PROJECT MANAGEMENT DURING COVID-19: THE RELEVANCE OF HUMAN SKILLS AND THE INFRASTRUCTURE PROJECT PERFORMANCE IN KLANG VALLEY MALAYSIA

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A project report submitted in partial fulfilment of the requirements for the award of Master of Project Management

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December 2023

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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APPROVAL FOR SUBMISSION

I certify that this project report entitled **"PROJECT MANAGEMENT DURING COVID-19: THE RELEVANCE OF HUMAN SKILLS AND THE INFRASTRUCTURE PROJECT PERFORMANCE IN KLANG VALLEY MALAYSIA"** was prepared by **PRIYADARSINI PALANIAPAN** has met the required standard for submission in partial fulfilment of the requirements for the award of Master of Project Management at Universiti Tunku Abdul Rahman.

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ABSTRACT

Historically, one of the keys streamlining projects in Malaysia's construction industry has been infrastructure, and the government serves as the primary employer for a variety of projects that are frequently undertaken. The government supports a number of national development plans with significant funding. Despite the huge allocation of the funding, many of them have underperformed, mostly as a result of a shortage of human skills. The COVID-19 pandemic, which has impacted the entire world and caused an economic collapse, has made matters far worse. The aim of this study is to analyse the relevance of human skills and their efficacy on the infrastructure project performance in Klang Valley, Malaysia during the COVID-19 pandemic and simultaneously to analyse the training and development in the infrastructure project performance during the pandemic. This quantitative genre investigation used a survey questionnaire with closed-ended questions, administered to construction professionals involved in infrastructure projects during the COVID-19 pandemic, aiming to collect valuable data for subsequent analysis. The results indicate that the efficacy of human skills in the realm of project management activities within infrastructure projects during the COVID-19 pandemic is shaped by key human skills and strategic training and development. The significance of human skills and their relevance on infrastructure project performance is noteworthy, with training playing a pivotal role in developing these skills. The implication of this study centres on the accomplishments of all the research objectives, while bridging the knowledge gap on the subject, as this research provides a comprehensive perspective on the relevance of human skills in infrastructure projects. It also sheds light on the unique role of human skills in the performance of infrastructure projects and the importance of training, beyond technological advancements and project management methodologies.

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LIST OF SYMBOLS / ABBREVIATIONS

km	kilometre
mw	megawatt
mpta	million metric tons per annum
PE	population equivalents
MOT	Ministry of Transport
PMO	Prime Minister's Office
RM	Ringgit Malaysia
DOSM	Department of Statistic Malaysia
COVID-19	Coronavirus Disease of 2019
GDP	Gross Domestic Product
MCO	Movement Control Order
MITI	Ministry of International Trade and Industry
SOP	Standard Operation Procedure
IEM	Institution of Engineers Malaysia
ICU	Implementation Coordination Unit (Prime Minister's Department)
CIDB	Construction Industry Development Board
KLIA	Kuala Lumpur International Airport
MSIC	Malaysia Standard Industrial Classification
PMI	Project Management Institute
PMBoK	Project Management Body of Knowledge
APMBoK	Association of Project Management Body of Knowledge

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CHAPTER 1

INTRODUCTION

1.1   Background of Study

Malaysia, a lively and diversified Southeast Asian country, has a solidly built and fast-growing infrastructure that serves as the backbone of its economic development and social progress. Located between Thailand and Singapore, the country is well-known for its contemporary infrastructure, which encompasses urban areas, rural landscapes, and key transportation networks. The country's dedication to infrastructure development has played a critical role in fostering economic growth, improving connectivity, and overall quality of life for its residents. It is also debatably one of the most developed countries in Asia.

A large transportation network, which includes well-maintained highways, railways, airports, and ports, lies at the centre of Malaysia's infrastructure landscape. The country has become an important centre for international trade and commerce due to its strategic location, the capital city, Kuala Lumpur, is a model of modern urban planning, with iconic buildings, efficient public transport networks, and cutting-edge services.

With a primary concentration on public infrastructure construction, the Malaysian government represents the largest clientele in the local construction sector. According to the report published in 2023 by Prime Minister's Office (PMO) highlighting the midterm review of the 12th Malaysia Plan (2021-2025), it has budget of RM400 billion to finance extension and new development projects over a five-year period.

Prime Minister Dato Seri Anwar Ibrahim revealed that the government has spent 34% of its budget in the first two years. In 2021, the total development expenditure is RM64.3 billion, while in 2022 the amount spent was RM71.6 billion (PMO, 2023).

Concurrently, according to an article published in 2019 by the Institution of Engineers Malaysia (IEM) titled 'Delays in Malaysia Government Projects' looking back at the 11th Malaysia Plan (2016-2020), the development expenditure allocation of RM260 billion with RM875.2 billion committed overall from the First Malaysia Plan to the Tenth Malaysia Plan.

With Coronavirus Disease of 2019 (COVID-19) sweeping the world at the end of 2019, the execution of infrastructure projects in the Klang Valley was considerably hampered due to various Movement Control Orders (MCO) in 2020, which eventually caused an economic collapse. Refer to Figure 1.1 showing national Gross Domestic Product (GDP) of negative 5.5 per cent in the year 2020 due to the COVID-19 health crisis.
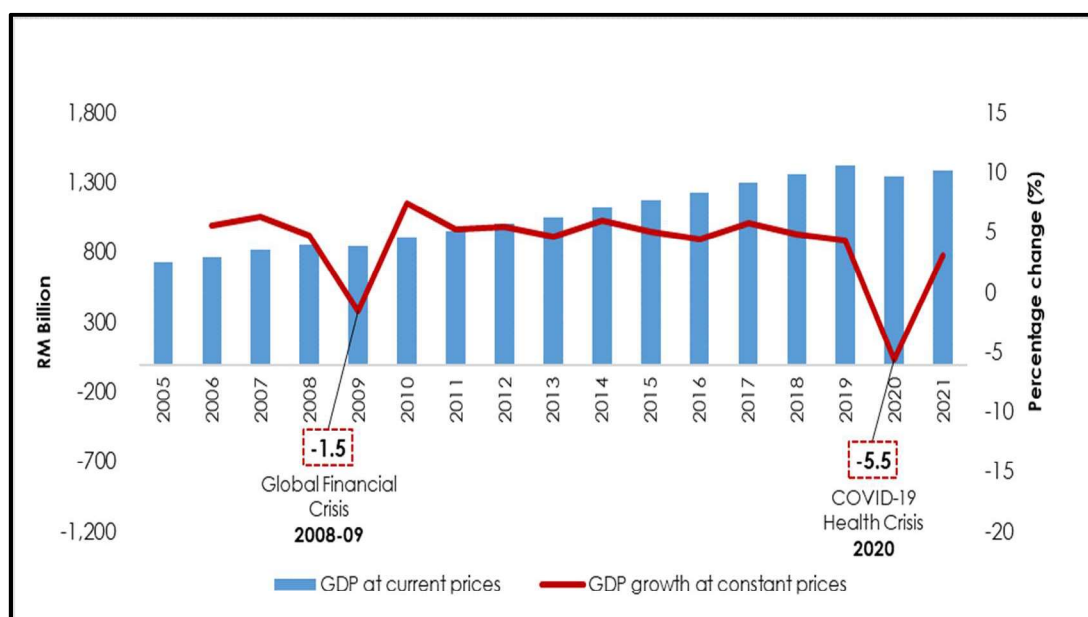
Figure 1.1: National GDP, 2005-2021 (DOSM, 2021)

The economic unrest that rocked Malaysia in 2020 appears to be abating as the nation moves into 2021, according to a report released in 2021 by the Department of Statistics Malaysia (DOSM). A swift economic recovery is now possible because to the administration's successful reaction to the global crisis. The massive vaccination campaign that started in early 2021 has, among other things, led to the easing of containment measures and the restart of business operations. According to DOSM (2021), the National Recovery Plan and several economic stimulus initiatives from the federal and state governments are among the other noteworthy efforts made to effectively end the COVID-19 epidemic.

On 27th September 2021, when the Prime Minister at that time Dato' Sri Ismail Sabri Yaakob presented the 12th Malaysia Plan (2021–2025) in the parliament, it became the nation's largest-ever development expenditure amounting to RM400 billion which is 54 per cent more than the budget initially allocated under the 11th

Malaysia Plan (2016 – 2020), in line with expectations of higher public spending to revitalize the economy after COVID-19 outbreak (Twelfth Malaysia Plan, 2021).

The 12th Malaysia Plan's goals of restoring economic growth to a sustainable trajectory, bolstering socioeconomic inclusion, and boosting environmental sustainability have the full backing of the Malaysian Ministry of Finance (Twelfth Malaysia Plan, 2021).

Following the COVID-19 outbreak, and various stages of Movement Control Orders (MCO) imposed by the government March 2020, economic sectors such as essential services and manufacturers of critical products, food chain supply, logistics, transportation, water, energy, security and defence, public cleansing, and so on were the only sectors allowed to operate.

In 2020, the Ministry of International Trade and Industry (MITI) conducted a media release stating that certain non-essential industries, including construction, machinery and equipment, aerospace, and automotive, were allowed to operate under the "new norm" as long as they adhered to standard operating procedures (SOP), social distancing, and hygiene and health control guidelines.

Nevertheless, even much earlier than the COVID-19 outbreak, to be precise during the era of the 11th Malaysian Plan (2016 - 2020), infrastructure projects primarily initiated by the Malaysian government have encountered many challenges in terms of finance, labour and material shortages, poor site management, construction errors etc. According to IEM (2019), despite the large budget allocation by the government as discussed in Paragraph 3, 4 and 5 above, underperforming projects owing to inadequate project oversight were severe issues that contribute to 10.3 per cent of project costs and 89 per cent of construction projects are experiencing cost overruns at 5-10% of the contract price, which is acceptable given that clients typically allot a maximum of 15% in the variation clause.

IEM (2019) further stated that aimed at investigating the causes for delays, questionnaire surveys have been carried out on one hundred (100) clients, consultants and contractors involved in delayed government projects, where the findings are validated by five subject matter experts. In their findings from the survey conducted, sixteen causes have been identified as due to consultants and contractors, whereas six causes have been identified as due to clients. Each cause has been ranked based on the priority it has on the project performance followed by the Relative Importance Index

(RII) factor, used to determine the relative importance of quality factors involved (IEM, 2019). The causes will be discussed in the Problem Statement.

It also mentions how project management flaws in the planning and execution stages are leading to a sharp rise in the number of underperforming infrastructure projects. Another 2018 report from the Prime Minister's Department's Implementation Coordination Unit (ICU) states that 61 projects are underperforming as a result of poor project management during the planning and implementation phases, and 87% during the construction phase (Ghani and Ismail, 2017).

Based on the reports stated above, it can be concluded that underperformance and delays in infrastructure projects were typical even before the pandemic, in addition the COVID-19 outbreak played a role in turning the tables and intensify the situation.

Meanwhile, throughout the COVID-19 outbreak in Malaysia, infrastructure projects were severely impacted and faced continuous challenges in managing its supply chain disruptions, workforce availability, health and safety concerns, project performance, regulatory changes, remote working challenges, financial strain, market uncertainty, and technology adoption issues to thrive in the face of this unprecedented circumstances.

COVID-19 pandemic was causing operational and financial difficulties in the building construction industry. The operation is being impacted by project timelines due to abbreviated construction operations and delayed clearances from relevant authorities. In addition, logistical challenges and a shortage of skilled labour and resources have caused project activities to be delayed (Zamani, et al., 2021).

On the positive note, the pandemic has highlighted the significant role of human skills and strike a balance between the preservation of human centric values and technological advancement, with Artificial Intelligence (AI) playing an important role in meeting the challenges of working during the COVID-19 pandemic. Although human skills and artificial intelligence co-exist, certain human skills cannot be replaced (yet) such as critical thinking, creativity, interpersonal skills, will be explained Chapter 2 Literature Review.

1.2   Problem Statement

The need for infrastructure projects has grown dramatically in recent years, as they are essential to a country's competitiveness, economy, health, education, and quality of

life. This is due to the fact that planning, coordinating, building, and managing infrastructure projects is crucial to the development of a country.

As noted in the background of the study, the Malaysian government had allocated adequate fund on national development, mostly on infrastructure projects, in their development plans. Despite the huge allocation and continuous support from the government, infrastructure projects continue to suffer performance and delivery issues. In addition to the pre-existing circumstances, the COVID-19 pandemic has further led to operational and financial challenges within the building construction sector.

An instance of unsuccessful infrastructure projects amid the COVID-19 pandemic is the Melaka Gateway. This project, spanning 609 acres and incorporating ports, industrial parks, and more, was initially anticipated to conclude by 2025. Chen (2020) reported that the local developer was identified as having failed in project completion, as per the Melaka government's announcement. Nevertheless, as indicated by Bernama (2023), the developer has now revived the mega project and intends to resume its implementation.

Chen (2020) also reported such a large-scale infrastructure project's cancellation might have a significant impact on foreign investments, local real estate markets, and job prospects. The cost of starting new infrastructure projects is significant and failure could negatively influence the economy (Unegbu, et al., 2020). Every project must achieve project performance, which is determined by a variety of criteria, the most common being time, cost, and quality (Mellado and Lou, 2020).

In their journal, Herrera, et al. (2020) reported that despite the importance, infrastructure projects have been associated with unwanted phenomena such as cost overruns, delays, disputes, corruption, and others, which have caused profound consequences, compromising the successful development of the projects. According to Aminah, et al. (2021), although most of the causes revealed in their study are related to financial concerns, low quality, contractual difficulties, poor execution, and monitoring activities remain as the most common causes of deficient performance.

Meanwhile, in a survey conducted by IEM (2019), six causes of underperforming infrastructure projects have been identified as due to clients whereas sixteen causes have been identified as due to consultants and contractors. Refer to the illustration in Table 1.1 and Table 1.2 below.

According to the IEM (2019) survey, while financial concerns are a key source of underperformance in Malaysian government projects due to clients, they are only

one of the factors. Besides that, all other five causes cited are attributable to a lack of human skills.

In terms of the factors attributed to consultants and contractors stated in Table 1.2, poor communication and coordination with stakeholders score first, followed by inadequate site management (IEM, 2019). In construction, poor communication is likely to be the most common issue (Britain and Emmerson, 2021; Higgin and Jessop, 2013). Additionally, other causes listed such as improper scheduling and planning, poor project management practices, design and specification changes, delay in approvals, inaccurate cost estimations, incomplete documents and others can be associated to a lack of human skills.

Table 1.1: Causes due to Clients (IEM, 2019)

Priority	Causes	RII (%)
1	Financial	75.00
2	Design changes	75.00
3	Slow decision-making	74.80
4	Improper schedules	74.40
5	Failure to provide requirement in construction site	69.80
6	Slow progress payment	69.40

Table 1.2: Causes due to Consultants and Contractors (IEM, 2019)

Priority	Causes	RII (%)
1	Ineffective stakeholder communication	81.00
2	Ineffective stakeholder coordination	81.00
3	inadequate site administration	80.60
4	Inadequate time management	80.00
5	inadequate preparation	79.60
6	Ineffective project management techniques	77.60
7	Modifications to the design	77.20
8	Specification modifications	77.00
9	Substantial adjustments to the work's scope are approved slowly	74.40
10	Shop drawings are approved slowly	72.00

Priority	Causes	RII (%)
11	Lack of productivity within the team	71.80
12	Inaccurate cost projection	71.80
13	Insufficient experience	71.40
14	Document not complete	71.20
15	Postponement of shop drawing preparation	70.80
16	Manpower shortage	64.20

Salman and Mohd (2018) state that intentional practises, the type of work being done, conditions resulting from the environment or situation in which the project is being run, organisational structure or operations, and customs resulting from standards, routines, and codes of practise are some of the reasons why public sector projects perform poorly. In Malaysia's construction industry, disputes, litigation, and arbitration often arise due to factors such as deficient planning, suboptimal site management, insufficient experience, financial challenges, shortages in both labor and materials, inadequate communication between involved parties, and errors occurring during the construction phase (Murali and Yau, 2007).

In their research, Amiril, et al. (2014) stated that project management and administration is a critical aspect in project performance, such as completing on schedule without disagreements and meeting customer objectives. Simultaneously, Zamani, et al. (2021) stated in their research, organisations are confronting a shortage of experienced personnel to complete the construction work during the COVID-19 pandemic. As foreign workers are no longer permitted to enter Malaysia, local skilled workers are in demand. However, finding local skilled workers becomes a problem.

According to Aminah, et al. (2021), the quality of construction collapse in nearly every project with the highest probability of recurrence was shown to be a poor performance element in their analysis of the Audit General's report on the previous 56 projects. Construction that does not adhere to the terms of the contract comes next. The first two criteria have a definite relationship. The ten factors of poor performance in their analysis is presented in Figure 1.2 below.
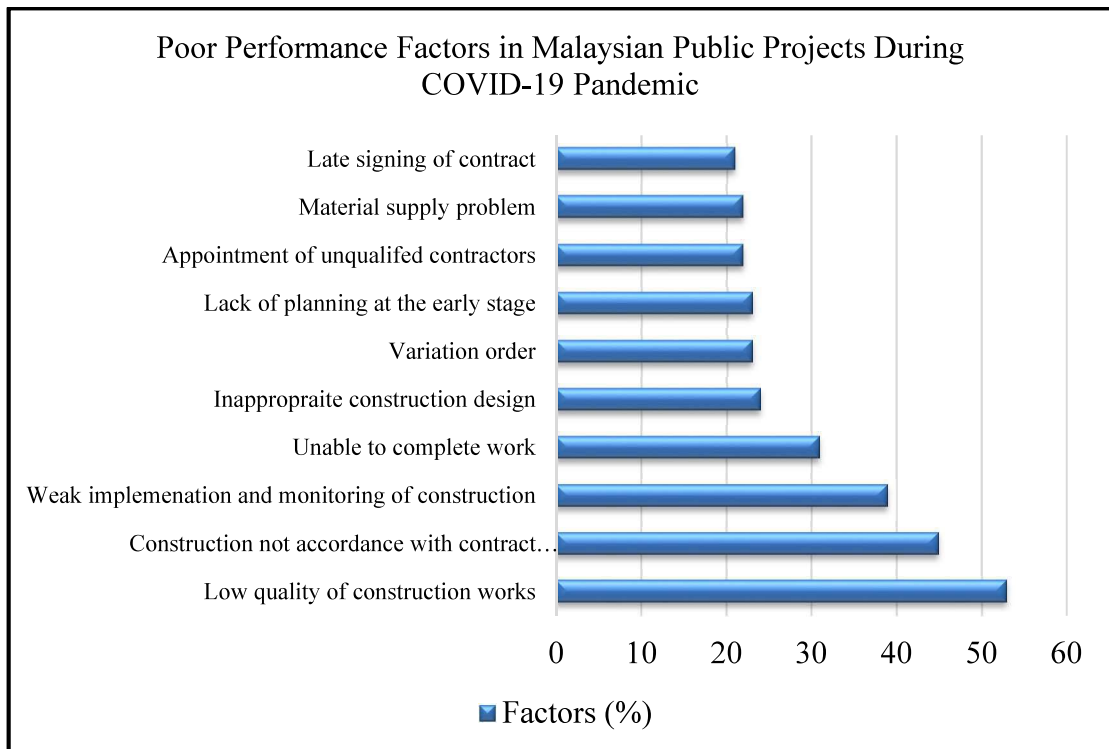
Figure 1.2: Poor performance Factors in Malaysian Public Projects during COVID-19 Pandemic (Aminah, et al., 2021)

The criteria with the highest rating are poor work quality, non-compliance with contract, followed by weak implementation and monitoring, inability to complete work, and others, all of which are related to human skills used in the projects.

A thorough analysis of each factors reveals that the common element connecting the causes is the incompetence, being unqualified for a given task, inexperienced, lacking practical experience or training in infrastructure projects, which ultimately leads to lack of human skills. Hussain, Xuetong, and Talib (2020) highlighted that there has been a persistent and significant demand for improvements in project performance within the construction sector, particularly stemming from advancements in human skills. It is widely recognized that the proficiency of labour plays a crucial role in determining project performance during its execution, with the skills and abilities of the workforce exerting varying degrees of influence on the project's overall progress. This is particularly evident in the context of construction projects.

Amid the COVID-19 pandemic, the Movement Control Order (MCO) had predominantly adverse impacts on project success, particularly affecting timeframes, costs, human resources, market conditions, and the availability of on-site resources.

Consequently, there is a critical need for construction stakeholders and government entities to prioritize and address these negative consequences diligently. This attention is crucial to mitigate potential project delays and losses, ultimately optimizing project timelines and overall performance, as emphasized by Esa, Ibrahim, and Kamal (2020).

Mohsen et al. (2021) stated that the COVID-19 pandemic has severe effects on construction projects related to human skills, such as project delays, effects on current tasks, decrease in productivity and efficiency, rise in conflicts, and further summarised the challenges to economic and operational aspects.

Based on the studies, it has brought to light the crucial role that human skills play in effectively managing the issues that arise in the workforce of infrastructure projects during the pandemic. Measures must be taken to cover the performance gap between human skills and project performance. More research on the relevance of human skills and infrastructure projects during the COVID-19 outbreak is needed to increase awareness, close the gap, sustain, and generate incredibly effective projects. Nevertheless, the current available studies are either inadequate, unexplored, or underexplored. The effects of COVID-19 on the infrastructure project performance and the importance of human skills in project management is highlighted in Chapter 2 under the literature review.

This research will highlight the relevance and efficacy of human skills in infrastructure project performance while analysing the training and development to enhance the project performance.

1.3   Research Questions

The aim of this study is to respond to the research questions formulated based on the issues identified in the Problem Statement:

(i)   Research Question 1:

Is there is any relevance of human skills and the infrastructure project performance during the COVID-19 pandemic?

(ii)   Research Question 2:

Does applying human skills in the infrastructure project in during the COVID-19 pandemic result in performance efficacy?

(iii)   Research Question 3:

Did the training and development of human skills provide enhanced the infrastructure project performance during the COVID-19 pandemic?

1.4 Research Aim

The aim of this study is to investigate the relevance of human skills and their efficacy on the infrastructure project performance in Klang Valley, Malaysia during the COVID-19 pandemic and simultaneously to investigate the training and development in the infrastructure project performance during the pandemic.

1.5 Research Objectives

The objectives of this research are as follows:

(i) Research Objective 1:

To investigate the relevance of human skills and the infrastructure project performance during the COVID-19 pandemic.

(ii) Research Objective 2:

To investigate the efficacy of human skills in infrastructure project performance during the COVID-19 pandemic.

(iii) Research Objective 3:

To investigate the training and development in the aspect of human skills in the infrastructure project performance during the COVID-19 pandemic.

1.6 Research Scope

As the objective of this research is to investigate if there is a relevance of human skills on the infrastructure project performance in Klang Valley, Malaysia during the COVID-19 pandemic, the targeted respondents are all professionals from the Malaysian construction industry, working in developer, consultant, and contractor firms, respectively.

The data was gathered from competent professionals and subject-matter experts with experience in designing, cost estimating, dealing with authority requirements, project management, site management, and office management in infrastructure projects in Klang Valley, Malaysia, during the COVID-19 pandemic.

The study area in this research, the peninsular Malaysian region known as the Klang Valley, or Greater Kuala Lumpur, covers a total size of about 2352 square km (Wahab, et al., 2022). The region was determined to be an urban conurbation located

in Western Malaysia, which is the centre of the nation's commerce and industry (ExpatGo, 2014).

The suburban, urban, and rural areas constituting the valley are geographically enclosed by the Titiwangsa Mountains to the north and northeast, as well as the Malacca Strait to the west. The central water basin of the region is defined by the Klang River, spanning approximately 120 kilometres in length and covering an area of about 1,288 square kilometres. This basin encompasses the majority of the Federal Territory of Kuala Lumpur and extends into portions of the state of Selangor (Wahab et al., 2022). The federal territories and a few other nearby districts can be regarded as part of the Klang Valley even though there are no formal borders established. They consist of the following regions:

      (i)   The Kuala Lumpur Federal Territory.

      (ii)   The Putrajaya Federal Territory.

      (iii)   Petaling, District of Selangor.

      (iv)   Gombak, District of Selangor.

      (v)   Klang, District of Selangor.

      (vi)   Hulu Langat, District of Selangor.

      (vii)   Sepang, District of Selangor.

      (viii)   Kuala Langat, District of Selangor.
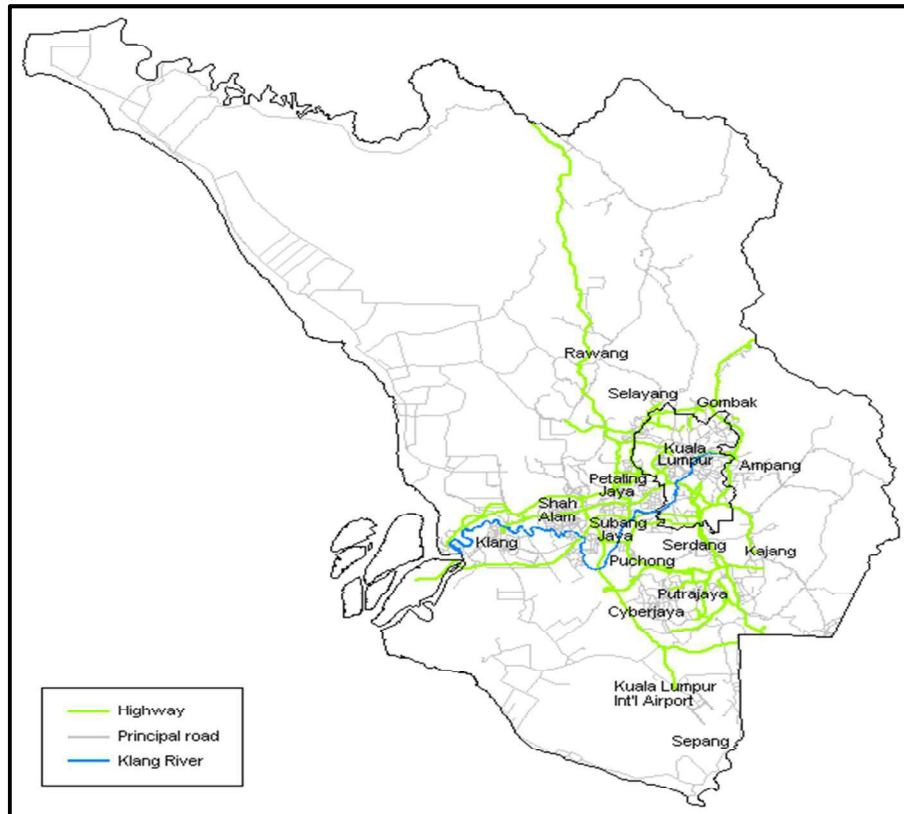
Figure 1.3: Klang Valley Region (Wikipedia, 2020)

With its rapid growth and urbanisation over the years, the Klang Valley has emerged as one of the region's most important economic hubs. A blend of contemporary skyscrapers, residential neighbourhoods, business districts, and cultural landmarks define it. With its diverse sectors, financial institutions, and global firms, the region is vital to Malaysia's economic growth.

1.7   Significance of Research

The present study is significant as it addresses the relevance of human skills which is one of the key success criteria to build successful relationships, and form highly productive teams and powerful organisations while enhancing the desired performance among the construction industry, particularly those involved in infrastructure projects in Malaysia.

Through exploring human skills, one can understand the importance of the skills required in the workplace and how they impact the productivity and performance of projects. It can also increase awareness of the importance of training and development throughout the organisation, which will eventually boost team member output and move projects closer to completion.

Consequently, this study will demonstrate the relevance and efficacy of human skills in infrastructure project performance while emphasising the significance of training and development in the same field.

1.8 Chapters Organisation

This section elucidated the project's structure, encompassing elements such as the background of the research, the statement of the problem, the aims and objectives of the research, the scope of the study, the justification for the research, the methodology employed, and the overall outline of the report.

1.8.1 Chapter 1 Introduction

In Chapter 1, the study delves into the contextual background, presenting the problem statement, research aim and objectives, research questions, research hypothesis, research scope, significance of the research, research area, and the overall research structure. The identification of the research problem is a focal point in this chapter, paving the way for the formulation of research aims and objectives through the exploration of research questions. The concluding subsection, outlining the research structure, is provided to facilitate a comprehensive understanding of the study's progression for the readers.

1.8.2 Chapter 2 Literature Review

Chapter 2 covers the overview of infrastructure developments in Malaysia, the COVID-19 pandemic, definition of human skill, type of human skills, importance and efficacy in infrastructure projects, and human skills from the aspect of training and development. This chapter attempts to offer readers with a comprehensive and fundamental grasp of human skills.

1.8.3 Chapter 3 Research Methodology

Chapter 3 explains in detail on the definitions of research methodology, research design and process, sampling design, questionnaire design, data collection methods and process, pilot test results, research ethics and expected work schedule.

1.8.4   Chapter 4 Results and Discussions

Chapter 4 will present the findings derived from the analysis of data gathered through the questionnaire. It will be supported by the information outlined in Chapter 2 to elaborate on the participants' perspectives in alignment with the project's goals and objectives.

1.8.5   Chapter 5 Conclusions and Recommendations

Chapter 5 will clarify the main conclusions, emphasising research limitations. Furthermore, various suggestions for future investigations will be proposed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Malaysia's rapidly expanding and well-built infrastructure is the foundation of the country's social and economic development. Infrastructure projects rely significantly on human skills, as its design, implementation, and management demand a wide range of competences, including human skills. Managing an infrastructure project is a difficult task and one could argue that this is due to the major negative influence it has on the local economy, ecology, and community (Zuo, et al., 2018).

Infrastructure projects are expensive, complex, fascinating, controversial, and full of control problems (Frick, 2008). Both dynamic and detail complexity are problems for these initiatives (Ninan, Hertogh and Liu, 2022).

Generally, the project team and its stakeholders bear the responsibility of reducing negative effects during the project. According to Xie, et al. (2014) and Zhao, et al. (2012), effective project delivery necessitates not only the management of resource constraints but also effectively managing project stakeholders. Professionals in construction management should have a wide variety of knowledge and skill sets, according to Edum-Fotwe and McCaffer (2000).

Internal and external stakeholders with frequently divergent expectations must be managed over the course of the project within the limitations of available resources, sometimes necessitating the use of new technologies (Xie, et al., 2014; Datta, et al., 2020). The two main categories of those skills are general skills and specific skills.

While general skills lay a large portion of the groundwork for the development of project management skills including problem solving, leading, communicating, and negotiating, specific skills relate to knowledge that are directly related to construction of projects (Xie, et al., 2014; Datta, et al., 2020).

Success criteria are the measurements used to evaluate a project's performance, while success factors are the inputs into the management system that either directly or indirectly support a project's success (Nguyen, et al., 2004). Similarly, project success ought to result from resource management, especially with regards to human resources (Creeasy and Anantatmula 2013).

Comparably, Fisher (2011) determined that recognising behavioural characteristics, leading and influencing others, authentic behaviour, conflict management, and cultural awareness are the most crucial human skills required for a successful project.

In their argument Ninan, Hertogh, and Liu (2022) emphasised that professionals engaged in infrastructure development should combine a foundational comprehension of various disciplines with specialized expertise in a specific area. The cultivation of competencies such as profound knowledge, the capacity to grasp diverse domains, adaptability to change, effective decision-making skills, and a commitment to continuous learning plays a pivotal role in shaping T-shaped infrastructure development professionals. Figure 2.1 below illustrates their argument.
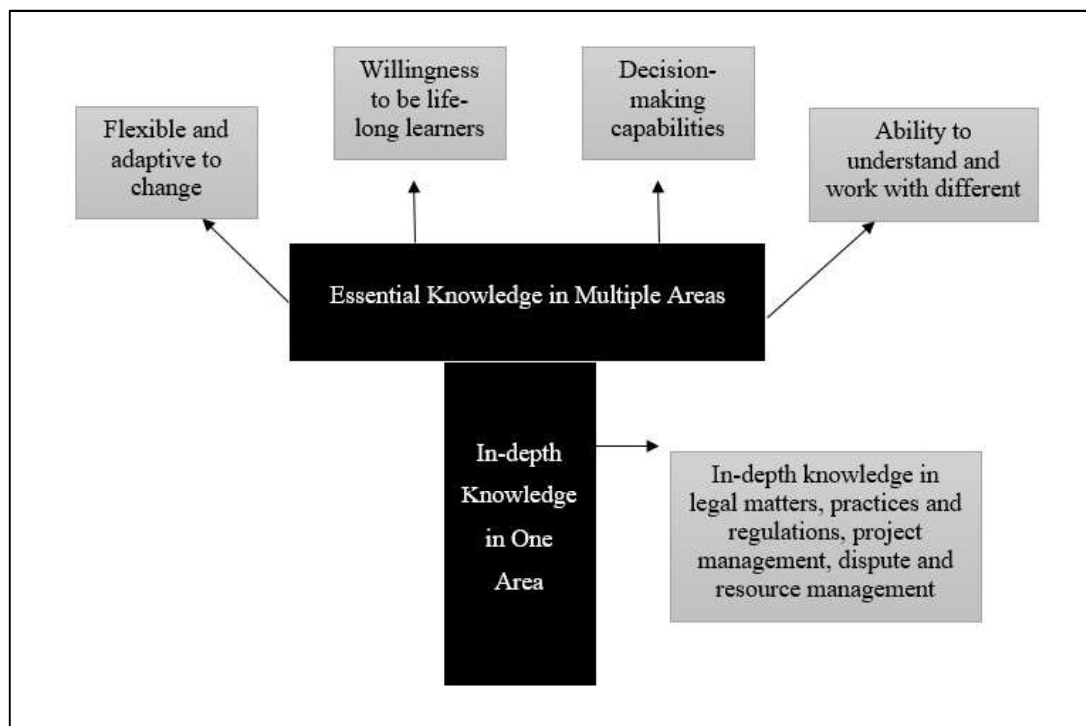
Figure 2.1: Competency Framework for Overseeing Infrastructure Projects with T-Shaped Skills (Ninan, Hertogh and Liu, 2022)

Nevertheless, the importance of human skills in the success of infrastructure projects is undeniable, and it significantly contributes to the economic growth of the country. Marcelo, et al. (2015) comparatively argued that infrastructure services are often included in national development plans and are underprovided in many locations;

they are commonly considered critical to trade connections, public health, social welfare, and economic development.

Amann, et al. (2016) mentioned that one of the most difficult relationships to evaluate in macroeconomics is the causal relationship between infrastructure and economic growth. Infrastructure investment is fuelled by economic growth, which in turn influences the accumulation of infrastructure.

Ivanova and Masarova (2013) stated in their research that employment, earnings, consumption, savings, investment, and tourism benefits; will eventually have an effect on the GDP, the primary macroeconomic indicator that gauges the state's economic output. Furthermore, infrastructure plays a vital role in international relations including international trade and collaboration across various domains.

In his newspaper article, Mahbob (2014) asserted that unquestionably, infrastructure advancements have a significant impact on the economy. Without a strong infrastructure network, it is impossible for products and services to move around effectively. Many of us tend to overlook this reality in favour of highlighting the importance of other elements, including the accessibility of a strong banking system and the simplicity of conducting business, among others.

The previous studies on infrastructure projects have emphasised the relationship of a nation's infrastructure development and its economic growth. Undeniably, there is a symbiotic relationship between infrastructure development and the economy. A thriving economy offers the resources and incentives for ongoing infrastructure development, while well-planned and carried out infrastructure projects can spur economic growth, create jobs, increase productivity, and improve quality of life.

Considering all the above, beyond a doubt, human skills are important to any project, but it is greatly required in infrastructure projects as it is the pillar of a nation's social and economic development.

Considering its importance and impact on the economic growth, employment opportunities, higher productivity across multiple industries, improvised standard of living, regional development, environmental sustainability, and other aspects, it can be certainly accepted that human skills plays a pivotal role in a nation's success and prosperity.

The new Madani Nation slogan, "Sustainable, Prosperous and High Income Nation" unveiled by Prime Minister Dato Seri Anwar Ibrahim on 19th January 2023, aligns with this and is meant to steer the nation in the right direction.

2.2   Overview of Infrastructure Development in Malaysia

Malaysia has experienced incredible economic growth and development in recent years, and a major factor in this advancement has been the strong infrastructure that runs throughout the nation, supporting a variety of industries and raising the standard of living for all of its residents. Malaysia's dedication to modernity and sustainable growth is demonstrated by its infrastructure.

According to Naidu (2008), the growth performance of the Malaysian economy, the physical landscape, and the socio-economic disparities among different regions persist as significant factors influencing infrastructure development in the country.

In their research, Azam and Nor (2017) have stated that Malaysia holds the 29th position among 144 countries in terms of its infrastructure quality, contributing to its appeal as a competitive investment destination. Within the Malaysian context, it is crucial to delve deeper into the topics of infrastructure development and regional disparities, as the positive impact of infrastructure development may be particularly pronounced in enhancing the income and welfare of the less affluent population.

According to Dani and Chin (2008), around a decade ago, the responsibility for infrastructure provision in Malaysia was largely shouldered by the public sector, leaving the private sector with less significant roles in fulfilling local needs.

There are two primary categories into which infrastructure can be classified: economic infrastructure and social infrastructure. The realm of economic infrastructure encompasses sectors like transport, communication, irrigation, energy, and banking. On the other hand, social infrastructure pertains to areas such as health, education, and housing, as outlined by Azam and Nor (2017).

Establishing the groundwork for prolonged economic growth and elevating the quality of life for its citizens, infrastructure investments play a crucial role. Thanks to substantial investments in infrastructure in Malaysia's history, a significant portion of the population now enjoys access to essential amenities such as clean water, energy, transportation, and communications.

Infrastructure improvements such as connected water services, high-speed broadband, ports, airports, and rail have made it possible for development to flow

throughout the country both virtually and physically, raising living standards and productivity across the board and enabling progress in all areas.

According to the article in 2023 by Construction Industry Development Board (CIDB), the types of infrastructures in Malaysia are as described in Table 2.1 below.

Table 2.1: Types of Infrastructure (CIDB, 2023)

Types of Infrastructure		
1	Aviation	Airports, Air Traffic Control, Heliports; Ground Facilities.
2	Power and Energy	Electric Power Grid Systems, Atomic Facilities, Gas Transmission Lines, Non-Renewable Resources; Sustainable Energy.
3	Water	Main Water Lines, Wells; Pumping Stations
4	Telecommunication	Telephone Wires and Cables, Radio Broadcasting Systems, Mobile Network Towers, Satellites; Internet.
5	Railways	Railway tracks, locomotives, subterranean passages, rail bridges; railway stations.
6	Waste Management	Wastewater Facilities, Landfills, Treatment Facilities, Recycling Facilities; Storage Facilities.
7	Bridge	Beam Bridges, Cable Bridges; Arch Bridges
8	Roadways	Roads, Bridges, Tunnels; Bus Transit.

In the 2015 publication by the Economic Planning Unit (ICU), it was highlighted that during the Tenth Malaysia Plan (2011-2015), the government initiated significant capital injections into transportation, digital, and energy infrastructure to address the rising demand for these resources. The national road network experienced a noteworthy 68% growth from 2010 to 2015, facilitating enhanced connectivity among communities and contributing to the advancement of Malaysia.

Notably, the Port of Tanjung Pelepas and Port Klang secured positions in the World's Top 20 Container Ports, with cargo and container volume experiencing a 23%

increase since 2010. To accommodate this surging demand, expansion projects were initiated at these ports (ICU, 2015).

Kuala Lumpur International Airport (KLIA) witnessed the opening of a new runway and terminal, resulting in a 46% growth in passenger numbers from 2010 to 2014. The National Broadband Initiative successfully rolled out 55,801 km of fiber, elevating broadband penetration to 70.2% of Malaysian households. Additionally, the construction of the Pengerang Integrated Petroleum Complex (PIPC) commenced in 2012 on approximately 9,100 hectares of land, enhancing energy security for Malaysians (ICU, 2015).

During the Tenth Malaysia Plan (2011 – 2015), notable progress was made in enhancing infrastructure to bolster economic growth, surpassing the achievements of the preceding development plan from 2006 to 2010, as depicted in Table 2.2 below.

Table 2.2: Achievements: Tenth Malaysia Plan, 2011 – 2015 (ICU, 2015)

No.	Focus Area	Achievement	
1	Improving physical infrastructure to boost accessibility and connectivity	A new road has been incorporated, expanding the overall network by 68% from 2010 to 2015	93,100 km
		The National Road Development Index rose from 1.42 in 2010	2.29
		Notably, two ports, Port Klang at #13 and Port Tanjung at #19, secured positions in the World Top Ranking	Top 20
		There was a rise in the number of passengers managed at airports between 2010 and 2014	39%
		KLIA2 was inaugurated in 2014, and the third runway became operational during that period	
2	Establishing a people-centric public transport system	Increase in urban rail ridership from 2010 to 2014	32%

No.	Focus Area	Achievement	
3	Expanding logistics and streamlining trade facilitation	Word Bank Logistic Index ranking rose from 29 to 25 in 2014	25th Ranking
4	Enhancing broadband coverage and initiating DTT migration	The percentage of households with broadband access as of 2014	70%
		Regions across the country equipped with Digital Terrestrial Television (DTT) accessibility by the conclusion of 2015	95%
5	Undertaking initiatives to restructure the water services industry	The population provided with clean and treated water by the year 2013	95%
		Sewage coverage, measured in grid and septic tanks, in terms of population equivalence by 2015	41 million PE
6	Ensuring efficient sourcing and delivery of energy	Generation capacity added	5,458 mw
		Increased LNG import capability via RGT-1	3.8 mtpa
		Rural electricity coverage rose from 93% in 2010	98%

2.3   The COVID-19 Pandemic

According to ICU (2021), the Malaysian economy followed its intended growth path from 2016 to 2019. The driving force behind this growth was sustained by domestic demand, while the external sector experienced moderate expansion despite challenges in the global environment. Stable labour market conditions, low inflation, and increased household income supported household spending.

Despite these positive aspects, the economy faced various challenges, including a slow structural economic transition, limited trade gains, disruptions in fiscal consolidation, socioeconomic inequalities, and adverse environmental impacts associated with growth pursuits. The final year of Vision 2020 posed the most

significant challenge, marked by the unprecedented COVID-19 pandemic, leading to economic growth falling below the target set for the Eleventh Malaysia Plan, 2016-2020 (ICU, 2021). Refer to Table 2.3.

According to ICU (2021), the Twelfth Plan (2021-2025) is a comprehensive economic recovery strategy designed for both medium and long-term objectives. Its primary aim is to counteract the repercussions of the COVID-19 pandemic and restore the economy to its sustained growth path over an extended period. Anticipated outcomes include a robust rebound of the economy, with the goal of attaining stronger and more sustainable growth throughout the 2021-2025 period.

Regardless of the setbacks posed by the pandemic, ICU (2021) documented positive improvements in the provision of fundamental infrastructure and amenities in 2020, refer to Table 2.4 below. These improvements incorporated the expansion of broadband infrastructure coverage, enhanced access to clean and treated water, improved electricity supply, and the expansion of paved roads.

Table 2.3: Gross Domestic Product and Construction Sector Growth, 2019 – 2023 (DOSM, 2023)

Year	Malaysia's GDP Growth	Construction Sector (Main Economic Activity)
2019	4.4%	0.6%
2020	-5.5%	-19.4%
2021	3.1%	-5.2%
2022	8.7%	5.0%
2023 (as of Quarter 3)	3.3%	5.8%

Table 2.4: Achievements: Eleventh Malaysia Plan, 2016 – 2020 (ICU, 2021)

No.	Focus Area	Achievement
1	Access to clean and treated water supply	95.1%
2	Broadband Coverage in populated areas	95.5%
3	Access to electricity supply	98%
4	Access to rural paved roads	3,982 km
5	Access to health centres	92.6%

Mohsen, et al. (2021) stated that COVID-19 is undeniably a global issue with far-reaching consequences spanning various industries, construction included. The pandemic is resulting in significant setbacks and disruptions in numerous construction endeavours.

According to the Quarterly Construction Statistics, Fourth Quarter 2020 by DOSM (2021), the value of completed construction work decreased by -19.4% to RM117.9 billion compared to RM146.4 billion in 2019. These subsectors recorded a decrease i.e. Civil Engineering -24.0%, Residential Buildings -17.2%, Non-Residential Buildings -17.1%; and Special Trades -2.1%.

DOSM (2022) recorded in the Quarterly Construction Statistics, Fourth Quarter 2021, that the value of completed construction work was increased by -5.0% in 2021 compared to -19.4% in 2020. The value of construction work completed recorded an increase across all subsectors, Special Trades by 35.8%, Non-Residential Buildings by 0.8%, Residential Buildings decreased by -9.3%; and the Civil Engineering decrease by -12.1%. Refer to Figure 2.2 and Table 2.5 for the pertinent information.
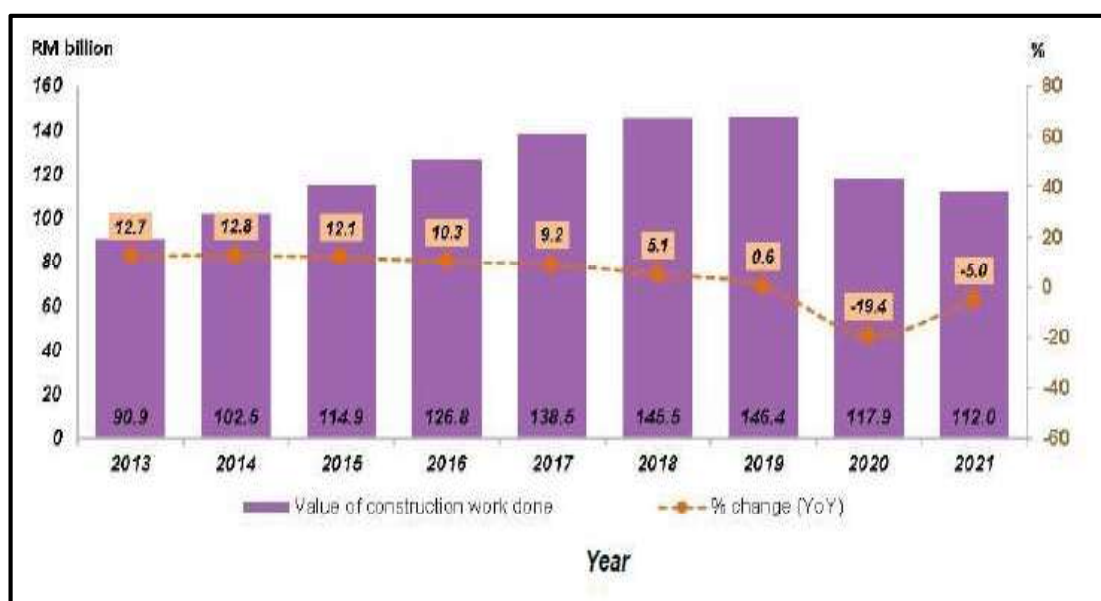
Figure 2.2: Construction Work Done Value and Yearly Percentage Change, 2013 - 2021 (DOSM, 2022).

Table 2.5: Construction Work Contributed by Subsectors, 2020 - 2021 (DOSM, 2022)

No.	Subsectors	2020	2021
1	Civil Engineering (Infrastructure classified in this subsector under Code 4210, 4220; and 4290 in the MSIC).	RM49.9 billion; 42.3%	RM43.8 billion; 39.1%
2	Residential Buildings	RM29.6 billion; 25.1%	RM26.8 billion; 24.0%
3	Non-Residential Buildings	RM31.1 billion; 26.4%	RM31.4 billion; 28.0%
4	Special Trades Activities	RM7.3 billion; 6.2%	RM9.9 billion; 8.9%
Grand Total		RM 117.9 billion	RM 112.0 billion

In the technical notes released by DOSM (2022), infrastructure developments are classified within the Civil Engineering section of the Malaysia Standard Industrial Classification (MSIC). This sector played a significant role in construction activities across various subsectors during the COVID-19 pandemic in 2020 and 2021, as illustrated in Table 2.5. Specifically, the Civil Engineering subsector includes activities listed under Code 4210 (Construction of Roads and Railways), 4220 (Construction of Utility Projects), and 4290 (Construction of Other Civil Engineering Projects except Buildings).

While battling the COVID-19 pandemic, the Malaysian government has been consistently undertaking efforts to enhance the existing infrastructures and develop new projects to ensure the seamless daily functioning of the population in Malaysia. This is particularly crucial in the densely populated Klang Valley, often regarded as the heart of the country.

The renowned Saloma Link, a pedestrian and bicycle bridge spanning the Klang River, along with the completion of the MRT Line 2 Sungai Buloh-Serdang-Putrajaya, Damansara-Shah Alam Elevated Motorway (DASH), and Sungai Besi–Ulu Klang Elevated Motorway (SUKE), all achieved amidst the challenges posed by the COVID-19 pandemic, stand out as noteworthy infrastructure accomplishments. These

projects merit special mention, underscoring the government's dedicated commitment to moving forward during difficult times.

Not to be overlooked are the ongoing River of Life Project to improve the aesthetics of the surrounding rivers and the Klang Valley Double Tracking Phase 2 which intends to improve and modernise the region's current railway tracks.

2.4   What are Human Skills?

The phrase "human skills" refers to any competencies that are not specifically related to a task; they are essential for every role because they primarily concern interpersonal interactions with other members of the organisation (Cimatti, 2016).

Bishop (2017) stated that human skills are defined as follows: written and verbal communication; successful teamwork; a willingness to learn; being teachable; a strong work ethic; leadership traits; motivation; flexibility; creativity; skilful problem-solving; and an overall good attitude. Predictably, productivity and human skills will be positively correlated. The deficiency of the aforementioned human skills is likely to adversely affect overall employee productivity.

According to Jacobson (2019), human skills are character traits that help leaders communicate with people in productive and constructive ways. Creativity, emotional intelligence, problem solving, strategic thinking, empathy, and storytelling are some of these vital abilities.

Sinek (2021), an English-American author and inspirational speaker, abilities such as effective confrontation, empathy, and patience are not merely soft skills; they are fundamentally human skills that require intentional learning. Frequently, organizations fail to recognize their most proficient internal leaders due to a lack of emphasis on these vital interpersonal attributes.

He has also extensively quoted as saying that he disagrees with the term "soft skills" and believes it should be called human skills, as it is not easy to be developed and requires learning.

"I really reject the idea of soft skills. There is nothing soft about them. We have hard skills and we have human skills. We need more human skills in business today" (Simon Sinek, 2021).

Conversely, attitudes and soft skills are more closely associated. Human skills are characterised as a stable, long-lasting, learned predisposition to respond to certain things in a certain way, mostly derived from psychological qualities, preferences, experience, upbringing, and other factors (Balcar, 2016).

According to an article by Jacobson (2019), a tech-savvy workforce is becoming more and more important as technology transforms every industry and permanently alters how companies function. But this tendency also increases the demand for human skills; a set of skills that only humans can acquire. Future workers will need leaders who can function well in a variety of settings and circumstances.

A study conducted by the Carnegie Mellon Foundation and the Stanford Research Institute International revealed that mastery of human skills accounts for 75% of long-term employment performance, whereas technical skills account for only 25% (Hansen, 2018). Human skills are more important than hard skills, according to 57% of world leaders (Dewar, 2023).

As illustrated by Bishop (2017) in Figure 2.3, an employee's productivity is the result of their education, experience, and human skills. Consequently, the employee's productivity serves as the dependent variable, while education, experience, and human skills are considered independent variables. Cost and culture are identified as moderating variables, playing a role in influencing the relationship between the independent and dependent variables.
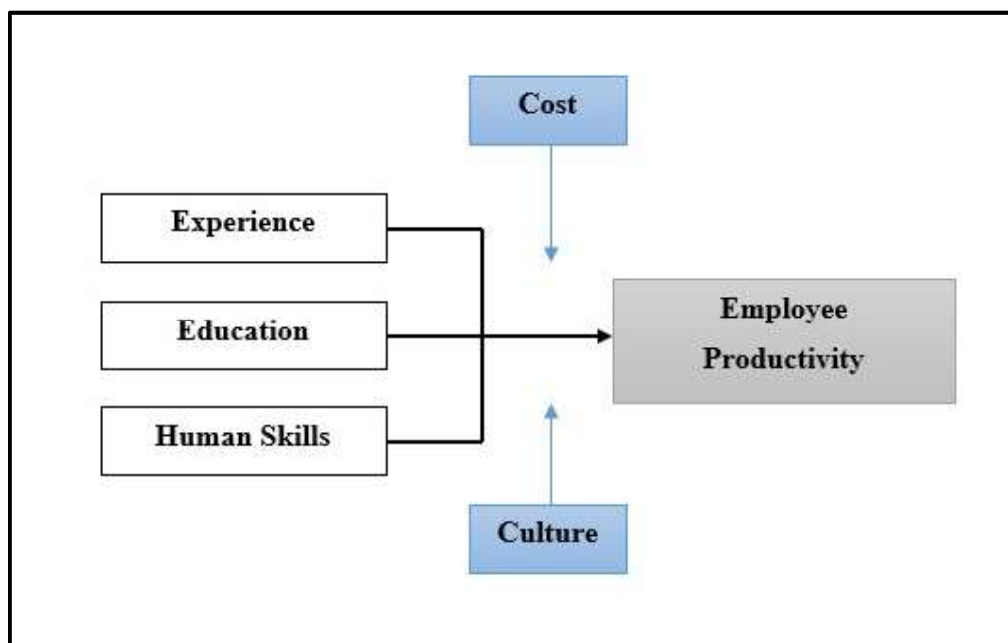
Figure 2.3: Employee Productivity Model (Bishop, 2017)

The present study aims to conduct a thorough investigation of human skills, examining their many attributes, widespread impact, and crucial function in promoting both personal and societal achievement in the modern world.

2.5   Human Skills in Project Management

Given the extraordinary uncertainty of phenomena like the COVID-19 pandemic, climate change, the rapid adoption of new technologies, and the rise of new areas of techno science, engineers are likely living in the most complicated and volatile moment in human history (Cruz, Dominguez and Cerveira (2021).

Over the past few years, there has been a notable shift in the skill sets deemed crucial for achieving success in the workplace. In response to the competitive dynamics of a global economy, employers emphasise the necessity of a more adept, responsible, and trainable workforce (Pant and Baroudi, 2006).

Meredith and Shafer (2021); Mantel (2011), categorised skills into six domains, which include organisational, communication, leadership, team-building, cognitive, and technology abilities. Katz (2009) asserts that the autonomous development of human, conceptual, and technical skills is necessary for effective administration.

Presently, most businesses require employees to exhibit and excel in a broad spectrum of human skills, encompassing teamwork and interpersonal growth (Wu, et al., 2018). According to El-Sabaa (2021), the human skills of project managers have the biggest impact on project management practises, whilst their technical skills have the least.

The prosperity of an organisation is closely tied to its ability to retain essential staff members integral to its daily functions. In contemporary times, businesses not only evaluate the hard skills specific to job efficiency but also consider the human skills of their workforce. Human skills encompass interpersonal abilities such as adaptability, teamwork, and communication (Gallardo, 2020).

According to Alam, et al. (2010), in the modern workplace, efficient communication between low and middle level managers and their respective subordinates is crucial for a company to run smoothly. Learning effective communication skills will improve the workplace atmosphere and prevent miscommunication between staff members and their immediate superiors. In addition,

good teamwork demonstrates the manager's capacity to collaborate with a group of individuals to achieve a common goal.

Human skills entails distributing responsibility, embracing all viewpoints, and attentively considering input from fellow team members. In contrast, adaptability is a human skill that characterizes a manager's ability to adeptly respond to diverse situations and collaborate effectively with individuals from various backgrounds and cultures (Gallardo, 2020).

Turner (2016) has reframed his concept of a "project" to include the human aspects in recognition of the importance of people management abilities. According to his definition, a project is "an undertaking in which human, financial, and material resources are orchestrated in an innovative manner to execute a distinctive scope of work, with specified requirements, while adhering to cost and time constraints." Encouraging change, as indicated by quantitative and qualitative criteria, is the ultimate goal.

As per Rahmani, et al. (2021), human skills encompass leadership, time management, problem-solving, communication, empathy, and interpersonal abilities. Due to their crucial role in any job, these skills are among the key attributes hiring managers seek in candidates. Given that they significantly enhance the likelihood of success in the workplace, hiring managers frequently prioritise candidates with strong human skills.

According to Kloppenborg, Shriberg and Jayashree (2003), competent project leadership involves more than just technical know-how; it also entails having the ability to manage a team. Strong relationship-building skills are necessary to guarantee stakeholder satisfaction at every stage of the project.

Bourne and Walker (2004) stated that since people apply their knowledge and creativity to complete projects rather than just employing hardware or processes, relational skills are an excellent complement to hard (technical) abilities.

Project success depends on soft skills, which Belzer (2001) refers to as "the missing link" in project management. This category includes abilities including teamwork, adaptability, creativity, leadership, communication, organisational effectiveness, problem solving, and decision-making.

Even if someone possesses exceptional technical and job-specific expertise, they may face challenges at work if they struggle with time management or teamwork. Human skills are pivotal for success, as most employers depend on them for effective

performance. Previous research suggests that a primary reason for project failures is the absence of necessary human skills among project management professional (Ling, et al., 2009).

In the middle of the 1980s, the United States based Project Management Institute (PMI) created the first Project Management Body of Knowledge (PMBoK), which served as the foundation for a global standard and certification in project management, to give project managers a written guideline for how they should define and design their success (Alam, et al., 2010).

The PMBOK guide, which has undergone multiple iterations of development, has consistently prioritised the hard skills considered essential for project management, pushing soft skills to the side (Baroudi and Pant, 2008).

Project Resources Management and Project Communications Management are two examples of knowledge areas that deal with human factors in the PMBoK; these areas are usually viewed as secondary to the more technically driven domains. Even in these domains of knowledge, it seems that process and instruments are given more weight than cognition and human interactions (Baroudi and Pant, 2008).

It is reasonable to say that the Associate Project Management (APM) United Kingdom (UK), which created the Associate Project Management Body of Knowledge (APMBoK), in the early 1990s, recognised the significance of human skills (Alam, et. al., 2010). Communication, teamwork, leadership, conflict management, negotiation, human resource management, behavioural traits, learning and development, professionalism and ethics are the key processes linked to people skills (APMBoK, 2020). The APMBoK appears to be a key resource in British project management education.

Developing students' critical thinking for handling complex projects, developing the "softer" aspects of project management such as leadership and interpersonal skills, and preparing project managers to work in the context of actual projects are all areas that educators frequently overlook (Ramazani and Jergeas, 2015).

According to Agrawal, et al. (2020), prior to the COVID-19, employment and the skills required to perform them were being disrupted by new technologies and methods of working. In the 2017 McKinsey Global Institute projection, automation and artificial intelligence might push up to 375 million workers, or 14% of the world's workforce, to change careers or pick up new skills by 2030. 87% of executives in a

recent McKinsey Global Survey that they were either already seeing skill gaps in the workforce or anticipated them in the coming years.

In addition to this, the study will delve deeper into the human skills required in project management during COVID-19 pandemic, and their efficacy on the performance of infrastructure projects. Subsequently, aspects related to training and development will be addressed.

2.5.1 Active Listening

According to Weger, et al. (2014), listening is "the process of receiving, constructing meaning from, and responding to spoken and/or nonverbal messages".

Friston, et al. (2020), stated speech recognition is a challenging field. It is the job of the auditory system to interpret a continuous audio signal into spoken words; hence, this continuous signal must be divided into discrete words. The acoustic signal provides few indicators for a novice listener to identify word boundaries.

Active listening is a dynamic, involved activity that calls for deliberate focus and understanding; it goes beyond simply hearing what is being said. In a variety of settings, including the business and interpersonal relationships, the capacity for active listening can greatly improve teamwork, encourage empathy, and fortify bonds.

Jahromi (2016) stated that listening is an essential but sometimes is disregarded. It is difficult to listen intently and focused when one's listening habits are often poor. Hearing is only one aspect of listening; listening is an attitude and a complex interaction of mental and emotional processes.

2.5.2 Adaptability

Adaptive capacity and adaptability are synonymous terms. According to Pisano (2012), the idea is defined as an actor's ability to affect resilience inside a system. Construction projects are extremely challenging to manage since they are filled with ambiguities and uncertainties. Construction stakeholders place a high value on adaptation since they understand that change is inevitable due to the complication of projects. This allows them to endure in the face of these disruptions (Abankwa, 2019). The ability to limit the effects of uncertainty by seizing opportunities is reflected in adaptability. This idea manifests itself in several ways (Pim-Wusu, Aigbavboa and Thwala, 2022).

The ability to easily adjust one's behaviour to suit a task or scenario is a crucial personal quality that may be especially relevant to the development of emotional

intelligence (EI). Essentially, it might be said that adaptability is a key trait of entrepreneurs, who frequently have to deal with risk and uncertainty (Barber, et al., 2023). The concept of adaptation has the potential to be significant in the entrepreneurial domain. According to certain theories, adaptability demonstrates the ability to strike a balance between pursuing improvements and achieving goals at the same time (Morris, et al., 2013).

2.5.3   Cognitive Flexibility

In early models of intelligence and creativity, cognitive flexibility was recognised as a feature of human cognition and intelligent behaviour. Ionescu (2012) stated that multitasking, coming up with new ideas, and flexible problem solving are only a few examples of behaviours that are thought to be flexible; it is challenging to identify one as the archetypal flexible behaviour. Several actions are classified as flexible behaviours, including the ability to seamlessly transition between tasks or engage in multitasking, adapting behaviour in response to new rules, discovering innovative solutions to problems, and generating fresh knowledge or tools (Goldstone and Landy, 2010; Leber, et al., 2008).

According to Diamond (2013), cognitive flexibility refers to the capacity to adaptively choose among various representations of an object, viewpoints, or methods in order to adapt to the needs of a scenario. Task-switching paradigms are most frequently used to assess cognitive flexibility. They measure how easy it is to move between several sets of sorting rules, revealing early successes (Ionescu, 2012).

Cognitive flexibility is the capacity to disrupt ingrained thought patterns, get over functional fixity, and create new, imaginative connections between ideas. Researchers view cognitive flexibility as the fundamental component of creativity and as a required but insufficient element of "real-life" creativity (Ritter, et al., 2012).

2.5.4   Conflict Resolution

The state of dispute disagreement can be the sole definition of conflict. Conflict arises between people when their actions are incompatible with each other's ideals or when their actions prevent the fulfilment of one another's demands. There are real or surface-level reasons for interpersonal communication problems (Ay, Keskin and Akili, 2019). A sense of indecision, incompatibility, and hesitation felt by the person compelled to select between two opposed situations that occur simultaneously is referred to as

conflict (Seren and Ustun, 2008). Individual differences in ideas, attitudes, and priorities can lead to conflict during interpersonal encounters (Sinskey, et al., 2019).

2.5.5 Critical Thinking

The American philosopher John Dewey, who preferred to refer to critical thinking as "reflective thinking," clarified it as considering any belief or purported body of knowledge actively, persistently, and carefully in light of the premises supporting it and the subsequent inferences it likely leads to, and recognised the practise of approaching such matters with a scientific mind-set (Hitchcock, 2018).

Critical thinking involves the skill of examining and assessing thoughts with the aim of enhancing them (Paul and Elder, 2014). Drawing from the collective viewpoint of the national panel of experts, interpretation is defined as the ability to grasp and articulate the meaning or significance across a diverse range of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria. This involves sub-skills such as classification, interpreting meaning, and clarification (Facione, 2013).

The ability to reason logically and clearly while making decisions and considering the possible consequences of taking or not taking action are two characteristics that define critical thinking. This means having the capacity for deliberate, independent thought (Lau, 2011). A person with critical thinking skills can infer consequences based on their knowledge and effectively utilize information to address relevant or interconnected problems (Azam, 2020).

2.5.6 Decision Making

Navigating the decision-making process is a formidable challenge for any team. In the absence of a clearly outlined methodology to guide this process, teams may find themselves entangled in a dysfunctional cycle of indecision. Even when equipped with a well-defined process, decision-making can be disrupted by the failure to establish and uphold priorities or by inadequately assessing the importance of individual decisions within the broader project framework (Cervone, 2015).

One of the most important aspects of management in a variety of organisations is decision-making, which is typically thought of as the act of identifying a problem. A variety of different activities are developed in order to achieve these goals, and one

is selected. These options are compared and evaluated according to predetermined standards and criteria, with the best choice being chosen as a result (Mele, 2010).

Regardless of the type of organisation, decision-making is without a doubt the most important process. Decisions become increasingly important, critical, complex, and intrinsically strategic, especially when the results directly affect whether the organisation succeeds or fails (Qur'an, 2023).

2.5.7 Effective Communication

According to Choon Hua, Sher and Sui Pheng (2005), consistency in communication is the state in which the expectations of the sender and the responses of the recipients match. Thus, the goal of every communication is to make sure that the expectations of the sender and the reactions of the receiver are as similar as feasible. In summary, communication's goal is to guarantee that the recipient responds as expected by the sender. Manzanares, Segura and Pellicer (2023) stated, communication is considered effective within the design team and between the stakeholders involved, internally and externally.

In order to transfer and exchange project information at every step of the construction project lifecycle, effective communication is a crucial component of project success. As a result, given the volume of information involved in a single project and the number of parties involved, maintaining an appropriate communication strategy and efficient flow of information can be challenging (Gamiljj and Abd Rahman, 2021).

2.5.8 Emotional Intelligence

Emotional intelligence is the ability for a person to notice and understand both their own and other people's feelings. It entails being able to recognise and categorise distinct emotions and use this emotional intelligence to direct behaviour and mental processes (Selvi and Aiswarya, 2022). Self-awareness, social awareness, self-management, and relationship management are the four components of emotional intelligence (Hoxha and Zeqiraj, 2022). Emotional intelligence is a foundational but interrelated component of human skills (Golemon, et al., 2004; Zhang, et al., 2013). According to Golemon, et al. (2004), emotional intelligence is twice as crucial for occupations of all levels as technical skills. Their concept of emotional intelligence

combines personality traits with emotional competences, such as social and self-awareness that can be learnt and may lead to exceptional success at work.

The definition of emotional intelligence is disputed and complicated. According to some observers, emotional intelligence is the result of a sophisticated interplay between the meanings of emotions, mood, metacognition, and personality that is used in both intrapersonal and interpersonal contexts (Hoxha and Zeqiraj, 2022). Additionally, Pant and Baroudi (2008) argued that emotional intelligence and tacit knowledge, such as subjective, cognitive, and experiential learning, were tightly related. Boyatzis (2011) identified emotional, social, and cognitive intelligence as various aspects of project teams' emotional skills.

2.5.9   Empathy Mind-Set

Empathy mind-set, or the capacity to feel another person's emotions, is essential for prosocial behaviour, adaptive social functioning, and developing harmonious relationships amongst groups (Gandhi, Dawood and Schroder, 2017). The ability to understand and relate to the emotional experiences of others is the core of the empathy mind-set, which is a fundamental strategy. According to Weisz, et al. (2020), since empathy is linked to social and emotional consequences that are adaptive, one important unanswered question is whether or not empathy can be strengthened in a way that actually improves people's lives. The majority of initiatives aimed at fostering empathy focus on improving empathetic abilities through the development of perspective-taking abilities.

In addition to other emotional and social intelligence skills, empathy plays a critical role in lessening the detrimental effects of cognitive biases and improving one's ability to lead innovation teams and organisations, negotiate with suppliers, distributors, and financial backers, and comprehend customers, users, or stakeholders (Korte, Smith and Cheryl Qing Li, 2018). Different psychological mechanisms can be used to characterise empathy. These mechanisms include identifying with, perceiving empathy as a trait requiring a particular skill, understanding empathy as a dynamic process of stepping in and out of the other's situation; and analysing empathy as a composite of different components that include both affective and cognitive elements. Empathy is defined as the capacity to think and feel oneself into the inner life of another person (Keusters, et al., 2023).

2.5.10 Leadership

Leadership can be defined as the proficiency in influencing and team-building skills. It involves providing direction, support, and standards for accomplishment, communicating a compelling vision, strategically staffing, motivating others, building effective teams, and managing diversity, as articulated by Hogan and Kaiser (2005). According to almost every definition, influence is a necessary component of leadership. Every leader shares one or more followers among their possessions. One cannot be leading if no one is trailing them. Should A's activities change B's behaviour in a way that suits A's needs, then A is the one in a leadership position (Vroom and Jago, 2007).

The efficacy of a team, an organisation, a task within a project, and individual performance are all improved by leadership. Moreover, it has been shown that leadership adds value to a variety of teams, such as agile teams, military acquisitions project teams, engineering design teams, information systems development teams, industrial construction projects, and internationally dispersed new product development teams (Muller, Bodea and Radujkovic, 2023).

2.5.11 Negotiation

Negotiation is a voluntary, free-will process used to split resources among two or more parties or to resolve issues. In this way, communication occurs between the parties as they get in touch to exchange ideas and counter suggestions. Each side uses its own strategies in an attempt to get the best possible outcome. Every day, whether consciously or unconsciously, negotiations take place (Zohar, 2015). A series of activities known as negotiation take place in situations where parties see their interests to be different, interdependent, and where agreement may be able to resolve disagreements, By definition, negotiation takes time: there may be "turning points" when the negotiation's direction shifts, offers and words are exchanged, and influence processes take place (Carnevale, 2019).

The phases of negotiation involve planning, presenting and justifying, negotiating, making offers and counteroffers, employing different strategies, and, finally, selecting a course of action or reaching an agreement. There is no assurance that negotiations will result in a favourable outcome, which poses a risk (Zohar, 2015). The process through which two or more parties engage to develop possible agreements meant to direct and regulate their future behaviour is known as negotiation. "Whenever people cannot achieve their goals without the cooperation of others," negotiation is a

"ubiquitous social activity," according to the definition of the term (Martin-Raugh, et al., 2019).

2.5.12   Networking

Professional networking is a sequence of goal-oriented, face-to-face encounters with one or more contacts in the network that create and sustain professional connections and make up the mutually advantageous exchange of resources necessary for success in the workplace and career (Porter, et al., 2023). People can perform better at work and succeed in their careers when they have greater access to information, guidance, influence, and other types of social capital (Porter and Woo, 2015).

One would imagine that professional networking would be highly valued as a career management activity given its benefits. However, a lot of individuals think that professional networking is awkward or untrue. The question of why people network has gained attention as a result of these unfavourable perceptions of such a useful professional endeavour (Gino, Kouchaki and Casciaro, 2016).

2.5.13   Open-Mindedness

Considering that it is consistently linked to the search for the truth, open-mindedness is recognised as an intellectual value. However, other theorists contend that open-mindedness's capacity to support truth depends heavily on a number of different circumstances (Kwong, 2016). Being open-minded means being willing to reconsider one's opinions even after forming one, being open to new ideas, and being concerned with dispelling any barriers that prevent one from thinking outside of preconceived notions. The measure of our open-mindedness lies in our willingness to consider alternative perspectives (Spiegel, 2012).

Deliberative and implemental mind-sets ought to vary in terms of their receptivity to information, in addition to variations in cognitive tuning and biased judgements. According to task analysis, deliberative attitudes should be linked to increased openness to all kinds and sources of information while making decisions towards goals. Being receptive to any information that could potentially help one make informed selections is essential for making excellent decisions (Fujita, Gollwitzer and Oettingen, 2007).

2.5.14 Organisational Skills

Capabilities within an organisation are always relative. A higher organisational capability is attained by an organisation with comparable human and physical capital if it increases productivity through more effective production scheduling (Khan, 2019). The foundation of effective management and leadership is organisational competence. Numerous ideas exist concerning leadership, management, and their interrelationships. It is possible to see management as a by-product of leadership; those with leadership skills make excellent managers (Wicker, 2009).

Strong organisational abilities, which serve as the foundation for project management and implementation, are essential to the successful completion of infrastructure projects. Infrastructure projects require careful planning, organisation, and execution to ensure smooth progress because they are frequently intricate and varied endeavours. The capacity to plan and arrange people, materials, and schedules in an organised manner is essential to accomplishing deadlines and project objectives. To synchronise different project parts, organisational abilities in this context include strategic planning, effective resource allocation, risk mitigation, and skilful communication.

2.5.15 Ownership

The infrastructure development industry is a dynamic field where project success is contingent not only on advanced technology and careful planning, but also on the individual commitment and accountability of those spearheading these initiatives. There is a paradigm change occurring that highlights how important it is for workers to take ownership of infrastructure projects. This shift encompasses a cultural evolution that promotes proactive involvement, creative problem-solving, and a strong sense of responsibility among team members, going beyond the conventional boundaries of job responsibilities (French and Rosenstein, 1984).

2.5.16 Problem Solving

One of the most unique cognitive activities that facilitates professional practise is problem-solving skills development. Problem-solving allows one to think logically and develop appropriate solutions to solve complex, multidisciplinary problems that arise in the workplace (Jonassen, 2000). The debate over skills and knowledge captures the essence of the ongoing conflict between practise and education. Based on their

individual experiences, each side contributes a different viewpoint to the conversation (Megahed, Elshater and Afifi, 2019). The capacity of engineering graduates to use and reflect problem solving skills and knowledge is widely cited in institutional assessments on engineering practises as a significant attribute that employers look for. Solving problems is one of the most important talents that engineering graduates lack (Yusof, Phang and Helmi, 2014).

2.5.17 Safety Consciousness

Globally, the quantity and scope of construction industry projects have increased dramatically. Nonetheless, incidents in the sector continue to happen far too frequently, having detrimental effects on communities, businesses, and employees. Construction workers' personal safety may be significantly enhanced by safety consciousness, which has been found to be an influential construct (Meng and Chan, 2020). Numerous research studies that have focused on safety outcomes have studied this construct, which relates to an individual's awareness of and emphasis on safety issues. It embodies both behavioural and cognitive traits; it is behavioural in that it speaks to acting in a way that promotes safe practise, and it is cognitive in that it relates to having a mental awareness of safety at work (Koster, Stam and Balk, 2011). The predictive variables for organisational, personal, or behavioural safety outcomes are linked by researchers studying workplace safety consciousness (Beus, McCord and Zohar, 2016).

2.5.18 Stress Management

The development of stress at work is comparable. Sometimes the impact of a professional career is so great that it's not so much that a person has a job as it is that the person has their job, and the ultimate result may be "burnout." Stress and burnout are typically the result of a complicated interaction between personal traits and workplace concerns rather than being solely attributable to pressures at work (Patching and Best, 2014). Stress is a common occurrence, and there are several straightforward activities that have been shown in the literature to be beneficial in reducing stress, some more so than others, depending on the individual. One could argue that declining mental health is closely related to both the demands on the labour force and low resilience (Ajayi, Jones and Unuigbe, 2019). Psychologists disagree as to whether experiences at work or other circumstances contribute to workplace stress, but it is

widely acknowledged that stress has a negative impact on performance at work (Patching and Best, 2014).

2.5.19   Teamwork and Collaboration

Construction projects cannot succeed without teamwork and collaboration, and those involved are beginning to understand that information sharing and knowledge exchange are critical components of a prosperous contractual arrangement. The collaboration process between the primary contractor and subcontractor does not seem to have any defined guidelines, which makes it challenging to communicate effectively and accomplish shared project objectives within the constraints of time, money, and quality (Rahman, et al., 2014). Teamwork and collaboration enhances productivity and minimises errors by guaranteeing information integrity and facilitating process integration. Collaboration that works can also improve a company's reputation and close the building energy efficiency gap (Wilde and Jones, 2014).

2.5.20   Time Management

The process of tracking and managing staff time spent on a project is known as time management. The problems include inefficient time management, bad site records, poor software implementation, poor construction work planning, inadequate shareholder participation, and others. Consequently, these problems can cause delays and are frequently subtle, leading to disagreements, lawsuits, time and expense overruns, and the total abandoning of projects (Chin and Hamid, 2015). In both theoretical and practical publishing, time is becoming more and more important. The need to better account for time in theoretical models and research designs was brought up by several authors. Others concentrated on the time management techniques employed by employees in organisations and how these practises could be strengthened (Claessens, et al., 2007).

All things considered, the goal of this research is to contribute to the growing body of knowledge about human skills by highlighting their significance in a changing environment. With the aim of empowering people, institutions, and communities to fully use human potential in an era of rapid technological development and change, we want to clarify the nuances of these talents.

2.6   Efficacy of Human Skills

Human skills are crucial when working with people. Taking care of individuals and their needs, acknowledging their accomplishments, and demonstrating empathy for them helps to foster a healthy work environment (Singh, Agrawal and Modgil, 2021). Human skills are a vital component that are essential to the success and efficiency of infrastructure projects in their ever-changing landscape. While there is no denying that automated methods and technology breakthroughs have revolutionised the construction business, the intricate and multidimensional nature of construction projects need the special skills that humans offer. Human skills, which include a range of interpersonal, problem-solving, and adaptive proficiencies, are essential in guiding projects towards successful completion.

According to Boynton and Zmud (1984), human skills are those select few tasks that must succeed for a project to succeed. It is important to understand the difference between success factors and success criteria. Success factors are the management system inputs that directly or indirectly contribute to a project's success, whereas success criteria are the standards by which a project's success is determined (Nguyen, et al., 2004). Similar to this, Creasy and Anantatmula (2013) proposed that managing resources, particularly human and team resources, should lead to project success. However, no stated performance goals of the skill set of project managers have been recognized as a factor in the success of projects.

Belassi and Tukel (1996) proposed that elements influencing project performance should be related to a project, a project manager and team, an organization, and, finally, the external environment. The efficacy of a project team, which can contribute to their capabilities, knowledge, and skills toward finishing the project, is a key factor in the construction sector (Chen, et al., 2012). Projects heavily rely on the participation, responses, and interactions of people, especially those with non-tangible end results, making these interdependencies challenging to model and unpredictable. Project management is expanded beyond the execution phase to cover a wider spectrum of the product life cycle, even for projects (Azim, et al., 2010). To sum up, research from the past has established a link between human skill and better project performance. In conclusion, human skills are essential to infrastructure projects at every point of their life cycle, from planning and conceptualization to building and maintaining them. The success of these projects depends on the effective collaboration of varied people with a range of skills.

2.7   Training and Development

In the modern professional world, human skills are essential for 21st-century workers to successfully negotiate the competitive global workplace (Dean and East, 2019; Griffith and Hoppner, 2013). In order to succeed in the workplace, employers are placing a greater emphasis on the value of human skills including enhanced communication, teamwork, and socio-emotional talents (Cunningham and Villaseñor, 2016; Groh, et al., 2016). Important human skills include persuasive communication, cooperative teamwork, self-motivation, skilled problem-solving, zeal, and building trust (Ellis, Kisling and Hackworth, 2014; Rasul, et al., 2013). Effective training of soft skills is crucial for improving employee and corporate success (Dean and East, 2019).

Ibrahim, Boerhannoeddin and Bakare (2017) conducted a quantitative study to assess the impact of a human skills training programme on the competencies of 260 managers, executives, and supervisors from nine private organisations, which is another well-documented case in Malaysia. The study found strong evidence that adopting appropriate training methodologies and acquiring human skills can boost employee performance. The results show that a time-spaced learning approach, which involves providing breaks for trainees to practise and internalise the knowledge they have gained during the training programme, improves knowledge transfer, helps them acquire human skills more successfully, and boosts their productivity at work. This study found a significant correlation between work performance and the approach used in human skills training.

In today's industry, human abilities are obviously highly valued and necessary. Industries have long provided human skill training, but most of the time it has not been thoroughly evaluated. Because of this, it is difficult to determine if people possess the human skills necessary to effectively handle the problems posed by more sophisticated technology (Chuang, 2022).

2.8   Research Framework

A research framework serves as the structural backbone of any scholarly investigation, providing a systematic and organised approach to address research questions or hypotheses. It outlines the essential elements, conceptual underpinnings, and methodological structure that guide the study, offering a roadmap for researchers to navigate the complexities of their research.

In essence, the research framework for this study in Figure 2.4 delineates the theoretical foundation, key variables, and the interrelationships among them, creating a conceptual framework that shapes the study's design and execution. It not only defines the scope and boundaries of the research but also serves as a lens through which data is interpreted and findings are contextualised.

2.9   Summary

In summary, this chapter has delved into relevant literature on the research topic. It introduced infrastructure developments in Malaysia, explored the impact of the COVID-19 pandemic, discussed the human skills essential for successful infrastructure projects and their efficacy on performance, and examined pertinent aspects of training and development in this context.
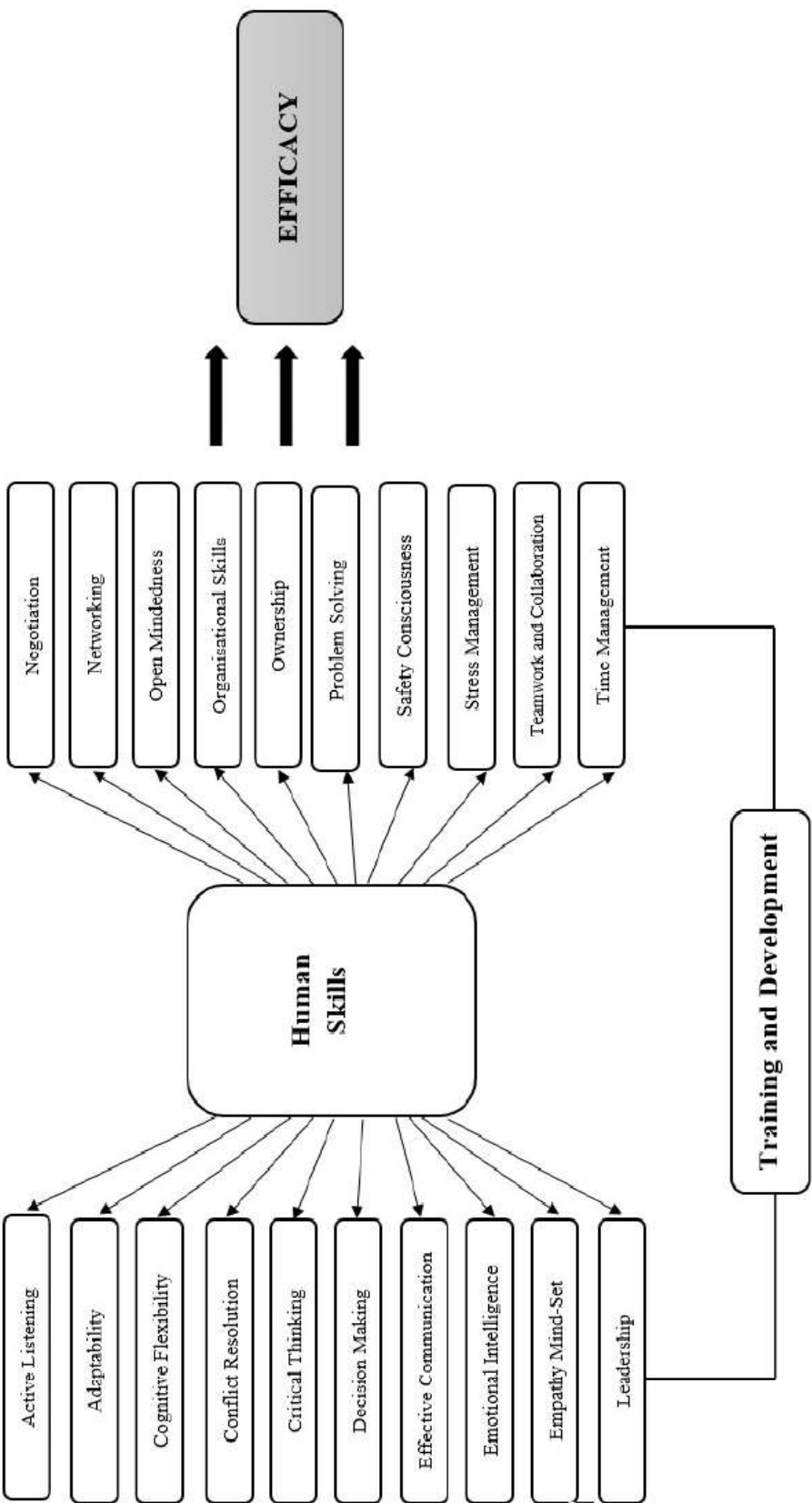
Figure 2.4: Research Framework

CHAPTER 3

RESEARCH METHODOLOGY

3.1   Introduction

This chapter comprises sections that delve into various aspects of research methods. These include qualitative research design, data collection methods such as literature reviews and interview types, data analysis methods, reporting approaches, and considerations for sample size.

According to Kothari (2009), research is characterized as a scientific and systematic search for pertinent information on a specific topic. He emphasises the systematic approach involved, which includes presenting the problem, formulating a hypothesis, collecting data or evidence, evaluating the data, and drawing conclusions leading to a solution or a generalisation of a theoretical formulation.

Saunders, et al. (2016) define research as a systematic method employed by people to discover things and expand their knowledge. They underscore the importance of terms like systematic method and finding out things. Creswell (2018) categorise research methods into three types: mixed, quantitative, and qualitative. They also highlight the significance of various research methodologies, encompassing approaches to data collection, analysis, and interpretation recommended by researchers for their studies. However, the term methodology specifically refers to the methods researchers use to address diverse challenges in their studies (Taylor, et al., 2016). Consequently, research methodology outlines systematic approaches or processes frequently utilized to classify, gather, and assess information and data relevant to the research issue.

3.2   Selection of Research Method

The quantitative research method will be applied through the development of a questionnaire. The rationale behind choosing the quantitative approach lies in the ability to swiftly gather large volumes of data through the distribution of a questionnaire survey, in contrast to the time and expense involved in qualitative research methods like interviews. Additionally, qualitative methods, such as interviews, may be less suitable due to their engagement with a limited number of respondents, whose perspectives may not necessarily represent those of the broader

population. The insights gained from interviews may not offer a comprehensive representation of the entire population's viewpoints. Moreover, the decision to opt for the quantitative research method is driven by the need for specific information in this research, coupled with constraints in resources such as time and cost.

3.3   Research Design and Process

According to academics Bryman (2012) and Creswell (2018), research design is a structure or framework that describes how data is collected and interpreted. It provides the overall framework for the study effort. The research design must be well thought out and planned before beginning any investigation. According to Kothari (2009), research design is crucial in helping to carry out research operations in an effective manner that yields the most trustworthy and perceptive results while making the most use of available resources, such as time and money. In order to accomplish the goals of the research, research design essentially entails the early preparation of strategies for obtaining pertinent data as well as techniques for analysing and interpreting that data.

When faced with a question, disagreement, incident, or circumstance requiring a decision, the appropriate course of action is to conduct research. The study objectives are established to pinpoint the specific information needed for decision-making. The data collection strategy aims to aid in problem-solving by gathering, storing, analysing, and evaluating data to ascertain their significance. This research study incorporates these distinct yet interconnected components, offering potential insights into resolving the issue. In this particular study, quantitative methods, specifically questionnaire surveys, were employed to gather data. Conducting a questionnaire survey was deemed necessary to fulfil all three research objectives, specifically to acquire data on the acceptance of consultants, contractors; and developers regarding the relevance of human skills and the infrastructure project performance in Klang Valley, Malaysia.

Surveying respondents through questionnaires enables the collection of a substantial amount of quantitative data within a short time frame. Subsequently, the acquired numerical data were analysed using the Statistical Package for the Social Sciences (SPSS). Refer to Figure 3.1 below for the illustration of the research design.
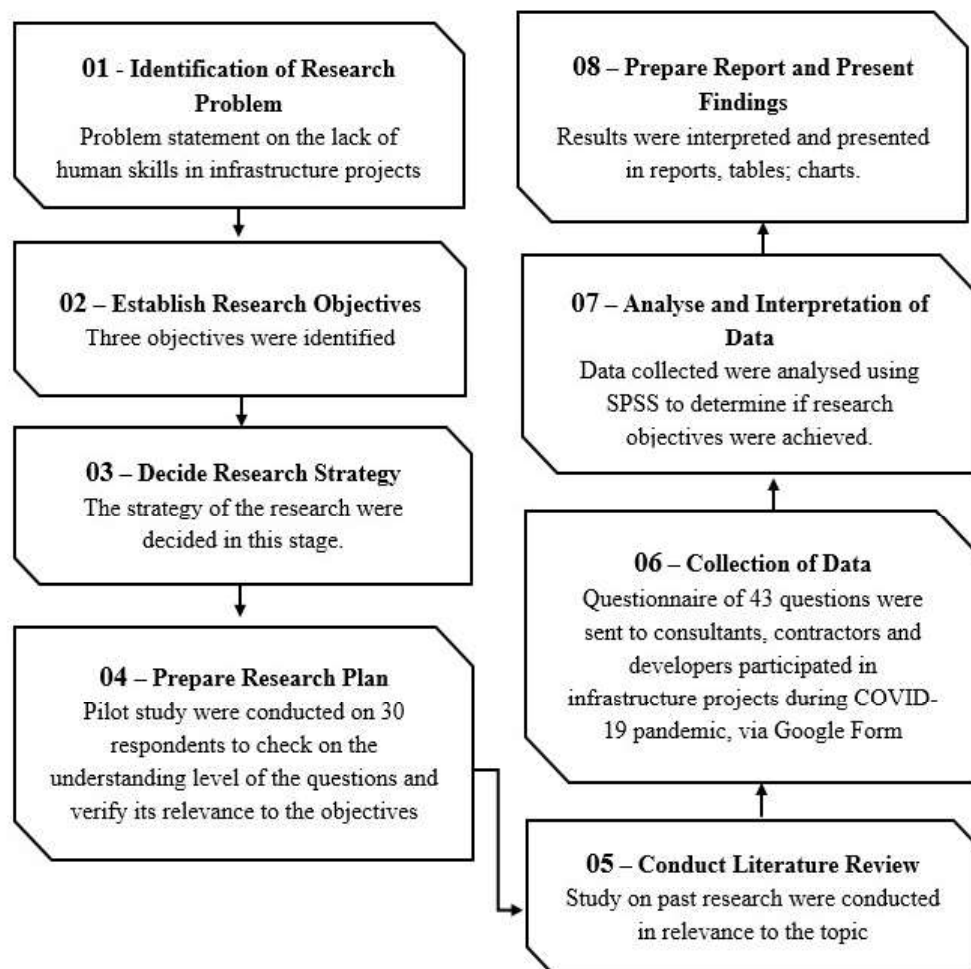
Figure 3.1: Research Design and Process

3.4   Data Collection

Primary and secondary data are the two main categories of research data. Primary data are those that are first, directly, and recently gathered from respondents, whereas secondary data are those that have already been obtained, previous studies have evaluated and used statistical approaches.

3.4.1   Primary Data

Primary data refers to additional information that researchers and investigators voluntarily collect through methods such as focus groups, interviews, and surveys. One of its key advantages is that primary data is tailored to the specific objectives of the study. Furthermore, throughout the study, responders may provide additional insights and information.

3.4.1.1 Questionnaire Design

The questionnaire for this study is divided into four sections which is Section A, for collecting the demographic profile of the respondents, Section B for collecting data on the capability of the respondents to apply human skills to contribute to the infrastructure projects performance they have participated in during COVID-19 pandemic, Section C for collecting data on the rating of efficacy by applying human skills; and Section D for collecting data on the rating of training and development provided by the organisations to meet the working challenges and simultaneously enhancing the project performance during the COVID-19 pandemic. Refer to Figure 3.2 below.

Section B, C and D are using a five-point assessment scale ranging from 1=Unsatisfactory Performance, 2=Improvement Desired, 3=Meets Expectation, 4= Exceeds Expectation 5= Outstanding Performance as used in previous studies by Septifani, Deoranto and Armada (2020) and Anwar (2019) to assess employee performance and skills as shown in Table 3.1. Descriptions for each questions were provided for respondents to make judgments that are more precise.

Table 3.1: Rating Scale for Questionnaire (Septifani, Deoranto and Armada (2020)

Assessment Scale	Explanation
1	Unsatisfactory Performance
2	Improvement Desired
3	Meets Expectation
4	Exceeds Expectation
5	Outstanding Performance

Relevance of Human Skills in Infrastructure Project Performance during the COVID-19 Pandemic

Section C
Efficacy of Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic
- Efficiency
- Productivity
- Performance

Section D
Training and Development of Human Skills during the COVID-19 Pandemic
- Align with objective
- Assessment
- Evaluation
- Organisation/Government Role

Section A
Demographic Information
- Type of Firm
- Position
- Working Experience

Section B
Capability to Apply Human Skills in the Infrastructure Project during the COVID-19 Pandemic
CA01 –CA20
- Interpersonal Skills
- Organisational Skills
- Cognitive/Communication
- Decision-making

Figure 3.2: Questionnaire Design

3.4.1.2 Questionnaire Distribution

The surveys were created using the Google Form. The surveys and a formal cover letter detailing the study's objectives were hyperlinked and attached to the email. The surveys were distributed to construction industry personnel who worked in developer, consultants and contractor firms Klang Valley, Malaysia during the COVID-19 pandemic. The survey's completion window for respondents was about two weeks. A courteous reminder was sent if no responses from any of the respondents after two weeks. Online email surveys often have higher response rates than paper surveys since they require minimal effort from respondents.

3.4.2   Secondary Data

Secondary data encompasses information that has previously been extracted from primary sources and is readily accessible to scholars for their research purposes. This data type has been acquired in the past and is obtained from written sources such as internal records, journals, books, periodicals, or the internet. Other researchers have already collected, analysed, and reported these facts. Researchers can easily access this information through the internet or published materials. Common sources of secondary data include newspapers, journal articles, government documents, books, magazines, and online searches. The initial stage of this research project involved the collection of secondary data to acquire a thorough understanding of the influence of human skills on infrastructure project performance in Klang Valley, Malaysia. As discussed in Chapter 2, these secondary data were obtained from written materials to support the literature review. Subsequently, the researcher gathered primary data for this research through questionnaire surveys to fulfil the predefined objectives.

3.5   Sampling

Sampling involves selecting small groups from the population, which then constitute the sample in a research study. This practice is employed when researchers face challenges such as limited time and resources to analyse the entire population. Further details on the sampling technique, sample size, and the chosen respondents will be elaborated upon.

3.5.1 Sampling Technique

Convenience sampling is a type of non-probability sampling that is preferred over other approaches due to its cost-effectiveness and ease of implementation. Furthermore, Taherdoost (2016) notes that this sample strategy frequently works well for resolving the limitations of the research. As such, it is widely used to cover vast populations effectively and affordably.

3.5.2 Sampling Size

The number of people selected from the population to take part in the research study is referred to as the sample size. According to Cochran (1977), the minimal sample size for the population is 384, and this number is established with a reasonable degree of accuracy. Owing to temporal limitations, the Central Limit Theorem was utilized in this study to determine sample size. This theorem states that if the sample size is 30 or larger, the sampling distribution of the mean will become roughly normally distributed. In this study, 130 respondents who have participated in infrastructure projects during the COVID-19 pandemic as consultants, contractors and developers in the Klang Valley were given the questionnaires.

3.5.3 Targeted Respondents

The study's targeted respondents consist of the Malaysian construction industry professionals, namely those who have participated in infrastructure projects in Klang Valley during the COVID-19 pandemic. They come from a diverse range of group from the construction industry, working in developer, consultant, and contractor firms, respectively.

3.5.4 Pilot Test

Due to the importance of pilot studies and the need to avoid receiving inconsistent and erroneous data from the respondents, a pilot test is necessary for this study. A pilot study's purpose is to evaluate, make changes, and reach final conclusions regarding the study (Mackey and Gass, 2005). The validity, reliability, and applicability of the questions were tested in the pilot study using thirty sets of questionnaires that were sent out and returned. This pilot group was excluded from the final study sample due to the respondents' input on the questionnaire.

This allowed it to be determined whether the sample of respondents could comprehend and complete the survey. After considering the input from the pilot test, some of the instructions were changed to make them clearer. The completed form was used to conduct a thorough survey.

The Cronbach's Alpha reliability test was used to assess the internal consistency of each assertion in Section B, C and D. Cortina (1993) and Habidin, et al. (2015) states that if the alpha value of the survey is equal to or greater than 0.7, it is deemed trustworthy. Reference is made to the interpretation in Table 3.2 below.

Table 3.2: Cronbach's Alpha Rule of Thumb (Habidin et al., 2015)

Cronbach's Alpha	Internal Consistency
>0.9	Excellent
0.8 <0.9	Good
0.7 <0.8	Acceptable
0.6 <0.7	Questionable
0.5 <0.6	Poor
<0.5	Unacceptable

Section B, focused on the capability to apply human skills in the infrastructure project during the COVID-19 pandemic, the reliability test shows the value of 0.969 for thirty respondents with twenty numbers of variables.

Section C, focused on the efficacy of human skills in the infrastructure project performance during the COVID-19 pandemic, the reliability test shows the value of 0.941 for thirty respondents with ten numbers of variables.

Section D, focused on the training and development of human skills and its essentiality to the infrastructure project performance during COVID-19 pandemic, the reliability test shows the value of 0.857 for thirty respondents with six numbers of variables.

The above tests conducted for all three sections resulted in an excellent scale, greater than 0.7 and it is deemed to be trustworthy. Table 3.3 shows the reliability test results conducted during the pilot test.

Table 3.3: Pilot Test

Section of Questionnaire	Number of Items	Cronbach's Alpha
Section B: Capability to apply human skills in the infrastructure project during COVID-19 pandemic	20	0.969
Section C: efficacy of human skills in the infrastructure project performance during the COVID-19 pandemic	10	0.941
Section D: Training and development of human skills and its essentiality to the infrastructure project performance during COVID-19 pandemic	6	0.857

Throughout the Pilot Test phase, numerous respondents provided feedback expressing concerns about their individual comprehension of the questions in Section D, which pertained to the training and development of human skills. Consequently, these questions underwent modifications to enhance clarity and ensure they were easily understood and answered according to the respondents' comprehension levels. These refined questions were then distributed to other participants during the final data collection process.

3.6   Data Analysis

The data was subjected to quantitative analysis using the Statistical Package for Social Sciences (SPSS) to perform Mean Analysis and Factor Analysis.

3.6.1   Mean Analysis

The connection between variables within a sample or population can be elucidated by summarizing data through mean analysis, as highlighted by Kaur, Stoltzfus, and Yellapu (2018). This approach, often recognized as the most straightforward method of analysis, offers a comprehensive overview of results through percentages or actual numerical values, as noted by Naoum (2013). The computation of descriptive statistics, specifically the mean, serves as a representation of the sum of the variables. Moreover, the relevance of human skills, its efficacy and the significant of training and development in the context of infrastructure projects during the COVID-19 pandemic

was conducted by evaluating the mean rankings provided by respondents. The mean was derived using the following formula:

$$\bar{x} = \frac{x_1 + x_2 + x_3 \dots x_N}{N}$$

Where,

$\bar{x}$ = *the mean*

x_1 = *the first value*

x_2 = *the second value*

x_3 = *the third value*

x_N = *the last value*

N = *the number of value*

3.6.2   Factor Analysis

Factor analysis stands out as a frequently employed multivariate approach in research investigations, as emphasized by Kothari (2004). This statistical technique proves valuable in condensing numerous correlated variables into a smaller set of essential elements, a process acknowledged by Opoku and Abdul-muhmin (2010) and Lee and Paik (2011). Factor analysis emerges as a potent statistical methodology, providing researchers with the capability to utilize their discernment and interpretation. This approach facilitates the identification of a cohesive and concise set of latent factors that meaningfully represent a cluster of indicators, as highlighted by Goretzko, et al. (2021), Howard (2016), and Watkins (2018).

Two primary methodologies exist for factor analysis: the confirmatory technique and the exploratory technique. The confirmatory technique is applied to scrutinize a proposed theory, while the exploratory technique empowers researchers to delve into the fundamental attributes, aiding in the creation of a theory or model from a multitude of variables. Generally, the confirmatory technique is embraced in the later stages of a research study, while the exploratory technique finds application in the initial phases of research, as noted by Williams, Onsman, and Brown (2010). A technique for examining the connections between observable variables and latent variables which are invisible to the naked eye; is factor analysis (Kusano and Uchida, 2023).

In the context of this study, three pivotal factors crucial to human skills and efficacy were identified. The factor analysis approach was employed to uncover the underlying factors influencing these findings. This method proves particularly apt for surveys encompassing a multitude of variables, as it discerns latent patterns, simplifies complexities, and categorizes them into interpretable groups based on underlying factors. The factor analysis were conducted using the Principal Components Analysis (PCA) with Varimax rotation. Additionally, an assessment of data acceptability and appropriateness was conducted through Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity.

3.7   Research Ethics

Respondents are at liberty to withdraw from the questionnaire survey at any point; participation is completely voluntary. The responders are guaranteed full privacy and confidentiality of their information, and that no information would be shared without permission. The data will be utilised only for this research, even if it contains personal data. Prior to submitting the survey, it is recommended that the participants go over the consent of participation and UTAR privacy notice.

3.8   Summary

This methodological section describes the methods and strategies used to address the study questions or hypotheses. It provides a concise and thorough explanation of the procedures followed for data collection, analysis, and interpretation, and also acting as a roadmap for the research. This chapter gives readers the ability to evaluate the thoroughness of the study and the validity of its findings by giving at detailed review of the research design. Maintaining reproducibility and transparency in research is crucial.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Introduction

In this section, the outcomes of the data analysis will be presented and discussed. It commences with a concise overview of the demographic characteristics of the respondents, followed by the outcomes of the reliability test conducted on the three sections of the questionnaire. The examination of the collected data employed various statistical tests facilitated by the Statistical Package for the Social Sciences (SPSS) software, elucidating relationships between variables through diverse statistical methods. The ensuing discussion will expound upon the results, draw comparisons in terms of significance with the literature review and research question, and present arguments supporting the overarching conclusions. Ultimately, a succinct conclusion will be summarized at the conclusion of this chapter.

4.2 Respondents' Demographic

The demographic details of the survey respondents are covered in this subtopic. To understand how respondents from various backgrounds express their level of agreement with each of the 40 variables in the questionnaire, it is crucial to understand the respondents' demographic backgrounds. A total of 130 questionnaire sets were distributed to consultants, contractors and developers who have participated in the infrastructure projects in Klang Valley, during the COVID-19 pandemic through varied platforms such as emails, Whatsapp, LinkedIn, and social media channels. The data collection phase extended over approximately three weeks, during which all questionnaires were received in a timely manner. The findings from the survey have been collated and are presented in Table 4.1, providing a comprehensive breakdown of frequencies and percentages of the professionals based on three distinct categories of characteristics.

The breakdown reveals that 36.9% represent consultant firms, 33.8% are affiliated with contractor firms, and 29.2% work with developers in infrastructure projects in the Klang Valley. The table further details that 24.6% of respondents hold positions in lower management, 59.2% in middle management, and 16.2% in upper management. Notably, the majority of respondents (51.5%) possess more than 10 years

of experience in infrastructure projects, while 29.2% have 5 to 10 years of experience, and 19.2% have below 5 years of working experience in infrastructure projects, respectively. This emphasizes the dependability of the collected data in this research, taking into account the types of organizations, positions, and professional experiences of the respondents.

Table 4.1: Demographic Information of Respondents

General Information	Frequency (n)	Percentage (%)
Type of Organisation		
Consultant	48	36.9
Contractor	44	33.8
Developer	38	29.2
Position in the Organisation		
Lower management	32	24.6
Middle management	77	59.2
Upper management	21	16.2
Years of working experience		
5 – 10 years	38	29.2
Below 5 years	25	19.2
More than 10 years	67	51.5

4.3   Mean Ranking

Mean analysis constitutes a statistical approach pivotal for comprehending and interpreting data. This method involves the computation of the average, or mean, within a set of numerical values, providing a central measure that reflects the central tendency of the distribution. Widely utilized across diverse fields, including research, finance, and data science, this analytical technique serves to summarize data and derive insights from datasets. Mean ranking involves assigning a numerical value to items or observations based on their relative positions in a ranked order, while descriptive statistics involves summarizing and describing the main features of a dataset.

The mean functions as a succinct representation of the dataset, serving as a fundamental tool for researchers and analysts aiming to grasp the central value around which data points cluster. Within this brief overview, we will delve into the importance of mean analysis, its application across various domains, and its integral role in extracting meaningful information from numerical datasets. The mean rank is derived as the average of the ranks assigned to all observations within each sample. In the context of the Kruskal-Wallis test, the mean rank is used to compute the H-value, serving as the test statistic for this particular statistical test (Minitab, 2023). The goal of descriptive statistics, when applied to sample data, is to articulate the fundamental features. By important characteristics, we allude to those quantities that furnish insights into the subject of interest under investigation (Perez-Vicente and Ruiz, 2009).

The most widely acknowledged forms of descriptive statistics encompass measures of central tendency such as the mean, median, and mode. These measures find application across various levels of mathematical and statistical analysis. Specifically, the mean, or average, is computed by summing all values within the dataset and subsequently dividing by the total number of values in the set (Hayes, 2023).

4.3.1   Mean Ranking on the Capability to Apply Human Skills in the Infrastructure Project during the COVID-19 Pandemic

Table 4.2 presents a tabulation of data showcasing the mean values, specifically pertaining to the capability of applying human skills. A higher mean ranking signifies a greater consensus among respondents, indicating the perceived importance of these capabilities in the infrastructure project performance during the COVID-19 pandemic.

Table 4.2: Mean Ranking on the Capability to Apply Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic.

Factors	Mean	Std. Deviation	Ranking
Safety Consciousness	3.8308	0.82723	1
Teamwork and Collaboration	3.7692	0.91954	2
Open-Mindedness	3.7615	0.83345	3
Problem Solving	3.7308	0.81449	4
Ownership	3.7154	0.87369	5

Factors	Mean	Std. Deviation	Ranking
Critical Thinking	3.7077	0.76195	6
Organisational Skills	3.7077	0.85767	7
Adaptability	3.6769	0.81854	8
Active Listening	3.6769	0.83727	9
Effective Communication	3.6769	0.89109	10
Emotional Intelligence	3.6538	0.84185	11
Empathy Mind-Set	3.6462	0.85237	12
Time Management	3.6462	0.97139	13
Decision-Making	3.6385	0.80698	14
Leadership	3.6385	0.90651	15
Networking	3.6308	0.92459	16
Cognitive Flexibility	3.6231	0.82842	17
Conflict Resolution	3.6077	0.87600	18
Stress Management	3.5615	0.88925	19
Negotiation	3.5231	0.88235	20

The highest mean value of 3.8308 indicates that **safety consciousness** in infrastructure projects amid the COVID-19 pandemic entails an increased alertness and proactive steps taken by individuals and communities to prioritise and uphold safety. This involves adherence to prescribed health guidelines, the adoption of preventive measures, and staying informed about the latest developments related to the virus. Construction workers' personal safety may be significantly enhanced by safety consciousness, which has been found to be an influential construct (Meng and Chan, 2020). Safety consciousness encompasses diverse facets, including the practice of good hygiene, utilisation of masks, observance of social distancing, adherence to quarantine or isolation protocols when required, and staying current on vaccination information. The significance placed on safety consciousness is pivotal in curbing the spread of the virus and safeguarding the health and well-being of individuals and the broader community amid these challenging circumstances (Baradan, Dikmen and Kale, 2018). The predictive variables for organisational, personal, or behavioural safety outcomes are linked by researchers studying workplace safety consciousness (Beus, McCord and Zohar, 2016).

The second-highest mean value of 3.7692 shows that ssuccessful execution of infrastructure projects hinges on effective **teamwork and collaboration**. Stakeholders are increasingly recognizing the pivotal role of information sharing and knowledge exchange in fostering prosperous contractual arrangements. The collaborative process between primary contractors and subcontractors often lacks well-defined guidelines, posing challenges to effective communication and the achievement of shared project objectives within the constraints of time, budget, and quality (Rahman, et al., 2014). Emphasizing teamwork and collaboration not only boosts productivity and reduces errors by ensuring information integrity and facilitating process integration but can also enhance a company's reputation and contribute to closing the building energy efficiency gap (Wilde and Jones, 2014).

The third-highest mean value of 3.7615, indicates that given its consistent association with the pursuit of truth, **open-mindedness** is acknowledged as an intellectual virtue in infrastructure projects during the COVID-19 pandemic. Nevertheless, certain theorists argue that the effectiveness of open-mindedness in supporting truth is contingent on various factors (Kwong, 2016). Open-mindedness involves a willingness to reassess one's opinions, staying open to novel ideas, and actively addressing barriers that may hinder thinking beyond preconceived notions. The gauge of our open-mindedness is reflected in our readiness to entertain alternative perspectives (Spiegel, 2012). Deliberative and implemental mind-sets are expected to differ in their responsiveness to information, alongside variations in cognitive tuning and biased judgments. Fujita, Gollwitzer, and Oettingen (2007) stated that task analysis suggests that deliberative attitudes should be associated with heightened receptivity to diverse kinds and sources of information when making decisions aligned with goals. Being open to any information that could potentially aid in making well-informed choices is crucial for optimal decision-making.

The fourth-highest mean value, 3.7308, emphasises how important it is to build **problem solving** abilities in infrastructure projects during the COVID-19 pandemic, as it is a unique cognitive activity that significantly improves professional practise. According to Jonassen (2000), problem solving techniques facilitate the development of appropriate solutions for complex, multidisciplinary problems that arise in the workplace. They also promote logical thinking. The ongoing conversation about knowledge and skills captures the essence of the ongoing struggle between practise and education, with each side offering unique viewpoints drawn from their own

experiences (Megahed, Elshater, and Afifi, 2019). Employers highly value engineering graduates' application and reflection on problem solving knowledge and skills, which is demonstrated in institutional evaluations of engineering practises. Problem solving skills are widely recognised as one of the essential abilities that engineering graduates frequently.

The fifth-highest mean value, 3.7154 indicates a significance of individuals are taking **ownership** in infrastructure projects amid the pandemic. This transformation entails a cultural evolution that advocates for proactive engagement, innovative problem-solving, and a heightened sense of responsibility among team members, surpassing the traditional confines of job responsibilities (French and Rosenstein, 1984). Various perspectives exist regarding the definition of ownership in the workplace. For some, it entails taking initiative and being proactive in one's job, while others associate it with feeling personally invested in the success or failure of the company. At its fundamental core, ownership involves taking responsibility for one's work and career, being accountable for actions and results, and possessing the autonomy to make decisions and take action without necessitating approval from others (Sharma, 2022).

The sixth-highest mean value of 3.7077 for the variable **critical thinking** suggests a quantitative representation of the average level of critical thinking among the observed data points or individuals. In the context of critical thinking, this numerical value indicates the central tendency or midpoint of the distribution of critical thinking scores. It indicates that a significance of individuals are using this skill in infrastructure projects during the pandemic. Critical thinking stands out as a key skill in the realm of learning and innovation, often highlighted as a crucial competency for academic and professional achievements. It is widely acknowledged to be pivotal in fostering logical reasoning, facilitating effective decision-making, and solving complex problems (Chesterman, 2014; Liu, Frankel and Roohr, 2014). An alternative definition underscores that critical thinking is associated with intellectual processes and methodologies, prioritizing these aspects over the ultimate results (Altun and Yildirim, 2023).

The seventh-highest mean value of 3.7077 for the variable **organizational skills** suggests that, on average, the respondents or participants in the study possess a moderate level of organizational skills in the infrastructure projects. This numerical representation indicates a central tendency in the dataset, and values around this mean

are likely prevalent. The mean serves as a statistical summary, providing a midpoint around which individual scores cluster. Numerous findings in the literature highlight the central role of employees in management, with effective team and people management being identified as predictors of organizational skills and employee productivity (Tafvelin, Schwarz and Hasson, 2017).

The eighth-highest mean value, 3.6769 **adaptability** for the variable adaptability suggests that, on average, the individuals involved in the study exhibit a moderate level of adaptability in the infrastructure projects. This numerical representation indicates a central tendency in the dataset, with values around this mean being prevalent. It implies that, overall, the participants demonstrate a reasonable degree of flexibility and adaptability in responding to changing circumstances or demands.

The ninth-highest mean value, 3.6769 emphasises how important it is to build **active listening** abilities in infrastructure projects during the COVID-19 pandemic. It suggests that on average, the individuals involved in the study exhibit a moderate level of active listening in the infrastructure projects. As per Weger, et al. (2014), listening involves "the reception, comprehension, and response to both verbal and nonverbal messages." Speech recognition, as highlighted by Friston, et al. (2020), is acknowledged as a formidable field where the auditory system must translate a continuous audio signal into discrete words, presenting a challenge due to limited cues for identifying word boundaries. Active listening emerges as a dynamic and engaged process demanding intentional concentration and comprehension, transcending mere auditory perception. Across diverse contexts, such as business and interpersonal relationships, cultivating active listening skills can significantly enhance teamwork, foster empathy, and strengthen connections.

The significance of fostering **effective communication** in infrastructure projects amid the COVID-19 pandemic is underscored by the tenth-highest mean value of 3.6769. This value indicates a moderate level of effective communication among the participants in the study, highlighting the importance of enhancing communication practices in the context of infrastructure projects during the pandemic. As outlined by Choon Hua, Sher, and Sui Pheng (2005), consistency in communication denotes a situation where the sender's expectations align with the responses of the recipients. Consequently, the objective of all communication is to ensure a high degree of similarity between the sender's expectations and the recipient's reactions. In essence,

the aim of communication is to secure responses from the recipient that closely match the sender's expectations. In a related context, Manzanares, Segura, and Pellicer (2023) affirm that effective communication is recognized within the design team and among both internal and external stakeholders.

The mean value from the eleventh to twentieth ranking stands from **emotional intelligence** with the mean value 3.6538, **empathy mind-set** and **time management** with the mean value 3.6462, **decision-making** and **leadership** with the mean value 3.6385, **networking** with the mean value 3.6308, **cognitive flexibility** with the mean value 3.6231, **conflict resolution** with the mean value 3.6077, **stress management** with the mean value 3.5615 and finally **negotiation** skills with the mean value 3.5231. The mean values suggest a moderate application of the aforementioned human skills among the study participants, underscoring the significance of these skills in the realm of infrastructure projects during the pandemic. Notably, negotiation appears to be the skill with the lowest mean ranking, potentially due to its limited use in a predominantly remote work setting during the unforeseen pandemic. The respondents were largely unprepared for sudden changes, leading to fewer opportunities for negotiation scenarios.

4.3.2 Mean Ranking on the Efficacy of Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic

Table 4.3 displays a tabulated representation of data, presenting the mean values specifically related to the efficacy of human skills. A higher mean ranking indicates a stronger consensus among respondents, signifying the effectiveness of these skills in enhancing the performance of infrastructure projects amid the challenges posed by the COVID-19 pandemic.

Table 4.3: Mean Ranking on the Efficacy of Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic

Factors	Mean	Std. Deviation	Ranking
Enhancement in Performance	3.7077	0.83940	1
Breakthrough in Self-Control	3.6385	0.80698	2
High Productivity	3.6308	0.83655	3

Factors	Mean	Std. Deviation	Ranking
Improvement in Decision-Making Ability	3.6231	0.80949	4
Improvement in Self-Confidence	3.6000	0.84082	5
Changes in Assertiveness	3.5923	0.83244	6
Enhancement in Engagement and Motivation	3.5769	0.80565	7
Refinement in Leadership Ability	3.5462	0.82698	8
Refinement in Managing Conflict and Crisis	3.4769	0.83727	9
Improvement in Efficiency	3.4077	0.85087	10

The highest mean value of 3.7077 suggests that human skills play a highly effective role in **enhancement in performance** among professionals involved in the infrastructure projects amid the challenges posed by the COVID-19 pandemic. Traditionally, performance measurement in projects has heavily relied on metrics derived from financial data. Nonetheless, financial metrics are predominantly retrospective, revealing outcomes and the impacts of past decisions. Consequently, they offer limited utility in enhancing current performance (Patyal, Ambekar, and Prakash, 2019).

The second-highest mean value of 3.6385 indicates a significant **breakthrough in self-control** among professionals engaged in infrastructure projects during the COVID-19 pandemic, thanks to human skills. Self-control is commonly defined as the ability to restrain automatic urges, assisting individuals in resisting temptation and attaining their long-term objectives. Similar to an internal locus of control, enhanced self-control has been linked to a broad spectrum of health outcomes. For instance, a healthier lifestyle and both physical and mental well-being are correlated with greater self-control (Botha and Dahmann, 2023). The ability to manage impulses and desires is essential for successful coexistence and collaboration with others. Individuals with high emotional, mental, and behavioral control not only excel academically and professionally but are also associated with better health, greater wealth, and enhanced popularity (Baumeister, 2015).

The third-highest mean value of 3.6308 suggests that the implementation of human skills has led to **high productivity** among infrastructure professionals during

the COVID-19 pandemic. The concept of high productivity has been a focal point since the inception of industrialization due to its crucial role in global prosperity and competitiveness. Among the pivotal factors influencing economic production activities, productivity stands out as arguably the most significant and potent (Patyal, Ambekar, and Prakash, 2019). Elevated productivity not only contributes to a society's overall well-being but also serves as a key source of competitive advantage for businesses (Grossman, 1993). Given its scale, the productivity trends within the construction industry significantly impact both the entire economy and national productivity (Allmon et al., 2000).

The fourth-highest mean value of 3.6231 suggests that human skills significantly contribute to the **improvement in decision-making ability** among professionals engaged in infrastructure projects during the COVID-19 pandemic. Decision-making, viewed traditionally as the process of identifying and resolving issues, stands as a pivotal aspect of management across various industries. The process involves creating multiple activities to achieve specific goals, ultimately selecting the optimal alternative by comparing and evaluating options based on predetermined standards and criteria (Mele, 2010). Regardless of the organizational context, decision-making remains a paramount process, growing more crucial, significant, intricate, and inherently strategic as it approaches the outcome—particularly when it directly influences the success or failure of the company (Qur'an, 2023).

The fifth-highest mean value of 3.6000 indicates that human skills play a significant role in **improvement in self-confidence** among professionals engaged in infrastructure projects during the COVID-19 pandemic. The Psychology Dictionary Online defines self-confidence as an individual's belief in their capability to effectively navigate the challenges and obstacles of daily life, coupled with their trust in their own abilities, capacities, and judgments. Being self-assured entails having confidence in one's own skills and competencies, a sentiment that may vary depending on the circumstances. It is not uncommon to feel highly confident in certain situations while being less assured in others (University of Queensland, 2019).

The significance of the sixth ranked mean value, 3.5923, lies in the majority of respondents concurring that they undergo **changes in assertiveness**. This implies a capacity to articulate their views while also respecting others' perspectives within the context of infrastructure projects during the COVID-19 pandemic.

The seventh ranked mean value, 3.5769, underscores the majority of respondents acknowledging at a moderate level that they have experienced **enhancement in engagement and motivation** in their daily work routines amid the COVID-19 pandemic. This improvement is attributed to the effective application of human skills in addressing the challenges encountered in their jobs during this period.

The mean value ranked eighth, at 3.5462, indicates a consensus among the research participants, affirming at a moderate level that the **refinement in leadership ability** occurs through the application of human skills in infrastructure projects amidst the pandemic. As leadership paradigms continue to evolve, the emphasis on honing and enhancing leadership qualities has become paramount. Refinement in leadership transcends traditional notions, encompassing a multifaceted approach to personal and professional growth. This introductory exploration delves into the nuanced dimensions of leadership refinement, examining its significance in fostering effective, adaptable, and visionary leaders who navigate the complexities of today's challenging and ever-changing environments (Schels, 2020).

The mean value ranked ninth, at 3.4769, indicates a consensus among the research participants, affirming at a moderate level that the **refinement in managing conflict and crisis** occurs through the application of human skills in infrastructure projects amidst the pandemic. In the domain of conflict and crisis management, the concept of refinement emerges as an essential attribute for effective leadership. The capacity to navigate conflicts, resolve issues, and handle crises with precision and resilience demands a nuanced and continually evolving approach. The refinement in the management of conflict and crisis entails the sharpening of skills needed to assess, strategize, and implement solutions that not only address immediate challenges but also contribute to the enduring resilience of the organization. This examination explores the intricate facets of refinement within the context of conflict and crisis management, underscoring its crucial role in nurturing leaders capable of skilfully guiding organizations through tumultuous periods, fostering stability and growth in the face of adversity (Wedell-Wedellsborg, 2022).

The last ranking at 3.4077, a consensus among the research participants, affirming at a moderate level that the **Improvement in Efficiency** indicates occurs through the application of human skills in infrastructure projects amidst the pandemic. Improvement in efficiency indicates a heightened level of effectiveness and optimization within a given system, process, or operation. It signifies the successful

enhancement of resource utilization, reduced wastage, and the streamlining of workflows to achieve higher output or desired results with the same or fewer inputs.

4.3.3 Mean Ranking on the Training and Development of Human Skills in the Infrastructure Project during the COVID-19 Pandemic

Table 4.4 exhibits a tabulated summary of data, illustrating the mean values specifically associated with the training and development of human skills. A higher mean ranking suggests a more pronounced consensus among respondents, indicating the importance of training and development initiatives in improving the performance of infrastructure projects in the face of challenges presented by the COVID-19 pandemic.

Table 4.4: Mean Ranking on the Training and Development on Human Skills in Infrastructure Projects during the COVID-19 Pandemic

Factors	Mean	Std. Deviation	Ranking
Training Coordination	3.4846	0.77993	1
User Friendly	3.4538	0.80802	2
Training Evaluation	3.4231	0.77625	3
Government's Role	3.4154	0.88733	4
Training Needs Assessment	3.3846	0.82954	5
Alignment with Organisation Objective	3.3846	0.84802	6
Organisational Priority	3.3692	0.93293	7
Customised, Personalised and Apt Training Programmes	3.3308	0.83887	8
Organisation's Investment	3.3077	0.93050	9
Project Manager/HR Manager's Role	3.3000	0.93717	10

The highest mean value of 3.4846 signifies the exceptional management of **training coordination** by the respondent's organization. The coordination of training delivery, program promotions, information dissemination, and logistical aspects such as scheduling, venue or platform booking, resources, and remote access features

exhibited a high level of effectiveness. These training sessions were strategically conducted to address workplace challenges and simultaneously enhance the performance of infrastructure projects, particularly during the challenges posed by the COVID-19 pandemic.

In the contemporary era marked by remote work, global collaboration, and rapid technological advancements, the importance of training coordination has reached unparalleled heights. The modern training coordinator is recognized for their adept use of digital tools, creation of engaging virtual learning experiences, and tailoring training approaches to suit diverse audiences. Training coordination is a multifaceted and dynamic process that involves planning, organization, communication, and assessment of various training endeavours and resources. It requires a combination of skills, expertise, and tools to ensure the attainment of training goals and the satisfaction of learners (LinkedIn, 2023). The focal point of training coordination is to enhance team coordination performance. Strategies for team coordination are refined through adaptable adjustments of teamwork processes to accommodate changes in both external and internal conditions (Serfaty, Entin, and Johnston, 1998).

The mean value, ranking as the second highest at 3.4538, underscores the notable importance of training modules, tools, and platforms tailored to be both suitable and **user friendly**, facilitating a smoother learning experience. This significance is particularly pronounced in training programs associated with infrastructure projects amid the challenges posed by the COVID-19 pandemic. Simui et al. (2017) emphasize the critical role of assessing instructional materials in maintaining and establishing the credibility and quality of distance learning systems. One effective approach to enhance the user-friendliness of instructional materials for distance students involves integrating interactive learning activities that are adaptable and responsive to individual needs.

The mean value, ranking third at 3.4231, signifies a favourable **training evaluation** conducted within the respondents' organization, demonstrating particular significance in training programs associated with infrastructure projects amid the challenges of the COVID-19 pandemic. Post-training assessments and feedback sessions were employed to assess performance changes and the proficiency in applying acquired human skills on the job. Understanding training evaluation proves to be a challenging task, especially in its practical implementation. Criticisms regarding the

assessment of training often arise from the irregular, informal, and impromptu evaluation methods adopted by training institutions (Hashim, 2001).

The mean value, ranking fourth at 3.4154, underscores the **government's role** in the realm of training and development within infrastructure projects, particularly in the challenging context of the COVID-19 pandemic. The Ministry of Human Resources (MoHR) and relevant entities fulfilled their responsibilities by ensuring workforce access to training and development, provision of resources to support these endeavours, budget allocation, dissemination of the latest information and regular updates, and enhancement of Standard Operating Procedures (SOP).

In Malaysia, the government assumes a supervisory role in monitoring training activities, necessitating organizations to engage approved training providers registered through official channels. This investigation scrutinizes client preferences in assessment, the commitment displayed by training providers, and the overall evaluation practices embedded in the Malaysian training landscape. The findings indicate that positive influences on evaluation practices emanate from governmental policies, client expectations, and prevailing economic conditions (Hashim, 2001).

The mean value, ranking fifth at 3.3846, signifies a favourable evaluation of the **training needs assessment** conducted within the respondents' organization. This holds particular significance in training programs associated with infrastructure projects during the challenging period of the COVID-19 pandemic. The assessment gauges the proficiency in applying human skills on the job and addresses existing skill gaps within the organization.

The needs assessment phase, occurring during the initial planning and analysis of a training program, emerges as the most robust and pivotal step in the training and development process. The accuracy of this analysis determines the credibility and effectiveness of the training program's design and subsequent implementations in the later stages. Various methods exist for identifying employees' developmental needs, with the survey approach being the most commonly utilized. This involves assessing employees' skill levels through surveys conducted with both employees and their managers (Tao, Rosa Yeh, and Sun, 2006).

While training needs assessments have long been acknowledged as essential for effective training and development programs, contemporary proactive managers express concerns about their utilization. They strive to employ these assessments to

create and implement a diverse range of practical solutions for individuals, teams, and organizations (Zahid Iqbal and Khan, 2011).

The mean value ranked from sixth to the tenth are **Alignment with Organisation Objective** with the value of 3.3846, **Organisational Priority** with the value of 3.3692, **Customised, Personalised and Apt Training Programmes** with the value of 3.3308, **Organisation's Investment** with the value of 3.3077; and **Project Manager/HR Manager's Role** with the value of 3.3000 respectively. These values indicate the caliber of training and development offered by the organizations represented by the respondents amid the pandemic, aimed at equipping them to address the challenges encountered in their work. Receiving the lowest ranking is the Project Manager/HR Manager's Role, suggesting that the level of satisfaction among the research participants regarding the involvement of project managers or human resources personnel during that period is comparatively low.

4.4　　Factor Analysis

Factor analysis serves as a method to portray the relationships among sets of correlated variables. By identifying commonalities, factor analysis condenses a set of variables into fewer components (Chan et al. 2004). In the current study, 40 items, as detailed in Table 4.6, Table 4.8; and Table 4.10 respectively, were developed into three distinct factors representing capability to apply human skills in the infrastructure project during the COVID-19 pandemic, efficacy of human skills in project performance; and strategic training and development process to enhance human skills. Utilizing factor extraction, a reduced number of factors can be derived, offering an enhanced comprehension of the representation of these factors.

Kaiser (1974) stated two crucial tests, Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity, were conducted to assess sample adequacy and data suitability for factor analysis. A KMO value above 0.90 indicates an excellent sample, while a value between 0.60 and 0.89 is deemed adequate; anything below 0.59 is considered unsatisfactory, and 0.49 represents the minimum acceptable value. The KMO value in this study, is reported in Table 4.5, Table 4.7; and Table 4.9 have surpassed the minimum requirement, rendering the research highly acceptable. Having said this, Factor Analysis can be conducted in this study.

The SPSS software was implemented so that the Principal Component Analysis (PCA) and Varimax rotation method can be conducted in order to extract highly

correspond elements into few numbers of major components dimensions. Given that every factor loading in the table had a value of greater than 0.3, it can be concluded that the loadings and the way the factors were retrieved were solidly and fairly interpreted. The ensuing sections go into further detail about the factors.

4.5   Factor Grouping Description

Component 1: Key Human Skills

Key Human Skills, refer to the essential skills, attributes, and capabilities that individuals possess, enabling them to excel in various aspects of life, work, and personal development. These competencies encompass a broad spectrum, ranging from cognitive abilities and technical skills to interpersonal and emotional intelligence. Recognized as fundamental building blocks for success in diverse fields, key human competencies form the foundation for effective communication, problem-solving, collaboration, and adaptability. As the demands of the modern world continue to evolve, emphasizing the importance of these competencies becomes integral for personal and professional growth. This brief introduction sets the stage for exploring and understanding the multifaceted dimensions of key human competencies and their significant impact on individual and collective success.

Twenty items were consisted in Component 1 and were correlated to key human competencies; teamwork and collaboration, critical thinking, effective communication, negotiation, organisational skills, problem solving, ownership, emotional intelligence, conflict resolution, leadership, active listening, decision-making, empathy mind-set, time management, networking, open-mindedness, adaptability, safety consciousness, cognitive flexibility; and stress management. All items are with factor loading that exceeding 0.600.

Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy value of 0.945 indicates an exceptionally high level of sampling adequacy. In practical terms, this suggests that the variables under consideration in the dataset are highly interrelated, making them conducive to factor analysis. The closeness of the KMO value to 1.0 signifies that the observed correlations among variables are substantial, indicating a robust dataset for extracting meaningful factors. KMO values are commonly interpreted on a scale from 0 to 1, with higher values indicative of more reliable and suitable data for factor analysis. Therefore, in this context, the KMO value of 0.945 underscores the appropriateness of the dataset for exploring underlying factors,

reinforcing the confidence in the reliability of the factor analysis results. Refer to Table 4.5 below.

The Factor Loading surpassing the 0.6 threshold in this analysis indicates a substantial and reliable correlation between the observed variables and the underlying factors. This suggests a robust association, reinforcing the validity of the factors identified during the analysis. Furthermore, the Initial Eigenvalues of Variance of 63.667% sheds light on the proportion of total variance in the data accounted for by the identified factors. The interpretation of Variance Explained necessitates a nuanced understanding, recognizing that various factors contribute to the overall variance. In this context, the combination of a strong Factor Loading and a moderate Variance Explained implies that the identified factor play a significant role in influencing the observed variables. Refer Table 4.6 and Scree Plot in Figure 4.1 below.

Table 4.5: KMO and Bartlett's Test for Component 1

Parameter		Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.945**
Bartlett's Test of Sphericity	Approximate Chi-Square	2403.736
	Degree of freedom	190
	Significance	<0.001

Table 4.6: Factor Loading and Variance Explained for Component 1

Key Human Skills in the Infrastructure Project during the COVID-19 Pandemic	Factor Loading	Total	Initial Eigenvalues of Variance %
Component 1: Key Human Competencies		*12.733*	*63.667*
Teamwork and Collaboration	0.850		
Critical Thinking	0.845		
Effective Communication	0.843		
Negotiation	0.837		

Key Human Skills in the Infrastructure Project during the COVID-19 Pandemic	Factor Loading	Total	Initial Eigenvalues of Variance %
Organisational Skills	0.837		
Problem Solving	0.835		
Ownership	0.834		
Emotional Intelligence	0.831		
Conflict Resolution	0.828		
Leadership	0.816		
Active Listening	0.798		
Decision-Making	0.797		
Empathy Mind-set	0.795		
Time Management	0.774		
Networking	0.767		
Open-Mindedness	0.756		
Adaptability	0.746		
Safety Consciousness	0.741		
Cognitive Flexibility	0.736		
Stress Management	0.664		
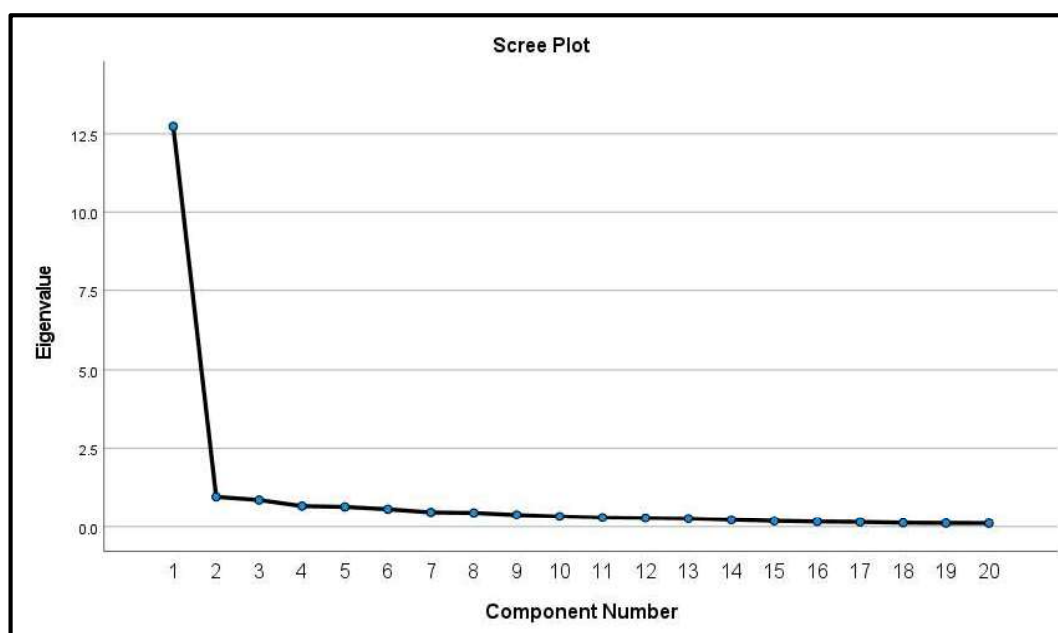
Figure 4.1: Screen Plot for Component 1

Component 2: Efficacy of Human Skills

The efficacy of human skills represents a cornerstone in various aspects of life, ranging from professional endeavours to personal interactions. The nuanced interplay of cognitive abilities, emotional intelligence, and practical expertise collectively contributes to what can be termed as the "Efficacy of Human Skills." This multifaceted concept underscores the profound influence that individuals wield through their capabilities, influencing not only their own success but also the dynamics of the environments they engage with. Exploring the efficacy of human skills involves delving into the intricate balance between interpersonal acumen, and adaptability, recognizing their pivotal role in navigating the complexities of today's world.

Ten items were consisted in Component 2 and were correlated to the efficacy of human skills; refinement in managing conflict and crisis, enhancement in performance, enhancement in engagement and motivation, improvement in self-confidence, high productivity, changes in assertiveness, improvement in decision-making ability, refinement in leadership ability, breakthrough in self-control; and improvement in efficacy. All items are with factor loading that exceeding 0.700.

With a Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy value reaching 0.942, the sampling adequacy is notably high. This implies a strong interrelation among the variables in the dataset, rendering them well-suited for factor analysis. The proximity of the KMO value to 1.0 indicates substantial correlations

among the variables, highlighting the dataset's robustness for extracting meaningful factors. Typically interpreted on a scale from 0 to 1, KMO values leaning towards the higher end signify more reliable and suitable data for factor analysis. Therefore, the KMO value of 0.942 in this context emphasizes the appropriateness of the dataset for exploring underlying factors, instilling confidence in the reliability of the factor analysis results. Refer to Table 4.7 below.

A Factor Loading exceeding 0.7 in a factor analysis suggests a strong and substantial correlation between the observed variables and the identified factors. This indicates that the factors extracted from the data are highly reliable in explaining the patterns within the variables. A Factor Loading above 0.7 often signifies a robust association, implying that the identified factors play a significant role in influencing the observed variables. On the other hand, an Initial Eigenvalues of Variance of 71.466% implies the percentage of variance in the data that is explained by the identified factors. Refer to Table 4.8 below.

Table 4.7: KMO and Bartlett's Test for Component 2

Parameter		Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.942**
Bartlett's Test of Sphericity	Approximate Chi-Square	1160.543
	Degree of freedom	45
	Significance	<0.001

Table 4.8: Factor Loading and Variance Explained for Component 2

Efficacy of Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic	**Factor Loading**	**Total**	**Initial Eigenvalues of Variance %**
Component 2: Efficacy of Human Skills		*7.147*	*71.466*
Refinement in Managing Conflict and Crisis	0.889		

| Efficacy of Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic	Factor Loading	Total	Initial Eigenvalues of Variance %
Enhancement in Performance	0.880		
Enhancement in Engagement and Motivation	0.877		
Improvement in Self-Confidence	0.865		
High Productivity	0.854		
Changes in Assertiveness	0.849		
Improvement in Decision-Making Ability	0.839		
Refinement in Leadership Ability	0.838		
Breakthrough in Self-Control	0.787		
Improvement in Efficacy	0.768		
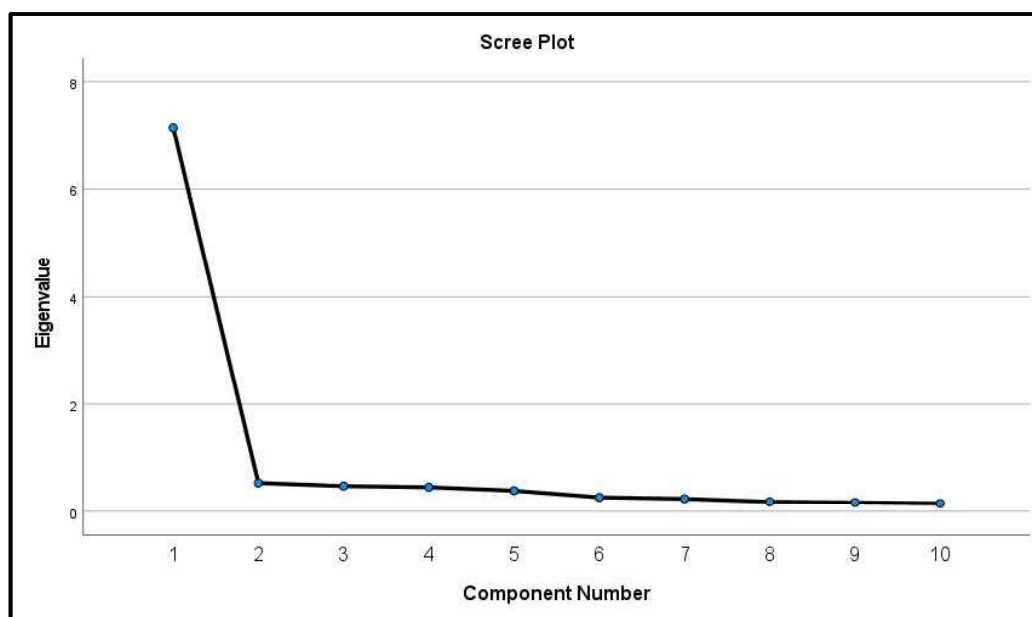
Figure 4.2: Scree Plot for Component 2

Component 3: Strategic Training and Development

Strategic Training and Development is a dynamic and integral component within organizational frameworks, designed to enhance the skills, knowledge, and capabilities

of individuals in alignment with broader strategic goals. This multifaceted approach goes beyond routine learning initiatives, focusing on creating a well-equipped workforce that can adapt to evolving challenges and contribute effectively to organizational success. By strategically aligning training programs with the overarching objectives of a company, organizations aim to cultivate a skilled and agile workforce capable of navigating the complexities of today's rapidly changing business landscape. This brief introduction sets the stage for exploring the strategic nuances and impact of training and development initiatives within the context of organizational growth and sustainability.

Ten items were consisted in Component 3 and were correlated to the strategic training and development process; alignment with organisation objective, organisation's investment, organisational priority, PM and HR role, training needs assessment, training coordination, user-friendly, customised, personalised and apt training; and government's role. All items are with factor loading that exceeding 0.700.

With a Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy value reaching 0.929, the sampling adequacy is notably high. This implies a strong interrelation among the variables in the dataset, rendering them well-suited for factor analysis. The proximity of the KMO value to 1.0 indicates substantial correlations among the variables, highlighting the dataset's robustness for extracting meaningful factors. Typically interpreted on a scale from 0 to 1, KMO values leaning towards the higher end signify more reliable and suitable data for factor analysis. Therefore, the KMO value of 0.929 in this context emphasizes the appropriateness of the dataset for exploring underlying factors, instilling confidence in the reliability of the factor analysis results. Refer to Table 4.9 below.

A Factor Loading surpassing 0.7 in factor analysis indicates a significant and robust correlation between the observed variables and the factors identified. This suggests that the extracted factors are highly reliable in elucidating patterns within the variables. Such Factor Loadings above 0.7 commonly denote a substantial association, signifying that the identified factors exert a considerable influence on the observed variables. Conversely, an Initial Eigenvalues of Variance of 75.367% signifies the percentage of variability in the data accounted for by the identified factors. Refer to Table 4.10 below.

Table 4.9: KMO and Bartlett's Test for Component 3

Parameter		Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.929**
Bartlett's Test of Sphericity	Approximate Chi-Square	1419.002
	Degree of freedom	45
	Significance	<0.001

Table 4.10: Factor Loading and Variance Explained for Component 3

Strategic Training and Development in the Infrastructure Project during the COVID-19 Pandemic	**Factor Loading**	**Total**	**Initial Eigenvalues of Variance %**
Component 3: Strategic Training and Development		7.537	75.367
Training Evaluation	0.913		
Alignment with Organisation Objective	0.897		
Organisation's Investment	0.891		
Organisational Priority	0.886		
PM and HR Role	0.880		
Training Needs Assessment	0.880		
Training Coordination	0.872		
User-Friendly	0.866		
Customised, Personalised and Apt Training	0.835		
Government's Role	0.751		
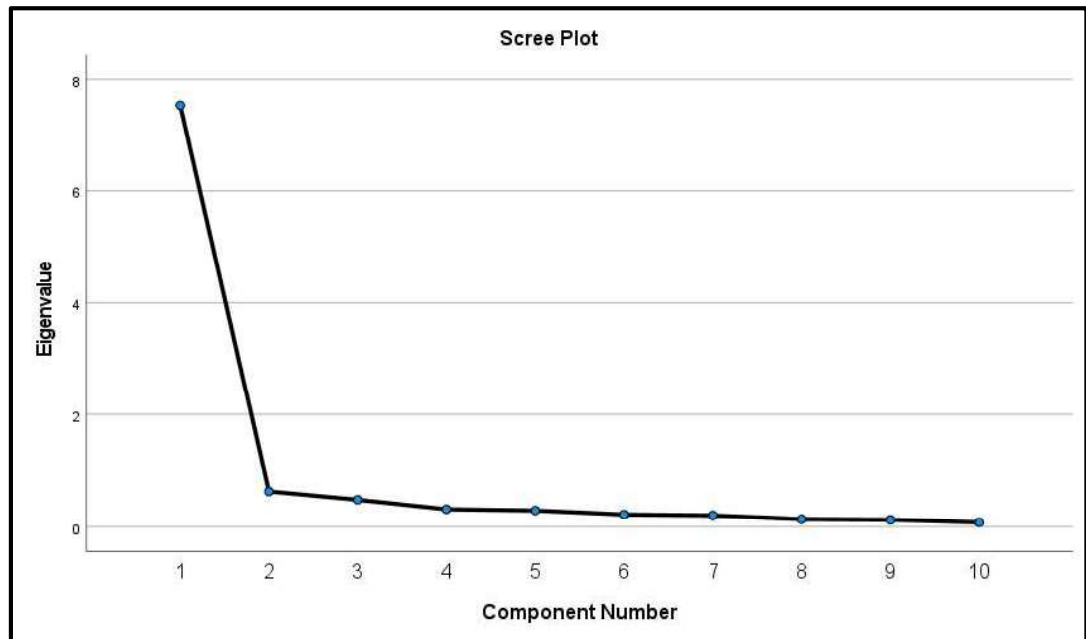
Figure 4.3: Scree Plot for Component 3

4.6   Conceptual Framework

A conceptual framework serves as the intellectual scaffolding that underpins research, providing a structured foundation for understanding, analysing, and interpreting complex phenomena. This conceptual roadmap outlines key concepts, variables, and relationships within a study, guiding researchers in their exploration and analysis. As an essential tool in academic and scholarly endeavours, a well-defined conceptual framework not only helps to organize ideas but also lays the groundwork for hypothesis formulation and the development of research methodologies. Refer to Figure 4.4 for the framework of this study.

The framework demonstrates that the effectiveness of human skills in the context of infrastructure projects and project management activities during the COVID-19 pandemic is influenced by independent variables, capabilities, and training and development, all within the backdrop of complexity.

Dependent Variable

Efficacy of Human Skills

EF01) Improvement in Efficiency

EF02) Improvement in Self Confidence

EF03) Enhancement in Engagement & Motivation

EF04) Refinement in Managing Conflicts & Crisis

EF05) Improvement in Decision Making Ability

EF06) Refinement in Leadership Ability

EF07) Breakthrough in Self-Control

EF08) Changes in Assertiveness

EF09) High Productivity

EF10) Enhancement in Performance

Infrastructure Projects

Project Management during COVID-19

Key Human Competencies

CA01) Active Listening

CA02) Adaptability

CA03) Cognitive Flexibility

CA04) Conflict Resolution

CA05) Critical Thinking

CA06) Decision Making

CA07) Effective Communication

CA08) Emotional Intelligence

CA09) Empathy Mind-Set

CA10) Leadership

CA11) Negotiation

CA12) Networking

CA13) Open Mindedness

CA14) Organisational Skills

CA15) Ownership

CA16) Problem Solving

CA17) Safety Consciousness

CA18) Stress Management

CA19) Teamwork and Collaboration

CA20) Time Management

Strategic Training and Development

TD01) Alignment with Objective

TD02) Trainings Needs Assessment

TD03) Customised, Personalised &

TD04) User Friendly

TD05) Training Coordination

TD06) Training Evaluation

TD07) Organisational Priority

TD08) Organisation's Investment

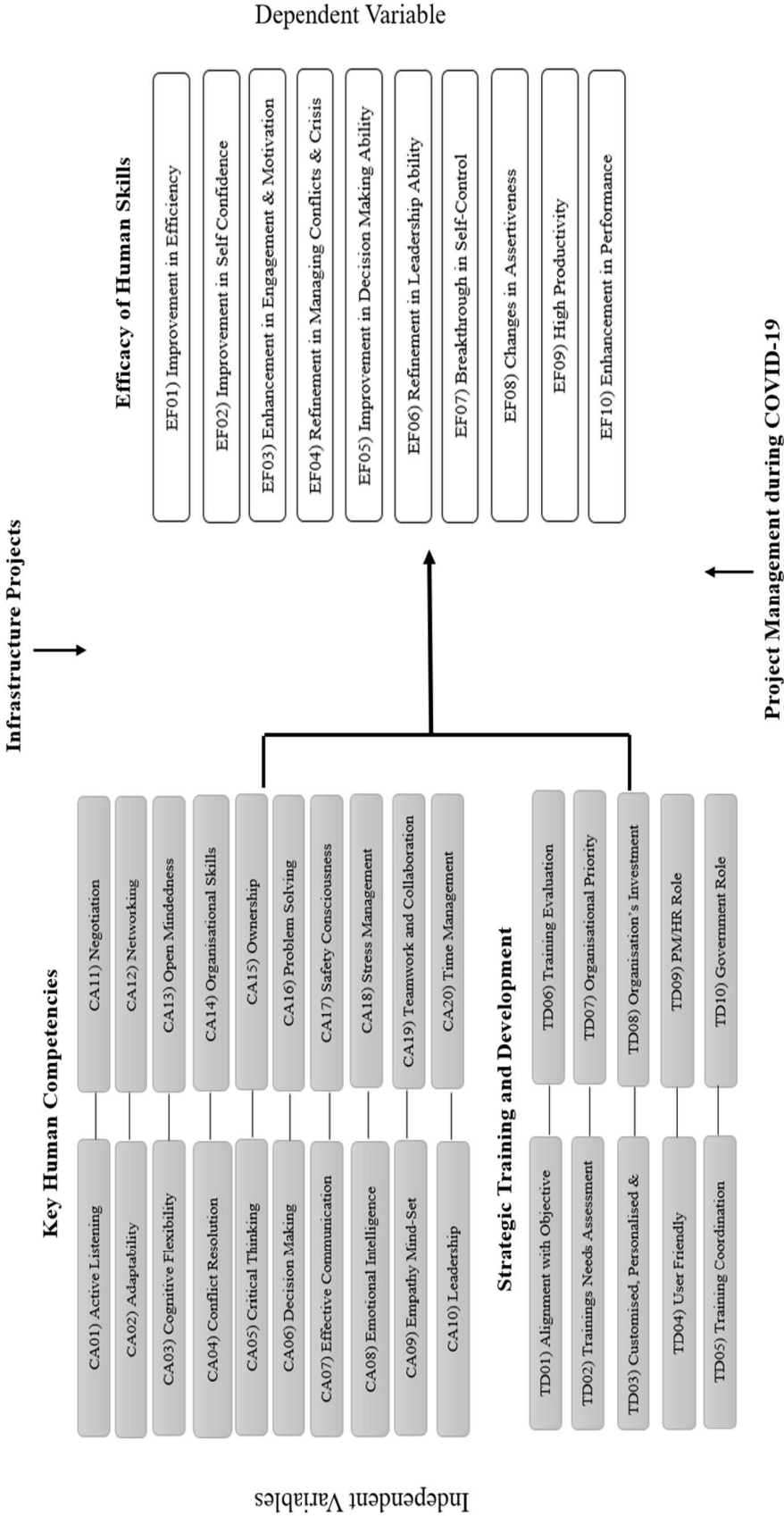TD09) PM/HR Role

TD10) Government Role

Independent Variables

Figure 4.4: Conceptual Framework

4.7   Summary

In conclusion, the findings of this study have been derived from the data and responses collected from 130 construction professionals, particularly those participated in infrastructure projects within the Klang Valley area, during the COVID-19 pandemic. The data analysis employed two statistical methods, namely Mean Ranking and Factor Analysis.

In the Mean Ranking test, the top five factors within each components in the research framework were identified as crucial for the relevance of human skills in the infrastructure project performance in Klang Valley, during the COVID-19 pandemic.

Furthermore, the Factor Analysis was employed successfully, revealing and extracting three underlying factors from the 40 influential variables within the research framework that are essential infrastructure project performance during the COVID-19 pandemic. These three factors are human capability of applying human skills, efficacy of human skills and training and development required to overcome the working challenges during COVID-19 pandemic.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

By presenting and discussing the results in accordance with the previously mentioned research aim and objectives, this chapter concludes the study. Furthermore, the research implications and limitations are discussed. A number of recommendations are provided at the end of the chapter with the goal of improving research in the same area in the future.

5.2 Achievement of Research Aim

This study seeks to explore the relevance of human skills and their efficacy on infrastructure project performance in Klang Valley, Malaysia, amid the challenges posed by the COVID-19 pandemic. Simultaneously, the research aims to delve into the role of training and development in enhancing infrastructure project performance during this unprecedented period. The achievement of the research aim is accomplished through the thorough examination presented in this study.

5.3 Achievement of Research Objectives

The subsequent sections provide an overview of the research questions raised, the research objectives established and the achievement of these objectives. Table 5.1 below displays the questions raised during the initial phase of this study, along with the established objectives and the attained achievements upon completion of the research.

Table 5.1: Achievement of Research Objectives

No.	Questions Raised	Objectives Established	Findings
1	Is there is any relevance of human skills and the infrastructure project performance during the COVID-19 pandemic?	To investigate the relevance of human skills and the infrastructure project performance during the COVID-19 pandemic.	Results shows a significant relevance of human skills and the infrastructure project performance during the COVID-19 pandemic.

No.	Questions Raised	Objectives Established	Findings
2	Does applying human skills in the infrastructure project in during the COVID-19 pandemic result in performance efficacy?	To investigate the efficacy of human skills in infrastructure project performance during the COVID-19 pandemic.	Results shows a significant efficacy of human skills in infrastructure project performance during the COVID-19 pandemic.
3	Did the training and development of human skills provide enhanced the infrastructure project performance during the COVID-19 pandemic?	To investigate the training and development in the aspect of human skills in the infrastructure project performance during the COVID-19 pandemic.	Results shows training and development in the aspect of human skills is essential in the infrastructure project performance during the COVID-19 pandemic.

5.3.1 Research Objective 1

Research Objective 1, to investigate the relevance between human skills and the infrastructure project performance during the COVID-19 pandemic, has been successfully achieved. This objective reflects a keen interest in understanding how the diverse set of human skills contributes to, influences, or possibly mitigates the effects of the pandemic on the infrastructure projects in this specific geographical area. The study offers valuable insights into the adaptability and resilience of these projects during these unprecedented times. This objective is achieved as the research shows a significant relevance in applying human skills in the infrastructure projects in the mean ranking and factor analysis.

5.3.2 Research Objective 2

Research Objective 2, to investigate the efficacy of human skills in infrastructure project performance during the COVID-19 pandemic, has been successfully achieved. Through a comprehensive investigation, this study has provided valuable insights into how the efficacy of human skills play a crucial role in influencing and determining the success of infrastructure projects during these

unprecedented times. The findings contribute to a better understanding of the dynamic relationship between the skills of individuals involved and the overall performance of infrastructure projects in the specific context of the global health crisis in Klang Valley. This objective is achieved as the research shows there is significant efficacy of human skills in the infrastructure project performance mean ranking and factor analysis.

5.3.3 Research Objective 3

Research Objective 3, to investigate the training and development in the aspect of human skills in the infrastructure project performance during the COVID-19 pandemic, has been successfully achieved. This study has thoroughly explored and analysed the impact of training initiatives on enhancing human skills within the context of infrastructure projects, focusing on the COVID-19 pandemic. The findings contribute valuable insights into the role of training and development programs in cultivating and fortifying the necessary human skills required for maintaining and improving infrastructure project performance in the unique circumstances in Klang Valley. This objective is achieved as the results shows training and development in the aspect of human skills is essential in the infrastructure project performance during the COVID-19 pandemic.

5.4 Research Implication

The fulfilment of all three research objectives successfully indicates the overall goals of the study have been fully achieved. Every goal, painstakingly crafted to tackle particular aspects of the research question, has been properly examined and successfully accomplished. This accomplishment highlights the thoroughness and effectiveness of the research approach used, demonstrating the breadth of analysis and the attainment of predefined goals. The achievement of these goals not only confirms the validity of the study's methodology but also makes a significant contribution to a wider understanding of the relationship between infrastructure project performance, training and development, and human skills in the particular context of Klang Valley, Malaysia, in the midst of the COVID-19 pandemic's challenges.

This study has significantly contributed to bridging a noticeable gap in the existing literature concerning the significance of human skills in influencing the performance of infrastructure projects in Klang Valley, Malaysia. By delving into this

specific aspect, the research has unearthed valuable insights and nuanced understanding that were previously absent from scholarly discourse. The findings not only enrich the current body of knowledge but also provide a more comprehensive perspective on the intricate dynamics between human skills and infrastructure project outcomes in the context of Klang Valley. This contribution enhances the scholarly dialogue on project management, offering a foundation for future research endeavours and practical implications for stakeholders involved in infrastructure development in the region.

The study has significantly heightened awareness regarding the pivotal role of human skills in the performance of infrastructure projects. This research sheds light on the notion that beyond technological advancements and project management methodologies, the human element plays a crucial role in ensuring the success and efficiency of infrastructure projects. The findings underscore the importance of investing in and nurturing a skilled workforce capable of navigating the complex challenges associated with large-scale projects. As Malaysia's Klang Valley continues to undergo rapid development and expansion, the recognition of human skills as a critical factor in project performance will likely reshape strategies and policies, emphasising the need for a well-equipped and proficient workforce to drive sustainable infrastructure development.

The findings of this study have brought to the forefront the diverse array of human skills and underscored their profound significance. In the relentless pursuit of technological advancements and specialised expertise, there has been a tendency to overlook the training and development of essential human skills. This study serves as a compelling eye-opener, prompting a re-evaluation of priorities and a recognition of the critical role that human skills play in various aspects of life, including professional endeavours. It signals a shift in perspective, emphasising the importance of cultivating a holistic skill set that encompasses not only technical prowess but also interpersonal, communication, and adaptability skills. As we absorb the insights from this study, there is a growing awareness of the need to strike a balance and invest in the multifaceted capabilities of the human workforce, acknowledging that a harmonious integration of diverse skills is key to navigating the complexities of our ever-evolving world.

5.5   Research Limitation

One notable limitation of this research lies in its reliance on quantitative data collection methods, where the results are derived from numerical answers. While quantitative approaches provide a structured and measurable framework for analysis, they inherently face challenges in capturing the nuanced and qualitative aspects of respondents' thoughts and motivations. The limitation becomes apparent in the complexity of human experiences and perspectives, which may not be fully encapsulated through numerical metrics alone. Respondents' thoughts, emotions, and underlying drivers often entail qualitative intricacies that can be challenging to quantify. Consequently, the research might not fully grasp the depth and richness of participants' insights, potentially overlooking valuable qualitative nuances that could enhance the overall understanding of the subject matter. Future studies might benefit from incorporating complementary qualitative methods to provide a more comprehensive and holistic view of the intricacies surrounding the research topic.

An additional constraint of this research is the scarcity of prior studies within the specific research domain concerning human skills in infrastructure projects. The absence of a robust body of existing literature on this topic limits the researcher's ability to contextualize findings, draw upon established frameworks, and engage in meaningful comparative analyses. The dearth of precedent studies may impede the depth of understanding regarding the nuances and dynamics of human skills in the context of infrastructure projects. Consequently, this limitation highlights the pioneering nature of the current research, emphasising the need for future investigations to build upon its groundwork and contribute to the gradual accumulation of knowledge in this relatively unexplored area. The absence of a well-established foundation underscores the importance of interpreting the results with caution and encourages a broader scholarly exploration to enhance the comprehension of the role of human skills in the success of infrastructure projects.

This research bears the inherent limitation of its scope and depth, attributed to the researcher's status as a postgraduate student. Unlike experienced researchers with years of prolific academic engagement, a postgraduate student may be constrained by a relatively shorter tenure of research experience and may not have accumulated the same depth of insights or extensive body of work. Consequently, the discussions within this research might lack the breadth and seasoned perspective that more

experienced scholars bring to their works. It is essential to acknowledge that this limitation arises from the developmental stage of the researcher's academic journey rather than a deficiency in the research itself. Despite these constraints, the study contributes a valuable entry point to the existing body of knowledge, and its limitations highlight the potential for future research to build upon and expand the discourse in this field.

One of the biggest challenges encountered during the questionnaire administration process was the resistance shown by stakeholders in infrastructure projects, who were overworked and reluctant to participate in the lengthy questionnaire. Due to the poor response rate caused by this initial hesitation, the researcher had to take proactive measures to build personal relationships in order to obtain the involvement of eligible respondents. The question was improved with a thorough example and a precise definition of the phrase "human skills" in response to worries that some participants would not completely understand the idea. In order to guarantee transparency and promote direct connection, the researcher's contact details were also supplied, creating an atmosphere of candour and understanding.

5.6   Research Recommendations

The following sections provide an overview of the research recommendations, encompassing the suggested courses of action and insights derived from the comprehensive investigation of this research. These suggestions serve as valuable contributions to the academic, practical, or policy landscape related to the research topic.

5.6.1   Recommendation 1

Further research into the human skills and how they affect the effectiveness of infrastructure projects in Malaysia's Klang Valley is still warranted. There is a clear gap in our knowledge of the wider significance of human skills and their complex impact on project outcomes, especially in the context of infrastructure projects, as previous research in this field has mostly concentrated on single or skill sets. There is plenty of room for a more thorough and in-depth investigation to fill up the current knowledge gaps, considering the intricacy and multidimensional character of such undertakings. The complex interactions between different human abilities and how

they all work together to contribute to the effectiveness and success of infrastructure projects in the dynamic.

5.6.2   Recommendation 2

In the Malaysian context, conducting a study on this subject in less developed areas presents a compelling avenue for research, allowing for a nuanced comparison with more developed regions. The choice of diverse settings adds a layer of complexity to the investigation, potentially unveiling variations in the outcomes based on the developmental disparities between these areas. The demographics of both the projects and the respondents in less developed regions could significantly influence the study's findings, offering valuable insights into how the value of human skills manifests in different socio-economic contexts. Exploring the potential substantial differences in project performance between less developed and more developed areas not only enhances the depth of understanding but also contributes to the broader discourse on effective infrastructure development strategies tailored to the specific needs of distinct regions within Malaysia. This comparative approach may yield findings with implications for more targeted and contextually relevant interventions in the future.

5.6.3   Recommendation 3

In the current landscape, where we find ourselves entrenched in the endemic stage, this study serves as a valuable tool for reflection and analysis. It offers a retrospective lens through which we can assess the challenges faced and strategies employed during this unprecedented period. As we navigate the complexities of the construction industry, notorious for its inherent uncertainties, the findings from this study become even more pertinent. Beyond a mere retrospective glance, the insights garnered can be instrumental in charting a course for improvement. By understanding the nuances of our responses to the challenges posed by the endemic situation, we can refine our approaches and fortify our strategies for future events. The study thus becomes a reservoir of knowledge, not only aiding in the continuous enhancement of our practices but also serving as a guidepost for resilience in the face of uncertainties that may arise in the dynamic landscape of the construction industry.

5.7 Summary

Within this chapter, a summary is provided on the approach taken to fulfil all research objectives. The implications and limitations of the research are thoroughly discussed and elucidated. Lastly, notable recommendations are underscored, offering valuable insights for the advancement of future research endeavours.

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APPENDICES

APPENDIX A: Questionnaire

Section A: Demographic Information

This section collects your personal information. Please select only the one most appropriate answer for each question.

DI01) Type of Organisation

Which of the following best describes the type of organisation you work for?

o Developer

o Consultant

o Contractor

DI02) Position in the Organisation

Which of the following best describes your position in the organisation you work for?

o Upper Management

o Middle Management

o Lower Management

DI03) Working Experience

How many years have you been working in infrastructure projects?

o Below 5 years

o 5 - 10 years

o More than 10 years

Section B: Capability to Apply Human Skills in the Infrastructure Project during the COVID-19 Pandemic

How do you rate your **capability** to apply the below described human skills to contribute to the infrastructure project performance you have participated in, during the COVID-19 pandemic?

Please find the indicator of each scale as follows:

1 - Unsatisfactory Performance

2 - Improvement Desired

3 - Meets Expectation

4 - Exceeds Expectation

5 - Outstanding Performance

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
CA01) Active Listening The capability of listening and responding to another person that improves mutual understanding.					
CA02) Adaptability Being open to change and capable to adjust to new circumstances and challenges.					
CA03) Cognitive Flexibility The capability to switch between tasks or work on several tasks simultaneously.					
CA04) Conflict Resolution The skill of resolving disputes and conflicts in a constructive and peaceful manner.					
CA05) Critical Thinking The capability to analyse information, evaluate arguments, and make well-informed decisions.					
CA06) Decision-Making The capability to make choices by identifying a decision, gathering					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
information, and assessing alternative resolutions.					
CA07) Effective Communication The capability to express ideas and information clearly and effectively (oral and written).					
CA08) Emotional Intelligence The capability to practise self-awareness, self-management, social awareness, and relationship management.					
CA09) Empathy Mind-set The capability to understand and share the feelings of others, which helps in building connections and relationships.					
CA10) Leadership The capability to guide, inspire, and motivate others, often involving decision-making and vision setting.					
CA11) Negotiation The art of reaching agreements and compromises in various situations.					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
CA12) Networking The capability to build and maintain professional relationships and connections.					
CA13) Open-Mindedness The quality of being willing to consider ideas and opinions that are new or different to your own.					
CA14) Organisational Skills The capability to use organisational resources efficiently and effectively.					
CA15) Ownership The capability of taking initiative and responsibility for your growth and the success of your team or organisation.					
CA16) Problem Solving The skill of identifying issues and finding practical solutions.					
CA17) Safety Consciousness The capability to practice awareness and adherence of safety protocols for preventing accidents and ensuring the well-being of all workers.					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
CA18) Stress Management The capability of coping with stress and maintaining a healthy work-life balance.					
CA19) Teamwork and Collaboration The capability to work effectively as part of a team, collaborate with others, and contribute to collective goals.					
CA20) Time Management The capability to efficiently allocate and prioritise time for tasks and responsibilities.					

Section C: Efficacy of Human Skills in the Infrastructure Project Performance during the COVID-19 Pandemic

How do you rate the **efficacy** of the below described, as a result from applying human skills listed in Section B in the infrastructure projects you have participated in, during the COVID-19 pandemic?

Please select only the one most appropriate answer for each question, based on your personal opinion and working experience.

Please find the indicator of each scale as follows:

1 - Unsatisfactory Performance

2 - Improvement Desired

3 - Meets Expectation

4 - Exceeds Expectation

5 - Outstanding Performance

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
EF01) Improvement in Efficiency The quality of accomplishing large amount of useful work with minimum energy and effort.					
EF02) Improvement of Self-Confidence The capability to see the best version of yourself and to be the best version of yourself.					
EF03) Enhancement in Engagement and Motivation The awareness of skills and experiences, personal attitudes, circumstances and able to engage in an activity for its inherent satisfaction rather than rewards.					
EF04) Refinement in Managing Conflict and Crisis The improvement in competence to handle conflicts and crisis emerging in teams and organisations.					
EF05) Improvement in Decision-Making Ability The improvement in assessing facts, understand the current state and goals, and choose the best course of action.					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
EF06) Refinement in Leadership Ability The capability to recognise different leadership styles and respective characteristics such as behavioural patterns, communication methods, ways of controlling team members' behaviours, and the level of delegation.					
EF07) Breakthrough in Self-Control The capability to control emotions and actions; self-restraint and deal with adversity.					
EF08) Changes in Assertiveness The capability to communicate with others in a direct and honest manner without intentionally hurting anyone's feelings.					
EF09) High Productivity The capability to dedicate time to specific tasks, completing them and ending the workday with a quality output.					
EF10) Enhancement in Performance					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
The capability to deliver the project with more value, quality and higher standard.					

Section D: Training and Development of Human Skills during the COVID-19 Pandemic

How do you rate the **training and development** of human skills provided by your organisation, to meet the working challenges and simultaneously enhance the project performance, during the COVID-19 pandemic?

Please select only the one most appropriate answer for each question, based on your personal opinion and working experience.

Please find the indicator of each scale as follows:
1 - Unsatisfactory Performance
2 - Improvement Desired
3 - Meets Expectation
4 - Exceeds Expectation
5 - Outstanding Performance

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
TD01) Alignment with Organisation Objective Alignment of the training programmes in accordance to the organisation's objective.					
TD02) Training Needs Assessment Assessment on the ability to apply human skills on the job,					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
to fill the existing skill gaps within the organisation.					
TD03) Customised, Personalised and Apt Training Programmes Training programs were customised, personalised and apt to meet the organisation's requirements and to cater to the specific needs of the diverse workforce.					
TD04) User Friendly Training modules, tools and platforms were designed to be apt and user friendly to ease the learning process.					
TD05) Training Coordination Training delivery, programme promotions and information, and logistical aspects i.e. scheduling, venue or platform booking, resources and remote access features were well coordinated.					
TD06) Training Evaluation Feedbacks and post-training assessments were conducted to evaluate the changes in performance and the ability to master the human skills learned on the job.					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
TD07) Organisational Priority Management support on prioritising training and development on human skills in the organisation's learning culture.					
TD08) Organisation's Investment Investment in apt programmes and new technologies to provide employees with the access to training, communication, knowledge and task management.					
TD09) Project Manager/HR Manager's Role The Project Manager/HR personnel's efficiency in the following areas: • analysing the training needs; • designing materials and methods; • embracing new technologies in learning; • monitoring and evaluating the outcome; and					

Questionnaire	1 Unsatisfactory Performance	2 Improvement Desired	3 Meets Expectation	4 Exceeds Expectation	5 Outstanding Performance
• feedback on the impact on project performance.					
TD10) Government's Role Ministry of Human Resources (MoHR) and other pertinent bodies met their obligations by ensuring that the workforce had access to the following resources: • training and development on improvising human skills; • resources to support training and development; • allocation of budget; • latest information and regular updates; and • improvised Standard of Procedures (SOP).					