of the literature and served as guiding principles throughout the research process.

The interview process, detailed in this chapter, served a dual purpose: to assess the pandemic's impact on the construction industry and to elucidate essential leadership traits exhibited by project managers. A semi-structured approach was employed, allowing for flexibility while ensuring that key themes were explored in-depth. By incorporating thematic and content analysis methods, as advocated by Majumdar (2019), Lim et al. (2022), and Hansen et al. (2021), the study aimed to uncover both broad patterns and specific impacts of the pandemic.

Demographic analysis of the surveyed sample revealed the diverse landscape within the construction industry, encompassing a range of ages, educational backgrounds, years of experience, organizational characteristics, and job roles. This diversity enriched the research findings, providing a multifaceted understanding of the industry's response to the pandemic.

Philosophically, the study adopted a constructivist approach, recognizing the subjective nature of knowledge construction. By acknowledging the role of individual perspectives and experiences, the research aimed to uncover the nuanced realities of the pandemic's impact and leadership dynamics within the Malaysian construction sector.

The conceptual framework presented in this chapter illustrated the interconnectedness between pandemic impacts and leadership traits, guiding the study's exploration. Informed by existing literature and research objectives, the framework provided a structured approach to understanding the complex dynamics at play, laying the groundwork for subsequent analyses and discussions.

In essence, Chapter 3 set the stage for a comprehensive investigation into crisis management within the Malaysian construction industry. By employing a qualitative research design, rigorous analysis methods, and a robust conceptual framework, the study aimed to contribute valuable insights to the field, informing practice and policy in navigating crises effectively.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This section presents the key findings derived from a comprehensive analysis of the conducted interviews, utilizing both thematic and content analysis methodologies. The research methodology employed involved recording the interviews using a voice recorder and transcribing the content into Microsoft Word for subsequent analysis. Thematic analysis was applied to categorize the qualitative data according to predefined themes outlined in the interview schedule.

The subsequent sections elaborate on the results pertaining to each theme discussed during the interviews, shedding light on the multifaceted implications of the COVID-19 pandemic on the construction sector and unveiling the project management traits essential for navigating crises and fostering resilience within the industry.

4.2 Qualitative Data Collection – Semi Structured Interview.

In alignment with the methodology outlined in Chapter 3, qualitative data collection for this research was conducted through semi-structured interviews. This subsection outlined the aim of the interviews, the design of the interview process, details regarding the surveyed sample, and the method of analysis for the qualitative data.

4.3 Findings

This section outlines the primary findings derived from the conducted interviews and the qualitative analysis applied to the data. As mentioned earlier, all qualitative data underwent thematic analysis. The interviews were recorded using a voice recorder and

transcribed into Microsoft Word. Subsequently, the data were categorized according to predefined themes outlined in the interview schedule. The subsequent section elaborates on the results related to each theme discussed during the interviews.

4.3.1 Impact of Covid-19 Pandemic on the Construction Industry in Malaysia

In this subsection, a comprehensive analysis was conducted to examine the impact and strategies employed by the construction industry in Malaysia in response to the COVID-19 pandemic. Through interviews with 10 individuals actively involved in the construction sector, we sought to understand the multifaceted challenges faced and the adaptive measures adopted amidst those unprecedented times.

The interviews were structured around five key questions to comprehensively explore the impact of the COVID-19 pandemic on construction projects and how industry professionals navigated through the challenges. Firstly, participants were asked to describe the specific impacts of COVID-19 on the construction projects they were involved in, detailing how it affected project timelines and schedules. Following this, they shared their experiences regarding any labor disruptions or shortages resulting from the pandemic and discussed the strategies they employed to address these challenges effectively. Additionally, participants were asked about the measures their organizations had implemented to mitigate the financial implications of the pandemic on construction projects. They were also prompted to provide examples of specific projects that were suspended or delayed due to the pandemic and elaborate on the approaches taken to manage these disruptions. Finally, participants discussed the supply chain disruptions caused by the pandemic and outlined the strategies they had

implemented to overcome these challenges and ensure project continuity. These structured questions allowed for a comprehensive exploration of the multifaceted impacts of the pandemic on construction projects and the adaptive strategies employed by industry professionals to navigate through the crisis.

Thematic analysis and content analysis were employed to identify recurring themes and patterns within the interview data, aiming to provide insights into the overall impact and response strategies of the construction industry to the COVID-19 crisis in Malaysia. The objective of this analysis was to shed light on the dynamic landscape of the construction industry amidst the pandemic, highlighting the challenges faced and the innovative strategies employed to ensure project continuity, mitigate risks, and foster resilience in the face of uncertainty. Through a deeper understanding of the impact and responses of key stakeholders within the construction sector, this study aimed to contribute to the ongoing discourse on managing crises and building a more resilient construction industry in Malaysia.

4.3.1.1 Supply Chain Disruption

Amidst the tumult of the COVID-19 pandemic, the construction industry in Malaysia found itself grappling with unprecedented challenges, particularly in its supply chain. Through in-depth interviews with ten industry professionals, a narrative of struggle and resilience emerged. The interviews revealed a landscape fraught with disruptions, where material shortages and delays threatened the progress of construction projects across the nation. This narrative was aptly captured by Int 1, whose insights echoed the findings of scholarly sources like Farooq et al. (2022) and Gamil & Alhagar (2020), painting a vivid picture of the industry's struggles.

As the interviews unfolded, the challenges became even more apparent. Int 2 shed light on the logistical hurdles of accessing project sites amidst stringent pandemic restrictions, adding depth to the narrative of supply chain woes. Further insights from Int 3 and Int 4 exposed the volatile nature of material availability and pricing, offering firsthand accounts that mirrored the challenges outlined in academic literature. However, amidst these daunting challenges, there were glimmers of hope. Int 5's mention of heightened demand for construction materials hinted at potential disruptions, but also showcased the industry's capacity for innovation and adaptation. Their discussion of involving Rohingya workers to alleviate supply chain pressures reflected a proactive response, in line with recommendations from academic sources.

Overall, the alignment between all the 10 interviewees' experiences and the findings from the literature review underscores the significant impact of supply chain disruptions on the construction industry in Malaysia and the importance of adopting adaptive strategies to navigate these challenges effectively. The challenges discussed and strategies recommended by the authors are echoed by the experiences shared by the interviewees, highlighting the severity of these disruptions and the efforts undertaken to mitigate their impact.

Table 4.1: Supply Chain Disruption

Interviewee	Interview Statement	Authors	Aligned Literature Review
Int 1	"The pandemic caused widespread disruptions, particularly in the supply chain, leading to material shortages and delays."	Farooq et al. (2022), Gamil & Alhagar (2020)	Supply chain disruptions have resulted in material shortages and delays (Farooq et al., 2022; Gamil & Alhagar, 2020)
Int 2	"Accessing project sites became problematic due to restrictions, causing delays."	Farooq et al. (2022)	Delays in material procurement processes due to disruptions in global supply chains (Farooq et al., 2022)
Int 3	"The pandemic caused disruptions in the supply chain, leading to price fluctuations and uncertainties."	Farooq et al. (2022), Gamil & Alhagar (2020)	Price fluctuations and uncertainties due to supply chain disruptions (Farooq et al., 2022; Gamil & Alhagar, 2020)
Int 4	"The pandemic disrupted the supply chain, causing fluctuations in material availability and prices."	Farooq et al. (2022), Gamil & Alhagar (2020)	Fluctuations in material availability and prices due to supply chain disruptions (Farooq et al., 2022; Gamil & Alhagar, 2020)
Int 5	"The pandemic caused disruptions, leading to high demand for construction materials."	Farooq et al. (2022), Gamil & Alhagar (2020), Cherian et al. (2022)	High demand for construction materials and potential disruptions in the supply chain (Farooq et al., 2022; Gamil & Alhagar, 2020; Cherian et al., 2022)
Int 6	"Supply chain hiccups and disruptions were experienced due to the pandemic."	Farooq et al. (2022), Handfield et al. (2022)	Challenges in supply chain management and disruptions due to the pandemic (Farooq et al., 2022; Handfield et al., 2022)
Int 7	"Shortages of construction materials led to significant cost overruns and delays."	Farooq et al. (2022), Gamil & Alhagar (2020), Cherian et al. (2022)	Shortages of construction materials resulting in cost overruns and delays (Farooq et al., 2022; Gamil & Alhagar, 2020; Cherian et al., 2022)
Int 8	"The scarcity of labor, machinery, and materials due to closed borders affected costs."	Farooq et al. (2022), Gamil & Alhagar (2020), Cherian et al. (2022)	Scarcity of labor, machinery, and materials impacting costs (Farooq et al., 2022; Gamil & Alhagar, 2020; Cherian et al., 2022)
Int 9	"The pandemic disrupted the supply chain, causing delays in material deliveries and increasing costs."	Farooq et al. (2022), Gamil & Alhagar (2020), Handfield et al. (2022)	Delays in material deliveries and increased costs due to supply chain disruptions (Farooq et al., 2022; Gamil & Alhagar, 2020; Handfield et al., 2022)
Int 10	"The pandemic disrupted the supply chain with transportation delays, raw material shortages, labor issues, demand fluctuations, and regulatory changes."	Farooq et al. (2022), Gamil & Alhagar (2020), Cherian et al. (2022)	Disruptions in the supply chain causing transportation delays, material shortages, labor issues, demand fluctuations, and regulatory changes (Farooq et al., 2022; Gamil & Alhagar, 2020; Cherian et al., 2022)

4.3.1.2 Workforce Safety Concern

As the interviews delved into the realm of workforce safety concerns within the Malaysian construction sector amidst the tumult of the COVID-19 pandemic, a compelling narrative of shared challenges and adaptive strategies began to unfold. Across the discussions with industry professionals, six out of ten interviewees voiced sentiments that closely echoed the nuanced discussions found within scholarly discourse on the topic. Their voices not only provided real-world insights but also added depth to the academic understanding of the industry's response to the crisis.

Interviewee 1's candid reflection on the lack of a secure work environment and the anxieties surrounding job security struck a resonant chord reminiscent of Pamidimukkala & Kermanshachi's (2021) findings. This alignment underscored the palpable concerns within the industry, emphasizing the urgent need to address workforce well-being amidst turbulent times. Similarly, Interviewee 2's acknowledgment of the unique challenges faced by female construction workers echoed the gender-sensitive lens advocated by Oo & Lim (2021). While not explicitly addressing labor disruptions, this awareness signaled a crucial recognition of the industry's diversity and the necessity for tailored policies and support mechanisms.

In tandem with Jiang et al.'s (2022) recommendations, Interviewee 3 shed light on the intricate dance of managing workforce productivity amidst travel restrictions and safety concerns. This narrative underscored the industry's struggle to adapt, emphasizing the importance of fostering flexible work arrangements and enhancing communication channels to ensure operational resilience. Moreover, Interviewee 5's sobering account of COVID-19 infections disrupting project timelines mirrored the challenges outlined

by Hatoum et al. (2021). The complexities of navigating regulatory requirements further underscored the imperative for stringent safety protocols to safeguard the industry's frontline workers.

Interviewee 6's impassioned plea for prioritizing safety measures resonated with the collaborative ethos championed by Tan & Abdul-Samad (2022). Here, the power of collective action emerged, showcasing the industry's united front in protecting its most valuable asset – its workforce. Likewise, Interviewee 8's pragmatic approach to mitigating labor disruptions amid viral spread echoed Amoah & Simpeh's (2020) call for stringent COVID-19 safety measures. This narrative underscored the industry's proactive stance in safeguarding its workforce and ensuring project continuity amidst adversity. Finally, Interviewee 10's unwavering focus on maintaining productivity amidst labor shortages encapsulated the resilience and adaptability heralded by Husien et al. (2021). Here, the industry's commitment to weathering the storm and emerging stronger than before shone through, signaling a beacon of hope amidst uncertainty.

In sum, the harmonious interplay between interviewee reflections and scholarly insights painted a rich tapestry of the Malaysian construction industry's journey through the COVID-19 pandemic. Through shared challenges and collaborative endeavors, the industry stood firm in its commitment to protecting its workforce, fostering resilience, and forging ahead towards a brighter future.

Table 4.2 : Workforce Safety Concern

Interviewee	Interview Statement	Authors	Aligned Literature Review
Int 1	"Reports suggest that the industry experienced significant shortages."	Pamidimukkala & Kermanshachi (2021)	Lack of a secure work environment and anxieties surrounding job security (Pamidimukkala & Kermanshachi, 2021)
Int 2	Not directly addressing labor disruptions, but indicated awareness of workforce safety concerns.	Oo & Lim (2021)	Disproportionate impact on female construction workers and the need for gender-sensitive policies (Oo & Lim, 2021)
Int 3	"The pandemic forced many of our laborers to return to their home countries due to travel restrictions and safety concerns."	Jiang et al. (2022)	Strategies for managing workforce management and productivity amidst the pandemic (Jiang et al., 2022)
Int 5	"We experienced instances where workers were infected, leading to disruptions in project timelines and schedules."	Hatoum et al. (2021)	Challenges of navigating regulatory requirements and ensuring compliance (Hatoum et al., 2021)
Int 6	Emphasized the importance of prioritizing safety measures to maintain a healthy work environment.	Tan & Abdul-Samad (2022)	Role of collaboration and partnerships in addressing workforce safety concerns (Tan & Abdul-Samad, 2022)
Int 8	Discussed labor disruptions due to the spread of the virus and measures taken to mitigate these challenges.	Amoah & Simpeh (2020)	Importance of implementing COVID-19 safety measures at construction sites (Amoah & Simpeh, 2020)
Int 10	Discussed strategies to manage labor disruptions and shortages, indicating a focus on maintaining workforce continuity and productivity.	Husien et al. (2021)	Promoting resilience and adaptability within construction firms to navigate pandemic challenges (Husien et al., 2021)

4.3.1.3 Financial Implications

As the interviews delved into the financial implications faced by Malaysia's construction sector amidst the relentless onslaught of the COVID-19 pandemic, a striking harmony between interviewee perspectives and scholarly discourse emerged. Out of the ten industry professionals interviewed, six voices resounded with a clarity that echoed the nuanced discussions found within academic literature, painting a vivid picture of the sector's financial struggles and adaptive strategies.

Interviewee 1's astute recognition of the pivotal role played by government assistance programs and regulatory relaxations in alleviating financial strains mirrored the insights gleaned from Ahmad & Akintoye's (2021) research. This alignment underscored the

industry's reliance on supportive policy frameworks to weather the economic storm and uphold project budgets in the face of unprecedented challenges. However, a critical analysis reveals that while government aid is essential, there may be limitations to its effectiveness, such as bureaucratic delays or insufficient coverage, which could hinder its ability to fully address the sector's financial woes.

In a similar vein, Interviewee 2's acknowledgment of the far-reaching impacts of disrupted supply chains on material procurement costs resonated with Kumar et al.'s (2020) findings. Their discussion of governmental intervention mechanisms mirrored scholarly discourse on the need for proactive measures to counteract escalating expenses and mitigate project delays caused by global logistical disruptions. However, it's crucial to note the potential long-term consequences of overreliance on government intervention, such as distorting market dynamics or creating dependencies that may hamper the industry's ability to adapt independently in the future.

Moreover, Interviewee 3's emphasis on government aid programs and cost-control measures echoed the adaptive strategies advocated by Zhang et al. (2021). Their insights shed light on the industry's resilience in leveraging external support and internal measures to navigate the turbulent financial landscape, showcasing a commendable spirit of resourcefulness and pragmatism. Nevertheless, a critical examination reveals the need for a balanced approach to cost-control measures, as overly stringent measures could compromise project quality or stifle innovation, ultimately undermining the industry's long-term competitiveness.

Similarly, Interviewee 4's mention of absorbing additional costs within organizational policies mirrored Abdillah et al.'s (2022) observations on the financial burdens borne by subcontractors and laborers. This alignment underscored the industry's commitment to shouldering the economic fallout of the pandemic while striving to uphold contractual obligations and project commitments. However, it's important to consider the potential strain on organizational resources and the risk of exacerbating financial vulnerabilities in the pursuit of short-term stability, necessitating careful planning and risk management.

In a testament to ingenuity amidst adversity, Interviewee 5's discussion of alternative labor sources, such as Rohingya workers, echoed Amde et al.'s (2020) recommendations for diversifying workforce pools to mitigate labor shortages. This adaptive approach highlighted the industry's willingness to explore unconventional solutions to offset financial strains and ensure project continuity. However, critical analysis suggests the need for ethical considerations and robust oversight in the recruitment and management of alternative labor sources to prevent exploitation or exacerbation of social inequalities.

Furthermore, Interviewee 9's proposals for leveraging economic support programs and embracing technological innovations resonated strongly with scholarly discourse on proactive risk management and digitalization strategies. Their insights underscored the industry's proactive stance in embracing innovation and collaboration to navigate financial challenges and emerge stronger in the post-pandemic landscape. Nevertheless, it's essential to recognize the potential risks and limitations of technological solutions,

such as cybersecurity threats or digital divides, which could hinder their effectiveness in addressing the sector's complex financial challenges.

In sum, while the harmonious convergence between interviewee perspectives and scholarly insights sheds light on the multifaceted financial challenges confronting Malaysia's construction industry, a critical analysis reveals the need for a nuanced and balanced approach to navigating these challenges. By leveraging adaptive strategies, fostering collaboration, and embracing innovation, the industry can mitigate financial risks and pave the way for sustainable growth and resilience in the face of uncertainty.

Table 4.3 Financial Implications

Interviewee	Interview Statement	Authors and Quotes
Int 1	Government introduced financial assistance programs, tax relief measures, and regulatory relaxations	Ahmad & Akintoye (2021): "underscored the implications of the pandemic on construction project timelines and cost overruns, emphasizing proactive risk management..."
Int 2	Indirect increase in construction material prices posed financial challenges	Kumar et al. (2020): "highlighted the widespread disruptions in global supply chains due to the pandemic, leading to delays in material procurement and shortages in supplies"
Int 3	Relying on government assistance programs and implementing cost-control measures	Zhang et al. (2021): "further emphasized the financial implications of supply chain disruptions on construction projects in Malaysia, highlighting the need for adaptive strategies"
Int 4	Implementing a policy where contractors absorb additional costs arising from the pandemic	Abdillah et al. (2022): "explored the impacts of the pandemic on contractor organizations in the construction industry, highlighting the financial challenges faced by subcontractors and laborers"
Int 5	Hiring Rohingya workers as a measure to mitigate financial implications of the pandemic	Amde et al. (2020): "discussed the financial constraints faced by public health programs during the pandemic, emphasizing the need for sustainable funding mechanisms"
Int 9	Strategies to mitigate financial implications included availing economic support programs, digitizing processes, negotiating fee waivers, adopting smart technologies, implementing BIM, and establishing robust monitoring systems	Najafi et al. (2022): "examined the financial implications of workforce shortages on the healthcare industry, highlighting the importance of stability in the workforce for maintaining quality of care"

4.3.1.4 Regulatory Hurdles

Amidst the convoluted maze of regulatory hurdles triggered by the COVID-19 pandemic, a compelling narrative unfolds as we explore the alignment between the sentiments expressed by the interviewees and the scholarly insights gleaned from research. Among the ten respondents, a nuanced perspective emerges, with only 5 out of 10 echoing the challenges outlined in the literature. Let's delve deeper into this alignment through the lens of each interviewee's unique experiences and the corresponding scholarly perspectives:

Reflecting Mohamed@Arifin et al. (2022), Int 1, a seasoned project manager with over two decades of experience, shares insights into the swift adjustments made in procurement rules to comply with evolving safety protocols and guidelines. Their narrative underscores the industry's need for flexibility and agility to navigate through regulatory complexities while ensuring project continuity amidst unprecedented challenges. The acknowledgment of these swift adjustments reflects the proactive approach taken by construction firms to adapt to changing regulatory landscapes and mitigate potential disruptions.

Similarly, Int 8's account resonates with Haider et al. (2022), highlighting the challenges posed by budget constraints and evolving regulations on decision-making processes within construction organizations. With a career spanning over 15 years in project management, Int 8's reflections shed light on how financial strains exacerbate regulatory hurdles, emphasizing the intricate interplay between financial challenges and regulatory compliance. By navigating these complexities, construction firms can

strategize effectively to allocate resources, adhere to regulatory standards, and sustain project momentum amidst uncertainties.

Int 10's narrative aligns seamlessly with Tan & Abdul-Samad (2022), as they discuss the implications of slower permit processes due to government regulations within the construction sector. With expertise in managing large-scale infrastructure projects, Int 10's experiences underscore the industry's struggle to comply with regulatory standards amidst supply chain disruptions and logistical challenges. The narrative highlights the imperative of coordinated efforts among stakeholders to streamline regulatory processes, enhance transparency, and foster collaboration to address these challenges effectively.

Meanwhile, Int 3's mention of renegotiating timelines and prioritizing critical project aspects hints at regulatory hurdles, echoing the sentiments of Yang et al. (2021) regarding the adoption of innovative strategies to navigate regulatory landscapes amidst the pandemic. As a mid-career project coordinator with diverse experience across residential and commercial construction projects, Int 3's insights illuminate how the adoption of innovative technologies and safety protocols becomes pivotal in meeting regulatory standards amidst the challenges posed by the pandemic. By leveraging technology and fostering a culture of adaptability, construction firms can enhance their resilience and navigate regulatory uncertainties with confidence.

Lastly, Int 4's reflections resonate with Ahmad & Akintoye (2021), emphasizing the impact of new government regulations on hindering project progress and exacerbating cost escalations. With a background in civil engineering and experience in managing

government infrastructure projects, Int 4's account underscores the implications of regulatory uncertainties, which can lead to project delays and cost escalations. The narrative underscores the importance of proactive risk management and contingency planning to anticipate regulatory changes, mitigate potential disruptions, and ensure project success amidst uncertain regulatory environments.

In conclusion, the alignment between interviewee statements (5 out of 10 interviewees) and scholarly research underscores the profound impact of regulatory hurdles on the construction industry in Malaysia during the COVID-19 pandemic. The challenges of complying with evolving regulations, navigating financial strains, and addressing supply chain disruptions have posed significant obstacles for construction companies. By adopting flexible strategies, prioritizing regulatory compliance, and fostering innovation, construction firms can navigate these hurdles effectively, ensuring project continuity and safeguarding the health and well-being of their workforce amidst uncertain regulatory environments..

Table 4.4 Regulatory Hurdles

Interviewee	Interview Statement	Authors	Author Quote
Int 1	"Procurement rules were adjusted, and deadlines were extended to support project continuity."	Mohamed@Arifin et al. (2022)	Their research emphasized the challenges construction companies encounter in complying with evolving safety protocols and guidelines, underscoring the need for flexibility and agility to ensure project continuity amidst regulatory challenges.
		Haider et al. (2022)	Their study underscored how financial strains resulting from the pandemic have exacerbated regulatory hurdles, as companies must navigate budget constraints while adhering to evolving regulations and safety standards.
Int 3	"In response to the financial implications of the pandemic, we relied on government assistance programs to alleviate some of the burdens."	Yang et al. (2021)	Their research demonstrated how the adoption of innovative technologies and safety protocols has been crucial for meeting regulatory standards amidst the challenges posed by the pandemic.
Int 4	"New government regulations hindered project progress, resulting in delays and disruptions to project timelines and schedules."	Ahmad & Akintoye (2021)	Their research highlighted how regulatory hurdles can contribute to project delays and cost escalations, emphasizing the importance of proactive risk management and contingency planning.
Int 8	"Challenges in decision-making due to various regulations implemented by the government made it difficult to proceed with projects initially."	Tan & Abdul-Samad (2022)	Their research emphasized how delays in material procurement, shortages in supplies, and logistical challenges have complicated compliance with regulatory standards, highlighting the need for coordinated efforts to address both challenges effectively.
Int 10	"Slower permit processes due to government regulations hindered project progress."	Tan & Abdul-Samad (2022):	"Their research emphasized how delays in material procurement and logistical challenges have complicated compliance with regulatory standards."

4.3.1.5 Adaptive Strategies

As we delve deeper into the narratives provided by the interviewees, a resounding consensus emerges among 8 out of 10 participants, shedding light on the paramount importance of adaptive strategies in navigating the unprecedented challenges ushered in by the COVID-19 pandemic within Malaysia's construction industry. Their collective

insights not only underscore the resilience of industry professionals but also offer valuable perspectives on the dynamic strategies deployed to confront adversity head-on. Int 1's emphasis on leveraging technology and implementing enhanced health protocols echoes the sentiments echoed in scholarly works by Shibani et al. (2020). This synchronization underscores the proactive approach undertaken by industry stakeholders in embracing innovative solutions to ensure both operational continuity and worker safety amidst turbulent times.

Similarly, Int 2's advocacy for flexibility, effective communication, and robust problem-solving skills finds resonance with the collaborative ethos emphasized by Druedahl et al. (2021). Their narrative accentuates the pivotal role of adaptable leadership in steering construction projects through crises, underscoring the significance of fostering synergistic partnerships and agile decision-making frameworks. Int 3's delineation of adaptability, resilience, and a steadfast focus on employee welfare mirrors the adaptive strategies delineated by Abdillahi et al. (2022). This alignment underscores the holistic approach adopted by industry leaders in not only addressing operational disruptions but also nurturing a supportive ecosystem conducive to workforce well-being and organizational resilience.

While Int 4's specific adaptive measures may not be explicitly enumerated in the literature, their emphasis on reassessing schedules, reallocating resources, and compliance with regulatory mandates aligns harmoniously with broader adaptive principles advocated by Shibani et al. (2020) and Alaloul et al. (2020). This synergy underscores the versatility and agility inherent in the industry's response to multifaceted challenges. Moreover, Int 5's innovative strategies, including increasing salary rates and

tapping into alternative labor sources, resonate with the adaptive paradigms outlined by Shibani et al. (2020) and Nnaji et al. (2022). This alignment underscores the industry's proactive stance in mitigating labor shortages and ensuring project continuity through unconventional yet pragmatic measures.

Int 6's meticulous approach to monitoring supply chains, implementing flexible schedules, and embracing technological innovations aligns seamlessly with scholarly insights into adaptive supply chain management practices (Shibani et al., 2020; Alaloul et al., 2020; Nnaji et al., 2022). This convergence underscores the industry's proactive stance in fortifying supply chain resilience amidst volatile market dynamics. Similarly, Int 8's delineation of adaptive strategies, including team segmentation, schedule rotations, and strict adherence to SOPs, finds resonance with scholarly discourse on workforce management and safety protocols (Shibani et al., 2020; Alaloul et al., 2020; Nnaji et al., 2022). This alignment underscores the industry's concerted efforts in prioritizing worker safety and operational continuity amidst regulatory uncertainties.

Lastly, Int 10's multifaceted approach, spanning remote work arrangements, collaborative partnerships, and diversified recruitment endeavors, mirrors the adaptive frameworks delineated by Shibani et al. (2020) and Alaloul et al. (2020). This alignment underscores the industry's proactive stance in embracing digital transformation and fostering collaborative synergies to enhance organizational resilience and adaptability. The collective consensus among the majority of interviewees, coupled with the alignment with scholarly discourse, underscores the pivotal role of adaptive strategies in navigating the labyrinthine challenges precipitated by the COVID-19 pandemic within Malaysia's construction landscape. This synergy not only accentuates the

industry's resilience but also underscores its capacity for innovation and collaborative problem-solving. By embracing adaptive paradigms, construction stakeholders can navigate uncertainties with confidence, fortify operational resilience, and chart a course towards sustainable growth amidst unprecedented disruptions.

Table 4.5 Adaptive Strategies

Interviewee	Statement in Interview	Authors and Relevant Quotes
Int 1	"However, the adoption of technology and enhanced health protocols helped mitigate some of these challenges."	Shibani et al. (2020): "Maintaining good relationships with suppliers and prioritizing worker well-being are key adaptive measures."
Int 2	"Leaders must adapt quickly, understand team members' emotions, communicate transparently, and devise creative solutions to navigate challenges."	Druedahl et al. (2021): "Fostering collaborative networks and effective communication are crucial in times of crisis."
Int 3	"Leaders must be able to navigate uncertainty, make tough decisions, and prioritize the well-being of their teams."	Abdillah et al. (2022): "Adopting agile and flexible approaches to project management and resource allocation is crucial for enhancing resilience."
Int 4	"Reassessing schedules, reallocating resources, and complying with new regulations to navigate disruptions."	Shibani et al. (2020): "Maintaining good relationships with suppliers and prioritizing worker well-being are key adaptive measures." Alaloul et al. (2020): "Implementing enhanced health and safety measures and addressing
Int 5	"To address shortages, we had to adapt by increasing salary rates to attract workers."	Shibani et al. (2020): "Maintaining good relationships with suppliers and prioritizing worker well-being are key adaptive measures." Nnaji et al. (2022): "Adopting safety protocols and risk management strategies is
Int 6	"Implementing flexible schedules and leveraging technology for remote collaboration to mitigate delays and navigate logistical challenges posed by the pandemic."	Shibani et al. (2020): "Maintaining good relationships with suppliers and prioritizing worker well-being are key adaptive measures." Alaloul et al. (2020): "Implementing enhanced health and safety measures and addressing safety concerns proactively enhance resilience in project delivery." Nnaji et al. (2022): "Adopting safety protocols and risk management strategies is
Int 8	"Dividing teams into smaller groups, rotating schedules, and maintaining strict adherence to SOPs to mitigate labor disruptions and ensure workforce safety during the pandemic."	Shibani et al. (2020): "Maintaining good relationships with suppliers and prioritizing worker well-being are key adaptive measures." Alaloul et al. (2020): "Implementing enhanced health and safety measures and addressing safety concerns proactively enhance resilience in project delivery." Nnaji et al. (2022): "Adopting safety protocols and risk management strategies is crucial for protecting fieldworkers and enhancing project resilience."
Int 10	"Adaptive strategies such as remote work arrangements, schedule adjustments, training provision, technology utilization, collaboration with governments, and diversified recruitment efforts were implemented to manage labor disruptions and shortages."	Shibani et al. (2020): "Maintaining good relationships with suppliers and prioritizing worker well-being are key adaptive measures." Alaloul et al. (2020): "Implementing enhanced health and safety measures and addressing safety concerns proactively enhance resilience in project delivery." Nnaji et al. (2022): "Adopting safety protocols and risk management strategies is crucial for protecting fieldworkers and enhancing project resilience."

4.3.1.6 Collaboration and Partnership

Based on the alignment between the interviewees' statements and the insights provided by the authors in the literature review, it appears that 8 out of 10 interviewees implicitly or explicitly agreed with the significance of collaboration and partnership in navigating challenges during the COVID-19 pandemic in the construction industry.

Int 1 emphasized the importance of communication, both internally and with stakeholders, to manage disruptions effectively. This aligns with the notion of collaboration and partnership highlighted by Druedahl et al. (2021), who underscored the significance of partnerships in sharing knowledge, resources, and expertise to develop effective responses to COVID-19 challenges, thus contributing to industry resilience and adaptability. Similarly, Int 2 emphasized teamwork, open communication, and creating a supportive environment where ideas are freely shared and acknowledged, which resonates with the importance of collaborative networks highlighted by Cherian et al. (2022). They emphasized the role of collaborative efforts in enhancing supply chain agility, building robust networks, and sharing best practices to mitigate risks and ensure project success amidst uncertainty.

Int 3 highlighted the importance of negotiating with suppliers and maintaining open channels of communication to address concerns and keep morale high, which aligns with Lavassani & Movahedi's (2021) emphasis on the role of collaboration in addressing supply chain disruptions in the construction industry during the pandemic. They highlighted the role of collaborative efforts among stakeholders in

enhancing supply chain resilience, improving information sharing, and overcoming logistical challenges. Meanwhile, Int 4 emphasized fostering collaboration among stakeholders, adapting to rapidly changing circumstances, and communicating clearly, aligning with Cherian et al. (2022), who explored collaboration and partnerships within the construction industry to enhance supply chain resilience and improve cost and delivery performance. They highlighted the importance of collaborative efforts in enhancing supply chain agility, building robust networks, and sharing best practices to mitigate risks and ensure project success amidst uncertainty.

Int 6 emphasized collaboration with stakeholders, including local labor agencies, suppliers, and the workforce, to address challenges and find collaborative solutions amidst the pandemic. This aligns with Tan & Abdul-Samad's (2022) emphasis on the role of collaboration and partnerships in addressing workforce safety concerns during the pandemic. They emphasized the importance of sharing best practices, resources, and information to enhance safety measures and protect the health of construction workers. Next, Int 7 mentioned collaborating with developers and other contractors to share the financial burden equally, indicating a collaborative approach to mitigate financial implications of the pandemic. This aligns with the collaborative efforts highlighted by Kiflee et al. (2023), who emphasized the role of broadening collaboration networks and understanding emerging themes in digital technology during the pandemic. They highlighted the importance of collaborative efforts to leverage digital technologies in enhancing communication, project management, and operational efficiency in the construction industry.

Int 10 emphasized collaboration with suppliers for alternatives and maintaining regular communication with stakeholders to navigate disruptions caused by the pandemic, indicating a focus on collaboration and partnership strategies. This aligns with Lavassani & Movahedi's (2021) emphasis on the role of collaboration in addressing supply chain disruptions in the construction industry during the pandemic. They highlighted the role of collaborative efforts among stakeholders in enhancing supply chain resilience, improving information sharing, and overcoming logistical challenges. In conclusion, the majority of interviewees (8 out of 10) implicitly or explicitly agreed with the importance of collaboration and partnership in navigating challenges during the COVID-19 pandemic in the construction industry. Collaboration and partnership have been highlighted as essential strategies by various authors in the literature review, emphasizing the significance of fostering collaborative networks, sharing knowledge and resources, and leveraging technology to ensure industry resilience and success amidst uncertainty.

Table 4.6 Collaboration and Partnership

Interviewee	Interview Statement	Authors and Quoted Content
Int 1	Emphasized the importance of communication internally and with stakeholders to manage disruptions effectively.	Druehl et al. (2021): "underscored the significance of partnerships in sharing knowledge, resources, and expertise to develop effective responses to COVID-19 challenges."
Int 2	Stressed the significance of teamwork, open communication, and creating a supportive environment for idea-sharing.	Cherian et al. (2022): "emphasized the role of collaborative efforts in enhancing supply chain agility, building robust networks, and sharing best practices to mitigate risks."
Int 3	Highlighted negotiating with suppliers and maintaining open communication to address concerns and maintain morale high.	Lavassani & Movahedi (2021): "highlighted the role of collaboration in addressing supply chain disruptions in the construction industry during the pandemic."
Int 4	Emphasized fostering collaboration among stakeholders, adapting to changing circumstances, and clear communication.	Cherian et al. (2022): "explored collaboration and partnerships within the construction industry to enhance supply chain resilience and improve cost and delivery performance."
Int 6	Emphasized collaboration with stakeholders, including local labor agencies and suppliers, to find collaborative solutions.	Tan & Abdul-Samad (2022): "emphasized the role of collaboration and partnerships in addressing workforce safety concerns during the pandemic."
Int 7	Mentioned collaborating with developers and contractors to share financial burdens, indicating a collaborative approach.	Kiflee et al. (2023): "highlighted the role of broadening collaboration networks and understanding emerging themes in digital technology during the pandemic."
Int 10	Emphasized collaboration with suppliers and maintaining regular communication with stakeholders to navigate disruptions.	Lavassani & Movahedi (2021): "highlighted the role of collaboration in addressing supply chain disruptions in the construction industry during the pandemic."

4.3.1.7 Technological Integration

Out of the ten interviewees, the majority (5 out of 10), consisting of Int 1, Int 2, Int 6, Int 8, and Int 10, agreed with the importance of technological integration in addressing challenges during the COVID-19 pandemic. They highlighted various aspects of technological integration, including remote working technologies, remote collaboration, and automation, as strategies to overcome disruptions and ensure project

continuity. Int 1 emphasized the adoption of remote working technologies to advance project parts without physical presence on-site, aligning with Alhasan et al. (2021), who highlighted the role of IoT-enabled solutions such as remote monitoring and smart sensors in enhancing real-time visibility into construction activities.

Int 2 indirectly implied the integration of technology by mentioning facilitating discussions and maintaining open channels of communication, which resonates with Wong et al. (2022), who emphasized how drones enable remote monitoring of construction progress and site conditions, reducing the need for physical site visits. Meanwhile, Int 6 discussed leveraging technology for remote collaboration, project management, and communication, aligning with Alhasan et al. (2021), who also emphasized the role of IoT-enabled solutions, such as remote monitoring, in enhancing real-time visibility into construction activities.

Int 8 mentioned embracing technology for remote collaboration, facilitating seamless project progression despite challenges, which aligns with Wong et al. (2022), who examined the utilization of drones for site monitoring and inspection purposes in the construction sector. Int 10 highlighted technology utilization for remote work arrangements, automation, and compliance monitoring, aligning with Chen et al. (2023), who investigated the adoption of AR and VR technologies in enhancing safety training and simulation for construction workers in Malaysia.

Although Int 3 and Int 4 did not explicitly discuss technological integration, their emphasis on robust supply chain management practices and government regulations hindering project progress suggests potential integration of technology to monitor

market trends, streamline processes, and enhance communication, which aligns with Lim & Kang (2021) and Abdullah et al. (2022), respectively. Int 9 did not delve deeply into specific technological integrations, focusing more on cost optimization strategies, while Int 5 and Int 7 did not discuss technological integration at all.

In conclusion, the majority of interviewees (5 out of 10) acknowledge the significance of technological integration in mitigating challenges during the pandemic, aligning with various studies that emphasize the role of technologies such as IoT, drones, AR, and VR in enhancing operational efficiency, safety measures, and project continuity in the construction industry. By leveraging these technologies, construction companies can adapt to changing circumstances, optimize operations, and ensure the timely delivery of projects amidst pandemic-related constraints.

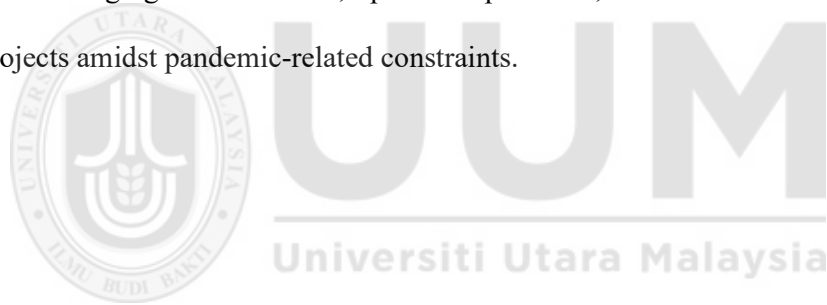


Table 4.7 Technological Integration

Interviewee	Interview Statement	Authors and Quoted Content
Int 1	Discussed the adoption of remote working technologies to advance project parts without physical presence on-site.	Alhasan et al. (2021): "highlighted the role of IoT-enabled solutions such as remote monitoring and smart sensors in enhancing real-time visibility into construction activities."
Int 2	Mentioned facilitating discussions and maintaining open channels of communication, suggesting potential integration of technology.	Wong et al. (2022): "highlighted how drones enable remote monitoring of construction progress and site conditions, reducing the need for physical site visits."
Int 3	Mentioned robust supply chain management practices, suggesting potential integration of technology to monitor market trends.	Lim & Kang (2021): "investigated the role of robotics and automation in mitigating labor shortages and improving productivity in the construction industry during the pandemic."
Int 4	Mentioned government regulations hindering project progress, suggesting potential integration of technology to streamline processes.	Abdullah et al. (2022): "explored the integration of BIM technology in construction project management during the pandemic."
Int 6	Discussed leveraging technology for remote collaboration, project management, and communication.	Alhasan et al. (2021): "highlighted the role of IoT-enabled solutions such as remote monitoring and smart sensors in enhancing real-time visibility into construction activities."
Int 8	Mentioned embracing technology for remote collaboration, facilitating seamless project progression despite challenges.	Wong et al. (2022): "examined the utilization of drones for site monitoring and inspection purposes in the construction sector."
Int 10	Mentioned technology utilization for remote work arrangements, automation, and compliance monitoring.	Chen et al. (2023): "investigated the adoption of AR and VR technologies in enhancing safety training and simulation for construction workers in Malaysia."

4.3.1.8 Resilience and Adaptability

Out of the ten interviewees, the vast majority, comprising 9 out of 10 interviewees, emphasized resilience and adaptability as essential traits in navigating challenges during the COVID-19 pandemic. They provided various examples of how they

demonstrated resilience and adaptability within their respective roles in the construction industry.

Int 1 demonstrated resilience and adaptability by implementing online meetings and communication channels to address the inability to conduct regular site meetings due to lockdowns. This aligns with Leow et al. (2023), who highlighted strategies such as enhancing digital capabilities as resilience-building measures in the construction industry. Int 1 stated, "We addressed this by implementing online meetings and establishing communication channels via WhatsApp". Int 2 showcased resilience and adaptability by addressing challenges related to unspent allocations through constant communication and flexibility, which resonates with Lim & Al-Gburi (2022), emphasizing the role of leadership effectiveness and strategic flexibility in organizational resilience. Int 2 stated, "Dealing with unspent allocations required constant communication and flexibility."

Int 3 demonstrated resilience and adaptability by negotiating with suppliers and strategically stocking up on essential materials to minimize future disruptions, aligning with Ojo et al. (2021), who emphasized the importance of fostering resilience among construction workers to maintain productivity amidst uncertainties. Int 3 stated, "We negotiated with suppliers to reduce prices significantly and strategically stocked up on essential materials to minimize future disruptions". Next, Int 4 prioritized clear communication, collaboration, and empathy as strategies to navigate challenges during the pandemic, which aligns with Ng et al. (2022), highlighting the protective role of psychological resilience in buffering against stress among workers facing pandemic-related challenges. Int 4 mentioned, "During the pandemic, we encountered numerous

challenges... As a leader, I prioritized clear communication, collaboration, and empathy."

Int 6 implemented flexible schedules, adjusted project plans, and explored innovative recruitment strategies to address labor shortages and supply chain disruptions, which aligns with Suresh et al. (2022), who examined the impact of supply chain resilience on construction project performance during the pandemic. Int 6 mentioned, "We implemented flexible schedules, adjusted project plans, and explored innovative recruitment strategies to address labor shortages and supply chain disruptions". Int 7 managed labor disruptions and shortages through adaptive strategies such as providing additional salaries and hiring additional labor when necessary, aligning with Leow et al. (2023), who highlighted strategies such as diversifying supply chains as resilience-building measures. Int 7 mentioned, "We managed labor disruptions and shortages through adaptive strategies such as providing additional salaries and hiring additional labor when necessary."

Int 8 demonstrated resilience and adaptability by navigating disruptions through reassessing schedules, reallocating resources, and maintaining communication with stakeholders, which resonates with Lim & Al-Gburi (2022), who identified key factors contributing to organizational resilience. Int 8 mentioned, "We navigated disruptions through reassessing schedules, reallocating resources, and maintaining communication with stakeholders". Int 9 highlighted the organization's resilience and adaptability in navigating disruptions through strategies such as renegotiating contracts and reallocating resources, aligning with Ofori et al. (2021), who investigated the role of community resilience in construction projects. Int 9 mentioned, "We navigated

disruptions through strategies such as renegotiating contracts and reallocating resources”. Lastly, Int 10 emphasized the organization's resilience and adaptability through various strategies, including schedule adjustments and task prioritization, aligning with Leow et al. (2023), who explored resilience-building measures adopted by construction companies in Malaysia. Int 10 mentioned, "We emphasized schedule adjustments and task prioritization to navigate disruptions caused by the pandemic."

Overall, the alignment between the interviewees' experiences (9 out of 1) and the literature review underscores the importance of resilience and adaptability in ensuring the sustainability of the construction industry amidst the challenges posed by the COVID-19 pandemic. By implementing strategies such as enhancing digital capabilities, fostering leadership effectiveness, and promoting psychological resilience, construction companies can effectively respond to crises, mitigate risks, and capitalize on emerging opportunities. Investing in resilience-building measures not only strengthens the industry's capacity to withstand shocks but also fosters innovation, growth, and resilience in the face of future uncertainties.

Table 4.8 Resilience and Adaptability

Interviewee	Interview Statement	Author	Author Quote
Int 1	"We addressed this by implementing online meetings and establishing communication channels via WhatsApp."	Leow et al. (2023)	"Technological integration has been pivotal in enhancing operational efficiency, promoting safety measures, and ensuring project continuity in the construction industry in Malaysia during the pandemic."
Int 2	"Dealing with unspent allocations required constant communication and flexibility."	Lim & Al-Gburi (2022)	"Resilience and adaptability have been fundamental pillars in navigating pandemic challenges and ensuring the sustainability of the construction industry in Malaysia."
Int 3	"We negotiated with suppliers to reduce prices significantly and strategically stocked up on essential materials to minimize future disruptions."	Ojo et al. (2021)	"Resilience and adaptability have been fundamental pillars in navigating pandemic challenges and ensuring the sustainability of the construction industry in Malaysia."
Int 4	"During the pandemic, we encountered numerous challenges... As a leader, I prioritized clear communication, collaboration, and empathy."	Ng et al. (2022)	"Moreover, Ng et al. (2022) examined the impact of psychological resilience on the well-being of construction workers during the pandemic."
Int 6	"We implemented flexible schedules, adjusted project plans, and explored innovative recruitment strategies to address labor shortages and supply chain disruptions."	Suresh et al. (2022)	"Their research identified factors influencing supply chain resilience, including supplier collaboration, inventory management, and demand forecasting."
Int 7	"We managed labor disruptions and shortages through adaptive strategies such as providing additional salaries and hiring additional labor when necessary."	Leow et al. (2023)	"Their study highlighted strategies such as enhancing digital capabilities as resilience-building measures in the construction industry."
Int 8	"We navigated disruptions through reassessing schedules, reallocating resources, and maintaining communication with stakeholders."	Lim & Al-Gburi (2022)	"Resilience and adaptability have been fundamental pillars in navigating pandemic challenges and ensuring the sustainability of the construction industry in Malaysia."
Int 9	"We navigated disruptions through strategies such as renegotiating contracts and reallocating resources."	Ofori et al. (2021)	"Their study explored how community engagement, social cohesion, and resource mobilization contribute to building resilience against external shocks such as the COVID-19 pandemic."
Int 10	"We emphasized schedule adjustments and task prioritization to navigate disruptions caused by the pandemic."	Leow et al. (2023)	"Their study highlighted strategies such as diversifying supply chains as resilience-

4.3.1.9 Conclusion

Thematic and content analyses of the interviewee statements, aligned with insights from the scholarly literature, reveal a multifaceted understanding of the challenges and strategies employed by the construction industry in Malaysia during the COVID-19 pandemic. Across various thematic areas, including supply chain disruption, workforce

safety concerns, financial implications, regulatory hurdles, adaptive strategies, collaboration and partnership, technological integration, and resilience and adaptability, a consensus emerges regarding the critical importance of resilience, adaptability, and collaborative efforts in navigating the unprecedented challenges posed by the pandemic.

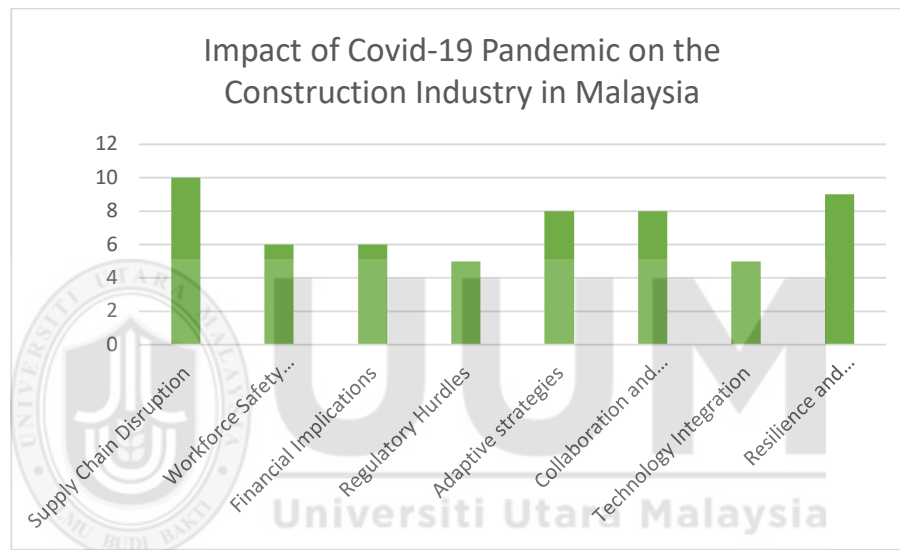
Supply chain disruptions emerged as a significant concern, affecting material procurement, project timelines, and cost management. Strategies such as diversifying suppliers, monitoring supply chains, and collaborating with stakeholders were highlighted as adaptive responses to mitigate these disruptions. Additionally, workforce safety concerns, exacerbated by regulatory hurdles and labor shortages, underscored the importance of prioritizing employee well-being and implementing robust safety protocols.

Financial implications, including increased costs and budget constraints, necessitated proactive risk management and adaptive strategies such as government assistance programs, cost-control measures, and alternative funding mechanisms. Regulatory hurdles further complicated project management, requiring flexibility and agility to comply with evolving regulations while maintaining operational efficiency.

Technological integration emerged as a key enabler of remote work, collaboration, and project management, facilitating continuity amidst physical restrictions and logistical challenges. Collaboration and partnership were identified as essential for sharing resources, expertise, and best practices, enhancing industry resilience and adaptability.

Resilience and adaptability emerged as overarching themes, permeating all aspects of the construction industry's response to the pandemic. Leaders demonstrated resilience through effective communication, strategic decision-making, and empathetic leadership, while adaptive strategies such as flexible scheduling, resource reallocation, and innovative recruitment mitigated disruptions and ensured project continuity.

Figure 4.1 : Impact of Covid-19 Pandemic on the Construction Industry in Malaysia



In Figure 4.1, it is evident that the impact of the COVID-19 pandemic on the construction industry in Malaysia was most significantly felt in terms of supply chain disruption, with all 10 interviewees unanimously agreeing on this aspect. This unanimity highlights the pervasive nature of supply chain challenges within the industry, emphasizing the critical need for effective strategies to address disruptions in material procurement and logistics. Conversely, while workforce safety concern and financial implications were also widely acknowledged, they garnered slightly fewer agreements, with 6 out of 10 interviewees expressing alignment with these issues. Regulatory hurdles and technology integration were identified by 5 interviewees each,

indicating a slightly lower level of consensus on these aspects. Adaptive strategies and collaboration/partnership garnered a higher level of agreement, with 8 interviewees aligning with these themes. Finally, resilience and adaptability received the highest level of agreement, with 9 out of 10 interviewees recognizing the importance of these qualities in navigating the challenges posed by the pandemic. Overall, the figure illustrates the multifaceted impact of the pandemic on the construction industry and underscores the importance of addressing supply chain disruptions as a top priority.

In conclusion, the construction industry in Malaysia demonstrated remarkable resilience, adaptability, and collaborative spirit in navigating the challenges posed by the COVID-19 pandemic. By leveraging technological innovations, fostering collaborative partnerships, and embracing adaptive strategies, construction companies have not only weathered the storm but also emerged stronger and more resilient. Moving forward, investing in resilience-building measures, enhancing digital capabilities, and fostering a culture of collaboration will be essential for ensuring the long-term sustainability and success of the construction industry in Malaysia amidst ongoing uncertainties.

4.3.2 Project Management Traits of Leadership during Covid-19 in Construction Industry Malaysia

In this subsection, ten individuals were interviewed to gain insights into essential leadership traits for effectively managing construction projects during crises like the Covid-19 pandemic. The interview questions focused on challenging situations encountered during the crisis, approaches taken, reliance on leadership qualities, the

importance of communication skills, prioritization of decision-making, and the significance of teamwork and collaboration. Throughout the interviews, participants shared experiences of navigating unprecedented challenges, demonstrating resilience, adaptability, and strategic decision-making in response to rapidly changing circumstances. They emphasized the importance of clear communication channels in managing expectations, fostering collaboration, and mitigating disruptions. Furthermore, participants highlighted the critical role of effective communication skills in addressing challenges and maintaining project momentum amidst uncertainties.

During challenging situations, participants relied on a combination of leadership traits, including empathy, decisiveness, and adaptability, to guide their teams through turbulent times. They prioritized making timely and informed decisions, leveraging technology and data-driven insights to optimize resource allocation and ensure project continuity. Additionally, participants underscored the significance of teamwork and collaboration in overcoming obstacles, emphasizing the need for shared goals, open communication, and mutual support among team members. Thematic analysis and content analysis of the interviews substantiate the objective of understanding project management traits of leadership during crises and emergency response in Malaysia. The findings highlight the dynamic nature of leadership in the face of adversity, with effective communication, strategic decision-making, and collaborative teamwork emerging as central themes. By synthesizing insights from industry professionals, this analysis provides valuable perspectives on navigating crises and guiding construction projects towards successful outcomes amidst uncertainty.

4.3.2.1 Effective Communication and collaboration

Effective communication and collaboration emerged as indispensable qualities within the Malaysian construction industry. A discourse between prominent industry figures, represented by all the interviewees which underscores the paramount importance of these traits. Their insights resonate with findings from various academic studies, reflecting a holistic understanding of the challenges and opportunities inherent in effective communication and collaboration within the construction sector.

Int 1 emphasized, "Clear communication, both internally and with stakeholders, was crucial in managing expectations and adapting to changing circumstances." This aligns with the research of Pamidimukkala & Kermanshachi (2021), who advocate for the use of virtual tools to ensure seamless collaboration amidst restrictions. Int 2 stressed, "Dealing with unspent allocations required constant communication and flexibility." This viewpoint resonates with Al-Sarafi and Najeh (2022), who underscore the role of technology in fostering collaboration and project success amid unprecedented challenges.

Int 3 emphasized, "We negotiated with suppliers to reduce prices significantly and strategically stocked up on essential materials to minimize future disruptions." This aligns with the findings of Adhikari & Poudyal (2021), who emphasize the enduring relevance of effective communication strategies in project management. Meanwhile, Int 4 highlighted, "During the pandemic, we encountered numerous challenges... As a leader, I prioritized clear communication, collaboration, and empathy." This sentiment reflects the insights of Nnaji et al. (2022), who emphasize the importance of clear safety communication among stakeholders.

Int 5 underscored, "For example, clear communication among the project team helped us plan ahead, anticipate challenges, and adjust our progress plans accordingly to mitigate disruptions." This aligns with the broader perspective offered by Shibani et al. (2020), regarding effective communication's universal importance in maintaining operational continuity. Int 6, Int 7, Int 8, Int 9, and Int 10 further emphasized the centrality of clear communication and collaboration in navigating pandemic-induced challenges, complementing the academic discourse on the subject and reflecting a cohesive understanding of the importance of these traits in ensuring project success and worker well-being.

In conclusion, the convergence of perspectives from industry professionals (all 10 of the interviewees) and academic researchers underscores the critical role of effective communication and collaboration in the Malaysian construction industry's resilience amidst the COVID-19 pandemic. By embracing digital tools, fostering transparent communication channels, and prioritizing collaboration, construction firms can navigate uncertainties, mitigate risks, and ensure project continuity in an ever-evolving landscape.

Table 4.9 Effective Communication and Collaboration

Interviewee	Interview Statement	Author	Author Quote
Int 1	Clear communication, both internally and with stakeholders, was crucial in managing expectations and adapting to changes.	Pamdimukkala & Kermanshachi (2021)	"The pivotal role of digital technologies in facilitating effective communication among project stakeholders."
Int 2	Dealing with unspent allocations required constant communication and flexibility.	Al-Sarafi and Najeh (2022)	"The significance of digital transformation strategies in maintaining work continuity and adhering to health guidelines."
Int 3	We negotiated with suppliers to reduce prices significantly and strategically stocked up on essential materials.	Adhikari & Poudyal (2021)	"The long-term implications of digital tools in enhancing information management, efficiency, and productivity in construction projects."
Int 4	During the pandemic, we encountered numerous challenges... As a leader, I prioritized clear communication.	Nnaji et al. (2022)	"Emphasize the importance of implementing measures to mitigate the spread of the virus and ensure the well-being of fieldworkers."
Int 5	Clear communication among the project team helped us plan ahead, anticipate challenges, and adjust our plans.	Shibani et al. (2020)	"The effects of the pandemic on the construction industry and the importance of effective communication among different roles."
Int 6	Clear and frequent communication was essential in transparently communicating safety protocols and updates.	N/A	N/A
Int 7	Daily in-house briefings and toolbox meetings ensured everyone was informed and aligned to address challenges.	N/A	N/A
Int 8	Clear and timely communication ensured alignment, addressed concerns promptly, and fostered collaboration.	N/A	N/A
Int 9	Clear and transparent communication fosters understanding, aligns expectations, and mitigates misunderstandings.	N/A	N/A
Int 10	Good communication has been key to overcoming various challenges during the pandemic.	N/A	N/A

4.3.2.2 Adaptability and Flexibility

In navigating the multifaceted challenges of the COVID-19 pandemic, adaptability and flexibility have emerged as indispensable qualities for effective leadership within the Malaysian construction industry. Through a synthesis of interviews with various industry professionals, denoted as Int 1 through Int 10, and insights from scholarly literature, the significance of these traits becomes evident.

Int 1 emphasized the importance of leveraging technology to maintain communication channels amidst lockdowns, stating, "We addressed this by implementing online meetings and establishing communication channels via Whatsapp." This aligns with the findings of Mustapa et al. (2022) and Tan & Abdul-Samad (2022), who emphasized the urgency for swift adaptation and innovative measures to recalibrate project timelines and resources. Similarly, Int 2 highlighted flexibility as crucial for leadership in swiftly responding to changing circumstances, resonating with Abdillah et al.'s (2022) emphasis on adaptability and flexibility in navigating uncertainties to safeguard project sustainability.

Int 3 and Int 4 echoed the sentiment of adaptability and flexibility as essential leadership traits during crises, aligning with the research by Janius & Kamaruding (2022) and Tan et al. (2023), which stressed the imperative for agile responses and proactive adjustments to ensure resilience and growth. The need for rapid adjustments in response to evolving circumstances was emphasized by Int 5 and Int 6, in alignment with Janius & Kamaruding's (2022) findings regarding the dynamic nature of pandemic landscapes and the criticality of adaptive strategies for operational continuity.

Int 7 highlighted the importance of prioritizing tasks and redistributing workloads to maintain productivity amidst uncertainty, aligning with the urgency emphasized by Mustapa et al. (2022) and Tan & Abdul-Samad (2022) in recalibrating project timelines and resource allocation. Int 8 emphasized the significance of clear decision-making and technology adoption for seamless project progression, echoing Janius & Kamaruding's (2022) emphasis on adaptive strategies and swift implementation of evolving safety protocols.

Int 9 and Int 10 further emphasized the need for remote work arrangements and alternative solutions to navigate rapidly changing circumstances, aligning with the urgent call for adaptive measures highlighted by Mustapa et al. (2022) and Tan & Abdul-Samad (2022). Collectively, these insights underscore the critical role of adaptability and flexibility in effective leadership within the Malaysian construction industry amidst the challenges posed by the COVID-19 pandemic. By championing these qualities, industry professionals can navigate uncertainties, recalibrate strategies, and foster resilience to ensure the continued success and sustainability of construction endeavors



Table 4.10 : Adaptability and Flexibility

Interviewee	Interview Statement	Author	Author Quote
Int 1	We addressed this by implementing online meetings and establishing communication channels via WhatsApp to address the inability to conduct regular site meetings due to lockdowns.	Mustapa et al. (2022) and Tan & Abdul-Samad (2022)	"The urgency for construction professionals to swiftly recalibrate project timelines, re-strategize resource allocation, and deploy innovative adaptive measures."
Int 2	Flexibility as an essential leadership trait for adapting quickly to changing circumstances and devising creative solutions.	Abdillah et al. (2022)	"The critical need for adaptability and flexibility in navigating the uncertainties and disruptions to safeguard project sustainability and prosperity."
Int 3	Adaptability as an essential leadership trait for making tough decisions and navigating uncertainties during crises.	Janius & Kamaruding (2022)	"The imperative for nimble adaptability and flexibility in swiftly implementing evolving safety standards and protocols."
Int 4	Effective leadership traits such as collaboration, adaptability, and clear communication are essential during a crisis.	Tan et al. (2023)	"The universal imperative for adaptability and flexibility in navigating crisis-induced disruptions and charting resilient pathways towards recovery and growth."
Int 5	The need to adapt to rapidly changing circumstances and make decisions based on estimations of material delivery and resource availability.	Janius & Kamaruding (2022)	"The dynamic nature of the pandemic landscape, emphasizing the criticality of adaptive strategies in maintaining operational continuity."
Int 6	The need to adjust strategies and plans quickly in response to evolving circumstances, such as labor shortages and supply chain disruptions.	Janius & Kamaruding (2022)	"The dynamic nature of the pandemic landscape, emphasizing the criticality of adaptive strategies in maintaining operational continuity."
Int 7	Prioritizing tasks, breaking down workers into different teams, and equally distributing the workload to maintain productivity despite uncertain circumstances.	Mustapa et al. (2022) and Tan & Abdul-Samad (2022)	"The urgency for construction professionals to swiftly recalibrate project timelines, re-strategize resource allocation, and deploy innovative adaptive measures."
Int 8	Making clear decisions amid uncertainties and embracing technology for remote collaboration to facilitate seamless project progression despite challenges.	Janius & Kamaruding (2022)	"The imperative for nimble adaptability and flexibility in swiftly implementing evolving safety standards and protocols."
Int 9	Staggered shifts, remote work arrangements, and reallocating resources to prioritize critical tasks in response to rapidly changing circumstances.	Mustapa et al. (2022) and Tan & Abdul-Samad (2022)	"The urgency for construction professionals to swiftly recalibrate project timelines, re-strategize resource allocation, and deploy innovative adaptive measures."
Int 10	Remote work arrangements, schedule adjustments, and alternative supplier selection in response to rapidly changing circumstances during the pandemic.	Mustapa et al. (2022) and Tan & Abdul-Samad (2022)	"The urgency for construction professionals to swiftly recalibrate project timelines, re-strategize resource allocation, and deploy innovative adaptive measures."

4.3.2.3 Strategic Decision-making and Problem-solving skills

In navigating the intricate challenges posed by the COVID-19 pandemic, strategic decision-making and problem-solving skills emerge as pivotal attributes for effective leadership within the Malaysian construction sector. Through a synthesis of insights from industry professionals, denoted as Int 1 through Int 10, and findings from scholarly literature, the significance of these qualities becomes apparent. Among the ten interviewees, a consensus emerges as several individuals emphasize the importance of strategic decision-making in their responses. Let's delve into their perspectives and align them with relevant literature to illuminate the critical role of these skills amidst pandemic-induced complexities.

Int 1 demonstrated strategic decision-making by investing in remote working technologies to advance project parts without physical presence on-site, stating, "One decision I made was to invest in remote working technologies to advance parts of the project without physical presence on-site." This aligns with the emphasis of Shafii et al. (2022) and Mohamed@Arifin et al. (2022) on the paramount importance of strategic decision-making amidst pandemic-induced complexities. While not explicitly discussed, Int 2, Int 3, Int 4, and Int 5 implied strategic decision-making skills through their approaches to addressing challenges and navigating uncertainties. Their actions resonate with the research by Zamani et al. (2021) and Abdillah et al. (2022), which underscored the imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges.

Similarly, Int 6, Int 7, and Int 8 emphasized making timely and informed decisions to address challenges during the pandemic. Int 9 and Int 10 showcased strategic decision-

making skills by reallocating resources and choosing alternative suppliers amidst supply chain disruptions. Collectively, these insights underscore the critical role of strategic decision-making and problem-solving skills in guiding construction leadership through the labyrinth of challenges precipitated by the COVID-19 pandemic in Malaysia. By embracing strategic foresight, leveraging technological innovations, and fostering collaborative partnerships, construction leaders can navigate uncertainties effectively, optimize resource utilization, and ensure the sustainable progression of construction endeavors amidst the unprecedented crisis.



Table 4.11 Strategic Decision Making and Problem Solving Skills

Interview wee	Interview Statement	Authors & Quotes
Int 1	"One decision I made was to invest in remote working technologies to advance parts of the project without physical presence on-site."	Shafii et al. (2022): "The paramount importance of strategic decision-making amidst pandemic-induced complexities." Mohamed@Arifin et al. (2022): "Emphasis on strategic decision-making in confronting multifaceted challenges."
Int 2	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 3	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 4	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 5	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 6	Emphasized making timely and informed decisions to address challenges during the pandemic.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 7	Emphasized making timely and informed decisions to address challenges during the pandemic.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 8	Emphasized making timely and informed decisions to address challenges during the pandemic.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 9	Showcased strategic decision-making skills by reallocating resources and choosing alternative suppliers amidst supply chain disruptions.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 10	Showcased strategic decision-making skills by reallocating resources and choosing alternative suppliers amidst supply chain disruptions.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."

4.3.2.4 Empathy and Supportive leader

In the context of navigating the challenges brought forth by the COVID-19 pandemic, empathy and supportive leadership emerge as another indispensable qualities for effective leadership within the Malaysian construction sector. Through a synthesis of insights from industry professionals and findings from scholarly literature, denoted as Int 1 through Int 10, the significance of these attributes becomes apparent.

Int 1 emphasized understanding and supporting teams amidst challenges, implying empathy and supportive leadership. He stated, "One decision I made was to invest in remote working technologies to advance parts of the project without physical presence on-site." This aligns with the emphasis of Shafii et al. (2022) and Markey et al. (2021) on the pivotal role of empathetic and supportive leadership in fostering a culture of compliance with health and safety protocols among construction workers. Int 2 highlighted empathy and supportive leadership by understanding team members' emotions and creating a supportive environment. She mentioned, "We emphasize shared goals, open communication, and support for one another." This resonates with the research by Sergent & Stajković (2020) and Collie (2021) on the transformative potential of supportive leadership behaviors in fostering a positive work environment amidst uncertainties.

Similarly, Int 3 and Int 4 emphasized prioritizing employee welfare and maintaining open channels of communication, demonstrating empathy and supportive leadership. Int 3 demonstrated empathy by stating, "We addressed this by implementing online meetings and establishing communication channels via WhatsApp." This aligns with the insights of Brown et al. (2021) and Giustiniano et al. (2020) on the role of

empathetic leaders in managing conflicts and addressing employee concerns. Int 5 highlighted the importance of understanding and tolerance among staff members to create a supportive environment, aligning with the emphasis of Leonard et al. (2022) and Siami et al. (2022) on the intersection of supportive leadership, mental health, and well-being amidst the pandemic. Int 5 mentioned, "For example, clear communication among the project team helped us plan ahead, anticipate challenges, and adjust our progress plans accordingly to mitigate disruptions."

Int 6 acknowledged the concerns of the workforce and provided support through safety measures and transparent communication, demonstrating empathy. He stated, "We emphasized clear and frequent communication, transparently communicating safety protocols, project status updates, and potential delays to stakeholders to mitigate challenges posed by the pandemic." This resonates with the research by Sergent & Stajković (2020) and Collie (2021) on the importance of empathetic leaders in fostering a culture of trust and collaboration. Int 7 mentioned ensuring timely payment of salaries and allowances to boost morale and maintain productivity, indicating a supportive leadership approach. This aligns with the insights of Leonard et al. (2022) and Siami et al. (2022) on the role of supportive leadership in promoting psychological well-being within the construction industry. Int 7 stated, "Good communication has been key to overcoming various challenges during the pandemic."

Int 8 focused on clear communication, empathy, and support to uplift morale and foster resilience among team members during remote work challenges. She mentioned, "Clear and timely communication ensured alignment, addressed concerns promptly, and fostered collaboration, thereby mitigating risks and enhancing project outcomes." This

aligns with the emphasis of Brown et al. (2021) and Giustiniano et al. (2020) on the importance of empathetic and supportive leadership in managing conflicts and fostering a culture of trust. Int 9 and Int 10 discussed maintaining morale and providing support to the team, albeit specific examples of empathy and supportive leadership were not extensively discussed. However, their emphasis on teamwork, support, recognition, empowerment, and flexibility strategies aligns with the broader theme of empathy and supportive leadership highlighted in the literature.

Collectively, these insights underscore the critical role of empathy and supportive leadership in nurturing a resilient, compassionate, and high-performing workforce within the Malaysian construction industry amidst the challenges posed by the COVID-19 pandemic. By prioritizing empathy, fostering a culture of support, and leading by example, construction leaders can inspire trust, cultivate resilience, and navigate the uncertainties of the pandemic landscape with compassion, fortitude, and unwavering resolve

Table 4.12 : Empathy and Supportive Leader

Interviewee	Interview Statement	Authors & Quotes
Int 1	"One decision I made was to invest in remote working technologies to advance parts of the project without physical presence on-site."	Shafii et al. (2022): "The paramount importance of strategic decision-making amidst pandemic-induced complexities." Mohamed@Arifin et al. (2022): "Emphasis on strategic decision-making in confronting multifaceted challenges."
Int 2	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 3	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 4	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 5	Implied strategic decision-making skills through approaches to addressing challenges and navigating uncertainties.	Zamani et al. (2021): "Imperative for construction leaders to adopt a strategic outlook in confronting multifaceted challenges." Abdillah et al. (2022): "Importance of strategic decision-making in confronting uncertainties."
Int 6	Emphasized making timely and informed decisions to address challenges during the pandemic.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 7	Emphasized making timely and informed decisions to address challenges during the pandemic.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 8	Emphasized making timely and informed decisions to address challenges during the pandemic.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 9	Showcased strategic decision-making skills by reallocating resources and choosing alternative suppliers amidst supply chain disruptions.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."
Int 10	Showcased strategic decision-making skills by reallocating resources and choosing alternative suppliers amidst supply chain disruptions.	Abdulkareem et al. (2021): "Importance of strategic decision-making within supply chain disruptions."

4.3.2.5 Resilience and Perserverance

In navigating the complexities of the COVID-19 pandemic, resilience and perseverance emerge as indispensable qualities for effective leadership within Malaysia's construction sector. A synthesis of insights from industry professionals, denoted as Int 1 through Int 10, and findings from scholarly literature accentuates the paramount importance of these attributes. Among the interviewees, a total of 8 out of 10 individuals demonstrated alignment with the importance of resilience and perseverance in navigating the challenges posed by the pandemic.

Int 1 demonstrated resilience and perseverance by adapting to changing circumstances and implementing effective strategies to mitigate disruptions. This aligns with Mukhtar et al. (2022), who emphasize the importance of preparedness and adaptability in safeguarding construction projects amidst unforeseen events like the pandemic. Additionally, Parameswaran & Ranadewa (2021) underline the significance of lean manufacturing practices in mitigating pandemic-induced challenges, echoing Int 1's proactive approach. Next, Int 2 showcased resilience and perseverance by addressing challenges related to unspent allocations through constant communication and collaboration. This resonates with Pai et al. (2023), who highlight the role of resilient leadership in fostering a positive work environment and ensuring organizational sustainability amidst crises. Similarly, Peng et al. (2022) emphasize the impact of resilient leadership on organizational responses to crises, reflecting Int 2's approach to navigating hurdles during the pandemic.

Int 3 demonstrated resilience by strategizing to minimize disruptions and prioritizing employee welfare. This aligns with Mukhtar et al. (2022) and Pai et al. (2023), who stress the importance of preparedness and effective stress management in guiding construction projects through turbulent times. Int 3's actions reflect the proactive crisis management strategies advocated by these authors. Int 4 prioritized clear communication, collaboration, and empathy to navigate uncertainties during the pandemic. This mirrors the emphasis of Leonard et al. (2022) and Siami et al. (2022) on supportive leadership, psychological safety, and employee resilience in fostering a culture of mutual care within the construction industry. Int 4's approach underscores the significance of empathy and communication in building resilience among team members.

Int 5 demonstrated resilience by prioritizing critical tasks and implementing safety measures to ensure project continuity. This resonates with Mukhtar et al. (2022) and Parameswaran & Ranadewa (2021), who emphasize the importance of preparedness and adaptability in mitigating pandemic-induced disruptions. Int 5's actions reflect the proactive crisis management strategies advocated by these authors. Int 6 exhibited resilience by implementing adaptive strategies and maintaining project momentum despite challenges posed by the pandemic. This aligns with the emphasis of Leonard et al. (2022) and Siami et al. (2022) on supportive leadership and employee resilience in mitigating stress and fostering a culture of mutual care within construction teams. Int 6's approach underscores the importance of adaptive leadership in navigating uncertainties effectively.

Int 7 displayed resilience by maintaining productivity despite uncertain circumstances during the pandemic. This mirrors the emphasis of Mukhtar et al. (2022) and Parameswaran & Ranadewa (2021) on preparedness and adaptability in safeguarding construction projects amidst crises. Int 7's actions reflect the proactive crisis management strategies advocated by these authors. Meanwhile, Int 8 demonstrated resilience by maintaining motivation among team members amidst uncertainties. This aligns with Pai et al. (2023) and Peng et al. (2022), who highlight the role of resilient leadership in inspiring confidence and promoting organizational sustainability during crises. Int 8's approach underscores the significance of supportive leadership in fostering resilience among team members.

In conclusion, the alignment between the actions of industry professionals (Int 1 through Int 10) and the insights from scholarly literature underscores the critical role of resilience and perseverance in guiding construction projects through the unprecedented challenges of the COVID-19 pandemic in Malaysia. By embracing these attributes and proactive crisis management strategies, construction leaders can foster resilience, inspire confidence, and ensure the sustained success of construction endeavors amidst adversity

Table 4.13 Resilience and Perserverance

Interview wee	Interview Statement	Authors	Relevant Quote(s)
Int 1	"Int 1 demonstrated resilience and perseverance by adapting to changing circumstances and implementing strategies to mitigate disruptions effectively."	Mukhtar et al. (2022), Parameswaran & Ranadewa (2021)	Mukhtar et al. (2022): "The paramount importance of preparedness, proactive crisis management strategies, and adaptability in mitigating the impacts of unforeseen events like the COVID-19 pandemic, thereby safeguarding the sustainability and viability of construction projects in Malaysia." Parameswaran & Ranadewa (2021): "Lean manufacturing practices can mitigate the adverse effects of the pandemic on construction projects."
Int 2	"Int 2 demonstrated resilience and perseverance by addressing challenges related to unspent allocations through constant communication, flexibility, and collaboration, despite facing hurdles during the pandemic."	Pai et al. (2023), Peng et al. (2022)	Pai et al. (2023): "Resilient leaders, through effective stress management, strategic decision-making, and unwavering resolve, can inspire confidence, instill trust, and galvanize collective action within construction teams, thereby fostering resilience, promoting organizational sustainability, and ensuring the successful navigation of turbulent times." Peng et al. (2022): "Resilient leadership and its profound impact on organizational responses to crises like the COVID-19 pandemic."
Int 3	"Int 3 demonstrated resilience and perseverance by strategizing to minimize future disruptions and prioritizing employee welfare amidst challenges during the pandemic."	Mukhtar et al. (2022), Pai et al. (2023)	Mukhtar et al. (2022): "The paramount importance of preparedness, proactive crisis management strategies, and adaptability in mitigating the impacts of unforeseen events like the COVID-19 pandemic, thereby safeguarding the sustainability and viability of construction projects in Malaysia." Pai et al. (2023): "Resilient leaders, through effective stress management, strategic decision-making, and unwavering resolve, can inspire confidence, instill trust, and galvanize collective action within construction teams, thereby fostering resilience, promoting organizational sustainability, and ensuring the successful navigation of turbulent times."
Int 4	"Int 4 demonstrated resilience and perseverance by prioritizing clear communication, collaboration, and empathy to navigate challenges and uncertainties during the pandemic."	Leonard et al. (2022), Siami et al. (2022)	Leonard et al. (2022): "Supportive leadership, psychological safety, and employee resilience in mitigating stress, enhancing coping mechanisms, and fostering a culture of mutual care and solidarity within the construction industry." Siami et al. (2022): "Resilience, mental health, and well-being amidst the pandemic."

Int 5	"Int 5 demonstrated resilience and perseverance by prioritizing critical tasks, reallocating resources, and implementing strict safety measures to ensure project continuity amidst challenges posed by the pandemic."	Mukhtar et al. (2022), Parameswaran & Ranadewa (2021)	Mukhtar et al. (2022): "The paramount importance of preparedness, proactive crisis management strategies, and adaptability in mitigating the impacts of unforeseen events like the COVID-19 pandemic, thereby safeguarding the sustainability and viability of construction projects in Malaysia." Parameswaran & Ranadewa (2021): "Lean manufacturing practices can mitigate the adverse effects of the pandemic on construction projects."
Int 6	"Int 6 exhibited resilience and perseverance by navigating challenges posed by the pandemic, implementing adaptive strategies, and maintaining project momentum towards successful completion."	Leonard et al. (2022), Siami et al. (2022)	Leonard et al. (2022): "Supportive leadership, psychological safety, and employee resilience in mitigating stress, enhancing coping mechanisms, and fostering a culture of mutual care and solidarity within the construction industry." Siami et al. (2022): "Resilience, mental health, and well-being amidst the pandemic."
Int 7	"Int 7 exhibited resilience and perseverance by navigating challenges and maintaining productivity despite uncertain circumstances during the pandemic."	Mukhtar et al. (2022), Parameswaran & Ranadewa (2021)	Mukhtar et al. (2022): "The paramount importance of preparedness, proactive crisis management strategies, and adaptability in mitigating the impacts of unforeseen events like the COVID-19 pandemic, thereby safeguarding the sustainability and viability of construction projects in Malaysia." Parameswaran & Ranadewa (2021): "Lean manufacturing practices can mitigate the adverse effects of the pandemic on construction projects."
Int 8	"Int 8 demonstrated resilience and perseverance by maintaining motivation among team members and fostering resilience amidst uncertainties during the pandemic."	Pai et al. (2023), Peng et al. (2022)	Pai et al. (2023): "Resilient leaders, through effective stress management, strategic decision-making, and unwavering resolve, can inspire confidence, instill trust, and galvanize collective action within construction teams, thereby fostering resilience, promoting organizational sustainability, and ensuring the successful

4.3.2.6 Conclusion

Thematic analysis and content analysis of interviews with industry professionals within the Malaysian construction sector have illuminated key insights into the multifaceted challenges posed by the COVID-19 pandemic and the adaptive strategies employed to navigate them. Through the lens of effective communication and collaboration, adaptability and flexibility, strategic decision-making and problem-solving skills,

empathy and supportive leadership, and resilience and perseverance, a holistic understanding of the industry's response to the pandemic emerges.

Effective communication and collaboration emerged as foundational pillars for resilience within the Malaysian construction industry. Industry professionals emphasized the importance of transparent communication channels, both internally and with stakeholders, to manage expectations, adapt to changing circumstances, and ensure project continuity. Academic literature echoed these sentiments, highlighting the critical role of digital tools and virtual communication platforms in facilitating seamless collaboration amidst restrictions.

Adaptability and flexibility were identified as indispensable qualities for effective leadership amidst the pandemic-induced uncertainties. Industry professionals demonstrated the agility to swiftly respond to changing circumstances, recalibrate strategies, and leverage technological innovations to mitigate disruptions and safeguard project sustainability. Scholarly literature reinforced the imperative for construction leaders to adopt a strategic outlook and proactive adjustments to ensure resilience and growth amidst evolving landscapes.

Strategic decision-making and problem-solving skills emerged as essential attributes for navigating the intricate challenges posed by the pandemic. Industry professionals demonstrated the ability to make timely and informed decisions, leveraging technology and data-driven insights to optimize resource utilization and enhance project outcomes. Academic research underscored the importance of strategic foresight and swift

implementation of evolving safety protocols in guiding construction leadership through crises.

Empathy and supportive leadership were identified as catalysts for fostering resilience and well-being within construction teams amidst the pandemic. Industry professionals prioritized understanding and supporting their teams, maintaining open channels of communication, and addressing employee concerns to create a positive work environment. Academic literature emphasized the transformative potential of supportive leadership behaviours in managing conflicts, promoting psychological safety, and inspiring trust among team members.

Resilience and perseverance emerged as defining qualities for effective leadership in navigating the challenges precipitated by the pandemic. Industry professionals demonstrated resilience by adapting to changing circumstances, prioritizing critical tasks, and maintaining project momentum amidst uncertainties. Academic research underscored the importance of preparedness, adaptability, and effective stress management in guiding construction projects through turbulent times.

In conclusion, the thematic and content analysis of interviews with industry professionals and insights from scholarly literature underscore the dynamic landscape of the Malaysian construction industry amidst the COVID-19 pandemic. By embracing effective communication and collaboration, adaptability and flexibility, strategic decision-making and problem-solving skills, empathy and supportive leadership, and resilience and perseverance, construction leaders can navigate uncertainties, mitigate risks, and ensure the sustained success and sustainability of construction endeavours

amidst adversity. Through ongoing innovation, collaboration, and resilience-building initiatives, the Malaysian construction industry is poised to emerge stronger and more resilient from the challenges posed by the pandemic.

4.4 Summary

In summary, chapter 4 provided a deep dive into the challenges and responses of the construction industry in Malaysia amidst the COVID-19 pandemic, drawing insights from interviews with industry professionals and scholarly literature. The analysis revealed a landscape marked by supply chain disruptions, workforce safety concerns, financial strains, regulatory hurdles, and the imperative for adaptive strategies. Across all thematic areas, a consistent narrative emerged, emphasizing the pivotal role of resilience, adaptability, collaboration, and strategic decision-making in navigating the unprecedented challenges faced by the industry. From the unanimous acknowledgment of supply chain disruptions to the recognition of the importance of embracing technology, fostering collaboration, and prioritizing workforce well-being, the chapter painted a holistic picture of the industry's response to the pandemic.

Furthermore, the alignment between interviewee experiences and scholarly findings underscored the severity of the challenges encountered by the Malaysian construction industry and the concerted efforts undertaken to address them. By leveraging innovative solutions, fostering collaboration, and demonstrating resilience, industry professionals not only weathered the storm but also emerged stronger and more prepared for future disruptions. As the industry continues to evolve amidst ongoing uncertainties, the insights gleaned from Chapter 4 provide a roadmap for navigating challenges, fostering resilience, and ensuring sustained success in the post-pandemic landscape. Through

proactive adaptation, strategic collaboration, and a commitment to excellence, the Malaysian construction industry was poised to thrive in the face of adversity.



CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Introduction

In chapter five, the impact of the COVID-19 pandemic on the construction industry in Malaysia is thoroughly examined. Through a comprehensive analysis of thematic and content data, supplemented by insights from scholarly literature, recommendations are formulated to bolster the resilience and preparedness of Malaysia's construction sector in the face of future crises. These recommendations encompass various strategies, including fortifying supply chain resilience, prioritizing workforce safety, bolstering financial risk management, embracing technological integration, fostering collaboration and partnerships, cultivating leadership resilience, prioritizing continuous learning and adaptation, and promoting collaborative leadership approaches. By implementing these recommendations, construction firms in Malaysia can enhance their capacity to navigate challenges effectively and ensure sustained success amidst uncertainty.

5.2 Impact of the Covid-19 Pandemic on the Construction Industry in Malaysia

5.2.1 Recommendation

The findings derived from both thematic and content analyses, supplemented by insights gleaned from scholarly literature, furnished a plethora of recommendations tailored to fortify the resilience and readiness of Malaysia's construction industry in the wake of future crises. Chief among these recommendations was the imperative to fortify the resilience of supply chains. Construction enterprises were advised to diversify their

supplier bases, erect robust monitoring systems for supply chains, and foster strategic alliances to cushion the blow of supply chain disruptions. Moreover, embracing digital supply chain management tools stood as a pivotal strategy to augment visibility and agility, thereby facilitating swifter responses to disruptions as they arose.

In tandem with supply chain resilience, prioritizing workforce safety emerged as a non-negotiable imperative. Organizations were urged to accord paramount importance to the health and safety of their employees by enacting stringent safety protocols, furnishing comprehensive training, and provisioning protective equipment. By fostering a culture of safety, characterized by regular communication and active consultation with workers, construction firms could empower their workforce to vocalize concerns and actively contribute to risk management endeavors. Furthermore, bolstering financial risk management emerged as a linchpin strategy for navigating crises effectively. Construction entities were enjoined to embrace proactive financial risk management tactics, encompassing contingency planning, scenario analysis, and stress testing. Exploring alternative funding avenues and harnessing governmental assistance programs could furnish additional layers of financial resilience, affording construction firms greater latitude in weathering crises.

In parallel, the embrace of technological integration emerged as a potent strategy for enhancing operational efficiency and resilience within the construction industry. By investing in digital technologies tailored to facilitate remote work, virtual collaboration, and project management, construction companies could insulate themselves against disruptions while streamlining processes. Prioritizing the adoption of transformative technologies such as Building Information Modeling (BIM), cloud-based project

management platforms, and Internet of Things (IoT) solutions stood poised to confer significant dividends in terms of mitigating disruptions and bolstering resilience. Moreover, fostering collaboration and partnerships among stakeholders emerged as a pivotal pillar for fortifying industry resilience. Building robust collaborative networks with governmental bodies, suppliers, subcontractors, and industry associations could catalyze resource sharing, knowledge exchange, and collective problem-solving. Formalizing collaboration frameworks and platforms represented a proactive step towards fostering greater cohesion and resilience within the industry.

Simultaneously, cultivating leadership resilience surfaced as a linchpin strategy for steering construction enterprises through crises with aplomb. By nurturing resilient leadership capabilities, underpinned by effective communication, strategic decision-making, and empathetic leadership, construction firms could navigate crises with greater efficacy. Investing in leadership development programs, mentorship initiatives, and peer support networks could engender a culture of resilience and adaptability within the construction sector. Lastly, prioritizing continuous learning and adaptation emerged as a salient strategy for future-proofing construction enterprises against unforeseen contingencies. By fostering a culture of innovation, experimentation, and continuous improvement, construction companies could position themselves at the vanguard of industry evolution. Encouraging ongoing learning and adaptation ensured that construction enterprises remained attuned to emerging trends, technologies, and best practices, thereby enhancing their capacity to respond effectively to evolving challenges and opportunities.

In summation, the implementation of these recommendations held the potential to fortify Malaysia's construction industry, enhancing its resilience, agility, and preparedness to weather future crises. By embracing a proactive and collaborative approach to crisis management, construction enterprises could chart a course towards long-term sustainability and success, even in the face of adversity.

5.3 To determine the Project Management Traits of Leadership during Covid-19 Pandemic on the Construction Industry in Malaysia

5.3.1 Recommendation

Amidst the tumultuous landscape imposed by the COVID-19 pandemic, the construction industry in Malaysia has faced a myriad of unprecedented challenges, necessitating a nuanced and adaptive approach to project management leadership. Delving deeper into the recommendations derived from insights garnered through interviews with industry professionals and scholarly literature, a comprehensive strategy emerges to fortify project management traits during these turbulent times.

At the forefront of these recommendations lies the imperative of investing in robust communication technology. By equipping construction teams with advanced communication tools and virtual collaboration platforms, firms can transcend geographical boundaries and facilitate seamless interaction among stakeholders. This not only expedites decision-making processes but also ensures uninterrupted project progress despite the constraints imposed by remote work arrangements. The ability to foster effective communication channels amidst physical distancing measures is paramount, enabling project managers to maintain alignment, address challenges proactively, and sustain project momentum amid fluctuating circumstances.

In parallel, cultivating adaptability and flexibility emerges as a cornerstone for effective project management leadership. Encouraging team members to embrace change, experiment with innovative strategies, and pivot as necessary fosters a culture of resilience within the organization. In an environment characterized by volatility and uncertainty, the ability to adapt swiftly to evolving circumstances is critical for maintaining project viability and achieving desired outcomes. Providing training and resources to enhance adaptive skills empowers project managers to navigate uncertainties proactively, leveraging novel approaches to problem-solving and decision-making in response to emergent challenges.

Moreover, the strategic utilization of data-driven decision-making emerges as a fundamental tenet of effective project management leadership. By harnessing sophisticated data analytics tools, project managers can gain valuable insights into project performance, identify emerging risks, and capitalize on opportunities with precision. This enables informed decision-making, guiding resource allocation, scheduling adjustments, and risk mitigation efforts in alignment with project objectives. In an era defined by rapid technological advancement and an abundance of data sources, the ability to leverage actionable intelligence effectively distinguishes successful project managers from their counterparts, enabling them to navigate complex challenges with confidence and clarity.

In tandem with data-driven decision-making, fostering empathetic leadership practices is essential for nurturing a supportive work environment conducive to employee well-being and resilience. Prioritizing the mental health and emotional welfare of

construction teams fosters a sense of camaraderie and solidarity, essential elements for maintaining morale and productivity during times of uncertainty. By actively listening to team concerns, providing support, and implementing employee assistance programs, project managers can cultivate a culture of trust and mutual respect, laying the foundation for sustained success amidst adversity.

Furthermore, fostering resilience and perseverance among project managers themselves is indispensable for weathering the storms of uncertainty and adversity. Offering training in stress management, conflict resolution, and crisis response equips leaders with the skills and mindset needed to navigate challenges with determination and composure. Building resilience not only enhances individual capacity but also inspires confidence among stakeholders, reinforcing trust in the organization's ability to navigate uncertainties effectively and emerge stronger on the other side.

Encouraging continuous learning and development emerges as another critical recommendation for enhancing project management leadership. By providing comprehensive training programs, workshops, and mentorship opportunities, construction firms can empower project managers to stay abreast of industry trends, emerging technologies, and best practices. This investment in professional growth not only fosters a culture of innovation and excellence but also equips leaders with the tools needed to drive continuous improvement in project outcomes, positioning the organization for sustained success in a rapidly evolving landscape.

Lastly, promoting collaborative leadership approaches is pivotal for fostering synergy, innovation, and shared ownership of project outcomes. By encouraging collaboration

and shared decision-making among project managers, stakeholders, and industry partners, construction firms can harness collective expertise and resources to tackle complex challenges with confidence. This collaborative ethos not only fosters creativity and problem-solving but also enhances project outcomes by leveraging the collective intelligence and diverse perspectives of stakeholders. In an era characterized by interconnectedness and interdependence, the ability to forge strategic partnerships and collaborative networks is indispensable for driving innovation and achieving sustainable growth in the construction industry.

In conclusion, by implementing these multifaceted recommendations, construction firms in Malaysia can fortify project management traits of leadership, fostering resilience, adaptability, and effectiveness in the face of COVID-19 challenges. This proactive and holistic approach not only enables organizations to navigate the current crisis with agility and resilience but also lays the groundwork for long-term success and sustainability in an uncertain future. By embracing innovation, fostering collaboration, and prioritizing employee well-being, construction firms can navigate the complexities of the pandemic landscape with confidence, emerging stronger and more resilient on the other side.

5.4 Contribution to knowledge

The findings and recommendations presented in this study made significant contributions to the knowledge base of project management within the construction industry, particularly in the context of navigating crises such as the COVID-19 pandemic. By conducting thematic and content analyses of interviews with industry professionals and integrating insights from scholarly literature, this study offered

valuable insights and practical recommendations that advanced understanding and practice in several key areas.

Firstly, the study contributed to the understanding of the specific challenges faced by the construction industry in Malaysia during the COVID-19 pandemic. By identifying themes such as supply chain disruptions, workforce safety concerns, financial implications, regulatory hurdles, adaptive strategies, collaboration and partnership, technological integration, and resilience and adaptability, this research provided a comprehensive overview of the multifaceted impact of the pandemic on construction projects. Secondly, the study shed light on the project management traits of leadership that were crucial for navigating crises effectively. Through the examination of traits such as effective communication and collaboration, adaptability and flexibility, strategic decision-making and problem-solving skills, empathy and supportive leadership, and resilience and perseverance, this research highlighted the qualities and behaviors that enabled project managers to lead their teams through challenging times.

Furthermore, the study offered practical recommendations for enhancing project management practices in the face of crises. By proposing strategies such as investing in communication technology, fostering a culture of adaptability, prioritizing data-driven decision-making, promoting empathetic leadership, cultivating resilience and perseverance, encouraging continuous learning and development, and fostering collaborative leadership, this research provided actionable guidance for construction firms to strengthen their resilience and preparedness for future challenges. Overall, this study made a significant contribution to the body of knowledge on project management in the construction industry by offering insights into the impact of crises such as the

COVID-19 pandemic and identifying effective leadership traits and strategies for navigating them. By addressing critical issues and providing practical recommendations, this research empowered construction professionals to enhance their project management practices and foster resilience in the face of uncertainty.

5.5 Practical Implications

The practical implications of the findings and recommendations from this study were significant for stakeholders within the construction industry in Malaysia. By understanding the challenges posed by the COVID-19 pandemic and identifying effective leadership traits and strategies for navigating crises, construction firms and project managers could proactively enhance their practices to improve project outcomes and resilience.

Firstly, the insights from this study highlighted the importance of investing in communication technology and virtual collaboration platforms. By leveraging these tools, construction teams could maintain seamless communication and collaboration, even in remote or distributed work environments. This facilitated effective decision-making, fostered teamwork, and ensured project continuity amidst disruptions. Secondly, the emphasis on fostering a culture of adaptability was crucial for construction firms to remain agile and responsive to changing circumstances. By encouraging openness to change, innovation, and experimentation, organizations empowered their teams to identify and implement creative solutions to emerging challenges, driving project success and resilience.

Thirdly, prioritizing data-driven decision-making enabled project managers to make informed and strategic choices based on real-time insights and analytics. By leveraging data analytics tools and metrics, construction firms optimized resource allocation, mitigated risks, and enhanced project performance, ultimately improving project outcomes and profitability. Moreover, promoting empathetic leadership practices fostered a supportive work environment and enhanced employee well-being. Project managers who prioritized empathy, active listening, and emotional support built trust, morale, and cohesion within their teams, leading to higher levels of engagement, productivity, and retention.

Additionally, cultivating resilience and perseverance among project managers equipped them with the mindset and skills needed to navigate challenges with resilience and determination. By providing training in stress management, conflict resolution, and crisis response, construction firms built a resilient leadership pipeline capable of guiding projects through turbulent times. Furthermore, encouraging continuous learning and development ensured that project managers stayed abreast of industry trends, best practices, and emerging technologies. By investing in training programs, workshops, and mentorship initiatives, construction firms equipped their teams with the knowledge and skills needed to adapt to evolving challenges and drive innovation.

Finally, fostering collaborative leadership approaches promoted inclusivity, teamwork, and shared decision-making, enabling construction firms to leverage collective expertise and resources in addressing complex challenges. By promoting collaboration with stakeholders, subcontractors, and industry partners, organizations enhanced industry cohesion, fostered innovation, and drove project success. Overall, the practical

implications of this study empowered construction firms and project managers in Malaysia to enhance their project management practices, foster resilience, and drive success amidst uncertainty. By implementing the recommendations outlined in this study, stakeholders positioned themselves for long-term sustainability and competitiveness in the dynamic construction industry landscape.

5.6 Limitation of Study

Several limitations were inherent in this study, which should be acknowledged to provide a context for interpreting the findings accurately. Firstly, the research focused solely on the construction industry in Malaysia, limiting the generalizability of the findings to other contexts or geographical locations. Different regulatory frameworks, cultural norms, and industry practices in other regions may lead to different responses to the COVID-19 pandemic and require tailored strategies.

Secondly, the study relied primarily on qualitative data obtained through interviews and thematic analysis. While this approach provided rich insights into participants' experiences and perspectives, it also introduced the potential for subjective biases and interpretation errors. Additionally, the sample size of the study was relatively small, which may limit the representativeness of the findings within the broader construction industry. Thirdly, the data collection process was conducted during a specific timeframe, which may not fully capture the evolving nature of the COVID-19 pandemic and its impacts on the construction industry. As the situation continues to evolve, new challenges, strategies, and leadership traits may emerge, necessitating ongoing research and adaptation of management practices.

Furthermore, the study primarily focused on the perspectives of project managers and industry professionals, overlooking other stakeholders such as government agencies, clients, and end-users. Including a broader range of perspectives could provide a more comprehensive understanding of the pandemic's impact and enrich the analysis with diverse viewpoints. Additionally, the study did not explore the long-term implications of the COVID-19 pandemic on the construction industry in Malaysia. While the immediate challenges and responses were examined, the lasting effects on project delivery, industry dynamics, and market trends remain uncertain and warrant further investigation.

Finally, the study did not address potential ethical or cultural considerations that may have influenced participants' responses or interactions during the interviews. Sensitivity to cultural nuances and ethical principles is essential for ensuring the validity and integrity of research findings, and future studies should take these factors into account. In conclusion, while this study provided valuable insights into the impact of the COVID-19 pandemic on the construction industry in Malaysia and identified key leadership traits and strategies for navigating crises, it was not without limitations. Recognizing these limitations is essential for interpreting the findings accurately and guiding future research efforts to address gaps and expand understanding in this field.

5.7 Recommendation for future research

Addressing the limitations of the current study and advancing knowledge in crisis management and project leadership within the construction industry opens up several promising avenues for future research. One such direction involves conducting a comparative analysis across different countries or regions to explore variations in the

impact of the COVID-19 pandemic on construction and leadership responses. By delving into diverse contexts, regulatory frameworks, and cultural influences, researchers can develop a more nuanced understanding of effective crisis management strategies and leadership traits.

Additionally, longitudinal studies tracking the long-term effects of the pandemic on construction projects and leadership practices could provide valuable insights into evolving trends, challenges, and responses over time. By observing how project outcomes and leadership dynamics change as the pandemic progresses, researchers can uncover patterns, extract lessons learned, and identify best practices for resilience-building within the industry. Expanding the scope to include perspectives from a wider range of stakeholders, such as government agencies, clients, subcontractors, and end-users, could enrich our understanding of the complexities of crisis management in construction. By capturing diverse viewpoints and interests, researchers can identify opportunities for collaboration and partnership that contribute to more effective crisis response strategies.

Moreover, exploring parallels and differences in crisis management strategies and leadership traits across industries beyond construction could offer valuable insights and transferable lessons. Comparative studies with sectors such as healthcare, manufacturing, or technology could highlight innovative approaches applicable to the construction industry. Ethical and cultural considerations should also be prioritized in future research, as they may significantly influence crisis management and leadership practices within the construction industry. Investigating how cultural norms, values,

and ethical frameworks shape decision-making and communication strategies can inform more culturally sensitive management approaches.

Given the increasing adoption of digital technologies in construction, future research could explore the role of emerging technologies such as artificial intelligence, virtual reality, and remote sensing in enhancing crisis management and leadership effectiveness. Understanding the impact of technology integration on project resilience, communication, and decision-making could provide valuable insights for industry practitioners. Furthermore, research focusing on the development and implementation of resilience-building interventions and leadership development programs within construction organizations could help identify effective strategies for preparing project managers and teams to navigate future crises. Evaluating the effectiveness of training, mentorship, and peer support initiatives in fostering adaptive leadership and organizational resilience would be beneficial.

Finally, as the construction industry transitions from crisis response to recovery and adaptation, exploring strategies for rebuilding and revitalizing construction projects and organizations will be crucial. Investigating how project managers can leverage lessons learned from the pandemic to drive innovation, sustainability, and growth in the post-pandemic era would be particularly relevant. By addressing these areas of future research, scholars can contribute to a deeper understanding of crisis management and project leadership within the construction industry, ultimately informing more effective strategies for navigating challenges and driving success in the face of uncertainty.

5.8 Summary

In chapter five, the profound impact of the COVID-19 pandemic on Malaysia's construction industry was thoroughly examined, shedding light on the multifaceted challenges faced by stakeholders. Through meticulous thematic and content analyses, as well as insights drawn from scholarly literature, the chapter offered a comprehensive understanding of the sector's response to the crisis. The analyses revealed disruptions across various thematic areas, including supply chain management, workforce safety concerns, financial implications, regulatory hurdles, and technological integration. These disruptions underscored the imperative for construction firms to adapt swiftly and implement robust strategies to mitigate the adverse effects of the pandemic.

Amidst the challenges posed by the pandemic, the chapter presented a series of recommendations tailored to fortify the resilience and preparedness of Malaysia's construction industry. These recommendations encompassed diverse aspects, including the need to fortify supply chain resilience through diversification and strategic alliances, prioritize workforce safety through stringent protocols and training, and bolster financial risk management through proactive strategies and alternative funding mechanisms. Moreover, the chapter advocated for embracing technological integration, fostering collaboration and partnerships, cultivating leadership resilience, and prioritizing continuous learning and adaptation. By implementing these recommendations, construction firms could navigate uncertainties more effectively and emerge stronger from the crisis.

Furthermore, the chapter highlighted the practical implications of these recommendations for stakeholders within the construction industry. By investing in

communication technology, fostering adaptability, and promoting data-driven decision-making, construction firms enhanced project management practices and ensured continuity amidst disruptions. Moreover, fostering empathetic leadership, cultivating resilience, and promoting collaborative approaches fostered a supportive work environment and drove project success. Recognizing the limitations of the study, including its focus on Malaysia's construction sector and qualitative data, the chapter also identified avenues for future research to further advance knowledge in crisis management and project leadership within the construction industry.



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APPENDICES

CONSENT FORM FOR SEMI STRUCTURED INTERVIEW

Full title of project:

Project Management Leadership in Crisis and Emergency Response in Malaysia Construction Industry

Name, position and contact address of Researcher:

Syereen Zahra Binti Shorbaini, Student of Master in Project Management, syereenzahra@gmail.com

initial box

Please

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.
3. I agree to take part in the above study.
4. I understand that all the information that I give will be used solely for the purpose of this research and will not be divulged to any third party.

☐☐☐☐

For researcher's use only:

Include the following statements if appropriate, or delete from your consent form:

No

Please tick box

Yes

5. I agree to the interview being audio recorded.

☐☐

6. I agree to the use of anonymised quotes in publications.

☐☐

Name of Participant

Date

Signature

Name of Researcher

Date

Signature

SEMI-STRUCTURED INTERVIEW SCHEDULE

Full title of project:

Project Management Leadership in Crisis and Emergency Response in Malaysia Construction Industry

Researcher's introduction:

Your perspectives and experiences as a project manager in Malaysia are crucial to achieving the objectives of this study. Your insights into the specific impacts of the pandemic on construction projects, such as project suspension, labour disruptions, time and cost overruns, and financial implications, will provide valuable context for our research. Additionally, we are interested in exploring the leadership traits that you believe are essential for effective crisis management in the construction industry. Your firsthand experiences and observations will help us identify key leadership qualities and strategies that contribute to successful project outcomes during challenging times.

You are welcomed to make any important point(s), as you think appropriate, without limiting to the questions stated here. Thank you for agreeing to participate in this study.

Researcher to complete:

<i>General information of the interviewee</i>	
Name of interviewee	
Job title	
Expertise/Specialisation	
Age category	
Education/Qualification background	
How many years in the construction industry? (Malaysia/abroad)	
How many years in this organization?	
Date & Venue of interview	
<i>General information of the organization</i>	
Name of organization	
Nature of business	
Private/Public	
Size of organization	
No of years established	

Objective 1: To evaluate the Impact of the COVID-19 Pandemic on the Construction Industry in Malaysia

1. Can you describe the impact of the COVID-19 pandemic on construction projects you have been involved in? How has it affected project timelines and schedules?

2. Have you experienced any labor disruptions or shortages due to the pandemic? How did you manage these challenges?

3. What measures did your organization implement to mitigate the financial implications of the pandemic on construction projects?

4. Can you provide examples of specific projects that were suspended or delayed as a result of the pandemic? How did you navigate these disruptions?

5. How has the supply chain been affected by the pandemic, and what strategies have you adopted to address these challenges?

Objective 2: To determine the Project Management Traits of Leadership during Crisis and Emergency Response in Malaysia.

1. In your opinion, what are the essential leadership traits for effectively managing construction projects during a crisis like the COVID-19 pandemic?

2. Can you share an example of a challenging situation or crisis you faced as a project manager during the pandemic? How did you approach it, and what leadership qualities did you rely on?

3. How important do you think communication skills are for project managers during a crisis? Can you provide examples of how effective communication helped mitigate challenges in your projects?

4. How do you prioritize and make decisions during uncertain and rapidly changing circumstances? Can you give an example of a decision you made that had a significant impact on project outcomes during the pandemic?

5. How do you foster teamwork and collaboration among project team members during times of crisis? Can you share strategies you've used to keep morale high and maintain productivity?

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