ACCESSING INDUSTRIAL SITE SELECTION CRITERIA BY INVESTORS IN MALAYSIA

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Accessing Industrial Site Selection Criteria by Investors in Malaysia

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DECLARATION

I hereby declare that:

(1) This Research Project is the end result of my own work and that due acknowledgement has been given in the references to all sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) The word count of this research report is 18,509.

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DEDICATION

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12MP	12th Malaysia Plan
AHP	Analytic Hierarchy Process
CI	Consistency Index
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CR	Consistency Ratio
DDI	Domestic Direct Investment
EM	Eigenvector
EPF	Employee Provident Fund
EPU	Economic Planning Unit
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
HRDF	Human Resource Development Fund
IGA	Investment Guarantee Agreements
IICA	Industrial Coordination Act
ITA	Investment Tax Allowances
Kwh	Kilo Watt per Hour
LPG	Liquefied Petroleum Gas
M&E	Mechanical & Electrical
MIDA	Malaysian Investment Development Authority
MIP	Managed Industrial Park
NIMP2030	National Industrial Master Plan 2030
NIP	New Investment Strategy
PRC	People's Republic of China
PS	Pioneer Status
PV	Photovoltaic
RCEP	Regional Comprehensive Economic Partnership
RI	Random Index
RO	Research Objective
RQ	Research Question

SEA	South East Asia
SOCSO	Social Security Organization
TM	Telekom Malaysia
TNB	Tenaga Nasional Berhad
USP	Unique Selling Points
WGMM	Weight Geometric Mean Method

PREFACE

My academic journey began with a fervent curiosity to delve into the research study of Accessing Industrial Site Selection Criteria by Investors in Malaysia. Reflecting on the trajectory that led me to complete this thesis, I reminisce about the extensive research hours, moments of inspiration, and the unwavering support and guidance I received.

The objective of this research study is to (i) examine site selection criteria influencing investors' site selection decision and to (ii) identify the weightage of site selection criteria in investors' decisions during the site selection process.

In this thesis, we have incorporated various studies and put it into literature reviews concerning the list of potential criteria influencing investors' site selection decisions. Simultaneously, we aimed to identify which criteria rank the highest and lowest through appropriate research methods to obtain the results.

Engaging in this thesis provided us with a broader understanding of how investors perceive the criteria or factors when considering site selection in Malaysia. By the end of the research, the outcomes will inform decision-makers and industry stakeholders, enabling them to make well-informed decisions regarding site selection for industrial investment in Malaysia.

ABSTRACT

Malaysia's strategic location in Southeast Asia, coupled with its unique attributes, makes it an attractive destination for Foreign Direct Investment (FDI) and Domestic Direct Investment (DDI). With its central location in the South East Asia, extensive infrastructure, matured highway connection, multiracial population, and robust port facilities, Malaysia stands as an advantageous choice for investors.

Amidst approximately 600 industrial parks nationwide, determining the optimal location poses a challenge. Not all industrial parks offer ideal infrastructure, utilities and facilities, prompting investors to seek sites tailored to their specific requirements. To enhance Malaysia's appeal as an investment destination, it is crucial to identify the most sought-after criteria for site selection.

Through a detailed literature review, key selection criteria were identified, encompassing factors such as connectivity and infrastructure, utilities, government institutional support, facilities and services, physical sites, labour, and investment costs. Subsequently, a survey questionnaire was distributed to key experts, including industrial property developers, industrial agents with extensive experience in dealing with potential investors seeking industrial land in Malaysia, and existing investors who have already established a presence in the country. The aim was to gather insights into their decision-making processes regarding site selection criteria.

The Analytic Hierarchy Process (AHP) tools were utilized to prioritize criteria based on data collected from key respondents. A total of 5 main criteria and 19 sub-criteria were selected for this analysis. Based on the findings, the main criteria were ranked in terms of weightage, with connectivity being the most significant criterion, followed by utilities, physical sites, facilities, and lastly, government institutional support.

Further delving into each main criterion, the AHP tools enable the researcher to explore its sub-criteria to address multi-criteria decision-making. Regarding connectivity, the weightage spans from connectivity with major highways and proximity to airport/seaport to proximity to urban centre and availability of raw resources. Similarly, for utilities, the weightage ranks from electricity supply and water supply to telecommunications & network infrastructure and waste disposal/collection management. In terms of physical site attributes, it ranges from size of the site and site topography to landscape/green features.

As for facilities, the ranking includes security measures, safety measures, worker accommodation, and management services. Finally, in terms of government institutional support, property ownership policy emerges as the most significant factor, followed by tax incentives offered by the government, supportive state administrative and permissible zoning and land used.

The findings shed light on the crucial factors influencing site selection, providing guidance for stakeholders to make informed decisions and bolster Malaysia's industrial parks' competitive edge, attracting investment and bolstering Malaysia's standing on the global stage.

CHAPTER 1

INTRODUCTION

Strategically positioned in Southeast Asia, Malaysia boasts a diverse economic history with a strong focus on exports, accorded at RM1.426 trillion in 2023, shaping it into a regional economic powerhouse (MATRADE, 2024). As per the Malaysian Investment Development Authority's (MIDA's) performance report for the year 2022, there were noteworthy approved investments in both foreign direct investment (FDI) and domestic direct investment (DDI). The figures stood at RM163.3 billion and RM104.4 billion, respectively, indicating a robust economic growth trajectory and heightened investor confidence in Malaysia's business landscape (MIDA, 2023a). Among the foreign investors, Singapore took the lead with RM9.6 billion, closely followed by the People's Republic of China (PRC) with RM9.6 billion, Japan with RM9.2 billion, The Netherlands with RM8.8 billion, and Germany with RM8.8 billion. Collectively, these five countries contributed RM46 billion, accounting for 69.7% of the total foreign investments approved in the manufacturing sector for the year 2022 (MIDA, 2023b).

The nation's economic landscape is a dynamic mix of industries, with the manufacturing sector playing a significant role in Malaysia's GDP with total approved investment of RM84.3 billion or 801 project which poise to generate over 76,093 new job opportunities in year 2022 (MIDA, 2023b). Renowned for its expertise in electronics, electrical products, transport equipment, chemical and chemical products, petroleum products, M&E and scientific and measuring equipment, this sector has been pivotal to Malaysia's economic success (MIDA, 2023b).

Back track to 1st April 2023, Malaysian Prime Minister Datuk Seri Anwar Ibrahim paid a courtesy visit to President Xi Jinping of China, with the aim of strengthening bilateral political and trade relationships between the two nations. During the visit, the Malaysian Government secured a total investment worth 170 billion into Malaysia (NST, 2023). This substantial investment signifies a high level of confidence in the country and demonstrates the positive outlook for economic growth and development.

This success aligns with the Malaysian government's initiatives. The government has implemented various economic development plans to spur growth and attract foreign investment, such as the Twelfth Malaysian Plan (12MP), New investment policy (NIP) and the recent National Industrial Master Plan 2030 (NIMP 2030). These initiatives aim to enhance competitiveness and sustainability, reinforcing Malaysia's position as an attractive destination for investors.

1.1 Unique features: Malaysia as the investment destination

Malaysia provides an optimal platform for businesses. Its advantageous geographical location, complemented by short travel times of approximately 6-8 hours by flight to major countries such as Shanghai, Hong Kong, Melbourne and etc, positions the country as a strategic hub for import and export activities. Recognizing its potential as a business destination, Malaysia has proactively engaged in 16 Free Trade Agreements with various countries, including Singapore, China, Japan, Brunei, Cambodia, Laos, Thailand, Vietnam, Australia, New Zealand, South Korea, Canada, Chile, Mexico, and Peru. Notable among these are the Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) (MITI, n.d.(a).) & MITI, n.d.(b).). These agreements offer businesses the advantage of importing or exporting raw materials, machinery and final goods with minimal or no tariff charges.

Moreover, Malaysia's participation in the Belt and Road Initiative where it has been established since Han Dynasty 2,000 years ago has significantly increased its allure as an investment destination, enhancing connectivity, infrastructure development, and economic cooperation. This involvement provides businesses with opportunities to expand and access new markets, further facilitated by shortened travel times (Belt and Road, 2023).

Additionally, factors such as globalization, supply chain dynamics, and government regulations significantly influence manufacturing industries to relocate or expand operations beyond their home countries. A notable example is the trade tension between the US and China, which began in 2018 and has significantly disrupted global supply chains. The imposition of steep tariffs by the US on imports from China has led to increased costs for numerous Chinese-based companies, prompting many to consider relocating their production facilities to mitigate the impact of these tariffs. Malaysia, situated in Southeast Asia, emerges as a potential beneficiary of this scenario, as companies explore alternative options within the region to navigate the repercussions of the trade dispute. This presents a significant opportunity for Malaysia to establish a presence in the region.

Malaysia has also offered other unique features and resources that make it an attractive destination for investors. These include political stability, attractive business tax incentives, a multiracial and multilingual workforce, multiple highways, proximity to sea ports and airports, abundance of raw materials, and low financing costs (Invest Selangor Berhad, n.d.). These factors provide a conducive environment for doing business in Malaysia, giving investors peace of mind and ease of operations.

Looking at the abundant resources Malaysia possesses and the government's efforts to attract more investment, it is evident that industrial parks, whether government owned or private owned, play a crucial role in providing world-class facilities for both foreign and local companies. Consequently, establishing standards for industrial parks has become a matter of concern. Notably, the Selangor state, being one of the most populous and the leading contributor to the state's GDP (The Star, 2023), has taken the initiative to institute guidelines for Managed Industrial Parks, which serve as a framework for industrial developers in Selangor to adhere to.

A managed industrial park is a gated and guarded industrial park which come with dedicated vehicles and passengers access control and the common areas are managed and maintained by industrial park manager. The development of managed industrial park ensure that the industrial park is conducive and is equipped with complete infrastructures, utilities and supporting amenities such as community centre, worker dormitory, guard house and perimeter fencing (Plan Malaysia @ Selangor, 2021).

Furthermore, A better manageable industrial park which encompasses essential infrastructure such as electricity, water, gas, sewerage, wide roads, and clean and green

features contribute to creating a favourable environment for businesses to operate efficiently and sustainably.

1.2 Problem statement

The aforementioned findings and insights present compelling reasons for both foreign and local investors to explore expansion opportunities in Malaysia. However, given the multitude of locations available for industrial development within the country, investors face a critical decision-making process. This prompts the crucial question: Which specific locations, if in Malaysia are deemed favourable for industrial expansion, and what factors weigh significantly in the minds of clients when selecting industrial land?

In Malaysia, there are a total of 13 states: 2 states in East Malaysia and 11 states in Peninsular Malaysia. Various states present themselves as promising options for industrial development. Nevertheless, not all developers possess the requisite resources and capabilities to meet the diverse needs and expectations of clients. For example, different industries have different requirements. The logistics business, for instance, requires cheaper land costs, proximity to highways, and close proximity to port facilities to easily send goods to other countries. On the other hand, the manufacturing sector has its own perspective. Businesses in this sector require world-class infrastructure, including high-power supply, sufficient water supply, and robust internet and network support to accommodate the IR 4.0 manufacturing line. Therefore, when drilling down to what customers truly need, selecting industrial land in Malaysia becomes challenging. Investors base their decisions on their ultimate requirements and choose their land based on what the Malaysian government or developers can offer. As a result, this discrepancy creates a notable gap between what the government, government-linked companies, or developers can offer and what clients actively seek in an industrial park.

Furthermore, numerous studies have been conducted in various countries, including Thailand, Turkey, Vietnam, Bangladesh, several European countries, India, and Germany, to determine the importance and weightage of industrial site selection criteria when it comes to location selection. For instance, according Ponhan & Sureeyatanapas (2022), a study was conducted on the location selection for production fragmentation of Thai

manufacturing companies. This study identified 5 main criteria to weigh their importance in the selection process. Another study focused on facility location selection for the furniture industry in Bangladesh, where 7 main criteria were established to evaluate the importance of potential factory sites (Suman et al., 2021). Additionally, a study on the chemical industry in European country also provided 7 criteria for interviewees to rank based on their significance (Makarevic & Stavrou, 2022).

Despite these various studies, it is evident that none have specifically addressed the importance of weighing the selection criteria for industrial parks in Malaysia. Therefore, it is crucial to conduct research to ascertain the outcomes and to assess the level of importance associated with these selection criteria.

1.3 Research Questions & Research Objectives

Recognizing and comprehending clients' preferences and priorities in their selection of industrial land stand as pivotal considerations for the government and industrial developers. Such understanding empowers them to craft relevant and competitive industrial developments that align precisely with the needs of clients. By placing emphasis on key criteria like location, connectivity, availability of skilled labour, and robust supporting infrastructure, they can effectively attract businesses and maintain a competitive edge (Arunyanart et al., 2021). Continuous research becomes imperative in bridging the aforementioned gap. To arrive at conclusive insights, the formulation of research questions and objectives is essential, marking the necessary steps towards achieving the ultimate findings.

Research Questions (RQs):

RQ1: What factors influence investors in their choice of industrial plots during the site selection process?

RQ2: What is the weightage of each selected site selection criterion in investors' decisions during the site selection process?

Research Objectives (ROs):

RO1: To examine site selection criteria influencing investors' site selection decision

RO2: To identify the weightage of site selection criteria in investors' decisions during the site selection process.

1.4 Research Scope

The scope of this study encompasses a thorough exploration of the reasons behind investor relocation and expansion plans. Additionally, the study will analyse the criteria that influence the selection of industrial sites in Malaysia. Subsequently, valuable insights will be gathered from various stakeholders, including potential investors, current occupants, property developers, agents, and government officials involved in investment and promotion activities within Malaysia.

Expertise will be drawn from individuals with a minimum of five years' experience in their respective fields. These seasoned professionals possess a wealth of knowledge and firsthand insights gained from navigating the complexities of the industrial sector. Their contributions will form the foundation of this research, providing invaluable perspectives and nuanced understanding to inform the analysis and conclusions. From there, the weighting of each criterion will be determined to ascertain which is more important and which is least important.

1.5 Significance of this Research

This study holds significant importance as it aims to identify the relevant criteria for industrial site selection across various industries. This endeavour is particularly valuable as it can empower industrial developers to craft more appealing offerings for potential investors. By creating more competitive industrial parks, we can elevate Malaysia's industrial landscape to international recognition, propelling the entire sector to greater heights.

Furthermore, the weightage obtained from this research can assist both developers and government authorities in pinpointing which criteria carry the most weight and which categories are of lesser importance. Armed with this knowledge, decision-makers can make

informed choices during land purchase and development, optimizing resources and avoiding unnecessary expenditures. This, in turn, can lead to more competitive pricing for industrial land, ultimately benefiting potential investors.

Moreover, understanding the preferences of potential customers is crucial. Armed with insights from this study, industrial developers, industrial agents, and government authorities engaged in promotional activities can better tailor their efforts to align with these preferences, enhancing their effectiveness in the field.

Lastly, this study serves as a valuable academic resource, providing insights and data that can inform future research endeavours in the field of industrial site selection and development.

1.6 Structure of the Research

Chapter 1: This chapter provides an overview of the research, covering aspects such as the background of the study, problem statement, research objectives, research scope, significance of the research, and the structure of the research.

Chapter 2: Delving deeper into extensive literature review, this chapter aims to identify the significant factors that investors consider for site selection. Understanding these factors is crucial as it provides valuable insights into the decision-making process of investors and sheds light on the elements that contribute to the attractiveness and competitiveness of potential industrial sites.

Chapter 3: Focusing on the research methodology, this chapter describes the methods used for data collection and analysis. For the purpose of this survey, a purposive judgment sampling approach will be adopted. Pairwise questionnaire will be employed as the primary method for gathering data.

Chapter 4: Analysis of all collected data takes centre stage in this chapter. The Analytic Hierarchy Process (AHP) tool will be used to analyze the data collected through the pairwise questionnaire method. The Eigenvector Method (EM) and weighted geometric mean method (WGMM) will be employed to compute the results. The findings of the

analysis will be thoroughly discussed, and the conclusions drawn in this chapter will align with the research objectives.

Chapter 5: As the final chapter of the research, this section provides a comprehensive conclusion summarizing the research conducted and its findings. Additionally, recommendations for further studies will be presented to encourage future exploration in this area.

1.7 Conclusion

In conclusion, Chapter One provides a comprehensive overview of the study, focusing on the Malaysian government's positioning in investment promotion. This chapter identifies the problem statement, research questions, and objectives. Additionally, it outlines the research scope, significance of the research, and the overall structure of the study. Building on the previously mentioned problem statement, a notable gap emerges in the research landscape concerning site selection criteria in Malaysia. Most existing studies are conducted overseas, making their applicability in the Malaysian context limited due to differences in countries and cultures.

To address this gap, Chapter 2, the literature review, will identify the relevant and necessary site selection criteria. This will enable readers to gain a deeper understanding of each criterion in site selection and its significance. Subsequently, the study will proceed to justify and evaluate the importance of each criterion.

Chapter 2

Literature review

2.1 Introduction

Before delving into the key criteria for industrial site selection, it is essential to understand the motivations behind each industrialist's interest in relocation or expansion. This literature review will then provide insights into these factors. Subsequently, each potential criterion for site selection will be analysed, considering its significance in the decision-making process. Lastly, industry-specific considerations will be taken into account to identify the criteria that are most likely to hold considerable importance.

2.2 Factors driving industrialists to consider relocation or expansion

2.2.1 Globalization's Impact the needs of industrial site location selection

Decisions on where to establish factories and manufacturing plants are closely tied to global changes, particularly the impact of globalization on how businesses operate worldwide. Companies are increasingly becoming global entities, spreading their production,

distribution, and supplies across different parts of the world. When one company decided to move, the entire supply chain follows suit. This shift is amplified by the growth of international trade and investment, making decisions about where to place factories even more critical. (Bhatnagar et al., 2011; World Development Report,2000).

In this global context, building robust and adaptable supply chains becomes essential for the ongoing success of businesses. When faced with challenges such as economic or political issues, companies might need to relocate to handle potential problems effectively. As discussed in the previous chapter, the relocation of manufacturing plants can be attributed to globalization factors, such as the US–China Trade war. Additionally, the need to be in close proximity to both upstream and downstream elements of the supply chain in order to reduce production costs becomes one of the factors influencing industrialists to consider relocation or expansion of their factories. For example, Penang, as a state, has excelled in this aspect, being ranked as the best Foreign Direct Investment destination under the Electrical and Electronics (E&E) sector in Malaysia. The E&E industry encompasses a broad spectrum of electronic goods, including consumer electronics, telecommunications equipment, and industrial electronics. By clustering E&E manufacturers and suppliers in dedicated industrial parks, Penang has fostered collaboration, knowledge sharing, and economies of scale within the industry, contributing to its success and competitiveness on a global scale. Previous studies have also suggested that being able to adapt to changes in production methods and supply chain configurations, especially through decentralized production, can enhance a company's competitiveness (Sun Weng et al., 2020). Looking more closely at the decision-making process for choosing the best place to set up factories and manufacturing plants, it involves external factors like considering the economy, markets, government, business efficiency, infrastructure, and human capital. Nowadays, there is an added layer of complexity, emphasizing the importance of sustainable practices within supply chains.

In a more detailed view, a survey by the Federation of Thai Industries reveals a trend where companies are moving their operations to countries where manufacturing is more cost-effective due to globalization. This is done to save costs and explore new markets (Arunyanart et al., 2021). Companies in this context might decide to move their entire factories or just certain stages of production, spreading them out globally to reduce costs. Key things to consider in this decision-making include the technical aspects, advantages of

different locations, and how cost-effective the connections between different production stages are (Kimura et al., 2007).

Highlighting the importance of sustainable practices in managing supply chains on a global scale, scholars contribute to discussions about the impact of sustainable innovation in terms of cost saving and efficiency improvement. In return, this emphasizes the need to think about the environment, social aspects, and economic factors when deciding where to set up production lines and how to structure supply chains. These considerations further influence the strategic decisions related to production and supply chains (Kusi-Sarpong et al., 2019).

2.2.2 The Government imposes sustainable environmental regulations

In response to the increasing global concerns regarding energy consumption and sustainability, the manufacturing sector is undergoing significant shifts. Countries worldwide are to address energy-related challenges, compelling businesses to explore alternative strategies to maintain competitiveness.

The integration of energy sustainability into the broader concept of sustainable development has gained prominence in recent years. Heightened anxieties about climate change, declining fossil fuel reserves, and the imperative for eco-friendly energy sources underline the urgency of this paradigm shift (Graciele et al., 2018; Lee et al., 2015).

Energy serves as a number one for global economic and industrial advancement, with traditional fossil fuels dominating over 80% of the world's energy production (Shao et al., 2020). However, this reliance on fossil fuels contributes substantially to greenhouse gas emissions, necessitating a re-evaluation of energy usage and sourcing strategies.

Manufacturing activities, as significant energy consumers, face increasing scrutiny amid global energy concerns. In 2012, the industrial sector accounted for over half of global energy consumption, with manufacturing emerging as a key energy-consuming subsector. The pursuit of cost efficiencies has led to manufacturing outsourcing to developing economies, yet this trend raises environmental apprehensions (Sihag et al., 2019).

The escalating global energy crisis, coupled with rising costs of gas, coal, and electricity, poses profound challenges for households and businesses, impacting their viability Office

for National Statistic, 2022; Makarevic & Stavrou, 2022). In response, regulatory bodies like the EU are setting ambitious energy-saving targets and promoting enhanced building energy efficiency measures (Frost and Sullivan, 2022; Makarevic & Stavrou, 2022).

To navigate these challenges and maintain competitiveness, businesses are increasingly diversifying their manufacturing operations across borders (Arunyanart et al., 2021). Strategic decisions, including the selection of optimal manufacturing locations, are influenced by both logistical considerations and broader strategic objectives (Hossein Kalantari, 2013; MacCarthy & Atthirawong, 2003; Makarevic & Stavrou, 2022). The site selection process, particularly in foreign territories, entails meticulous evaluation of various factors to identify the most advantageous strategic options (Arunyanart et al., 2021).

2.2.3 Theoretical frameworks influencing industrial relocation and expansion

A) The Weber Theory

The Weber Theory, advanced by economist Alfred Weber, offers valuable insights into the spatial distribution of manufacturing industries, particularly regarding location decisions driven by cost considerations. According to the theory, industries seek to minimize overall costs by strategically positioning themselves in proximity to key resources and markets. This entails a careful balance between minimizing transportation costs for raw materials and finished products, optimizing access to markets, and leveraging factors such as labour availability and infrastructure. In the context of contemporary manufacturing dynamics, industries are increasingly compelled to reassess their locations due to various factors. These include rising labour costs in traditional manufacturing hubs, evolving consumer preferences necessitating closer proximity to markets, and shifts in global supply chain dynamics prompted by geopolitical factors or regulatory changes. Moreover, environmental concerns and sustainability imperatives imposed by governments are becoming significant drivers for industries to consider relocating. By aligning with sustainable practices and optimizing their locations accordingly, manufacturing industries strive to enhance competitiveness and ensure long-term viability in a dynamic economic landscape (Weber, 1958).

B) The Burgess Model

The Burgess Model, developed by sociologist Ernest Burgess, elucidates the urbanization process and its impact on land use patterns within cities. According to this model, cities expand outward from a central business district in concentric rings, with distinct zones for residential, commercial, industrial, and other purposes (Burgess, 1925; Brown, 2013.). As urbanization progresses, the increasing density and development pressure in the inner-city lea to rising land values and higher costs of operation for manufacturing industries. Consequently, these industries are compelled to relocate outward to less congested areas, often at the periphery of the city, to mitigate these challenges. The outward shift of manufacturing industries aligns with the concentric expansion of urban areas described by the Burgess Model, reflecting the interplay between urbanization dynamics and industrial location decisions. Thus, while the Burgess Model primarily addresses urban land use, it indirectly influences the spatial distribution of manufacturing industries by shaping the evolving landscape of cities.

Despite the outward movement of manufacturing industries described by the Burgess Model, industrialists often consider the agglomerative factor when making location decisions. Agglomeration refers to the clustering of economic activities in specific geographic areas, and it can influence industrial location choices in several ways. Firstly, firms may seek to locate near other similar or complementary businesses to take advantage of agglomeration economies, such as access to a skilled labour pool, knowledge spillovers, and supply chain efficiencies. Additionally, being part of an industrial cluster can enhance a firm's visibility, reputation, and access to markets, further incentivizing industrialists to consider agglomerative effects when deciding on a new location (Marshall, 1890; Vatne, 2011). Thus, while urbanization forces manufacturing industries to expand outward, the agglomerative benefits associated with clustering can still be a crucial factor in location decisions, shaping the spatial distribution of economic activity within cities.

2.3 Location Selection Criteria

As discussed, many companies are expanding their manufacturing activities beyond their home countries, opting for cross-border production plants. This strategic move is driven by the recognition that the chosen location of a facility plays a crucial role in cost minimization and resource optimization. Jahr & Borrmann (2018) affirm this viewpoint, stating that decisions regarding manufacturing plant location significantly influence a firm's competitiveness, survival, and market share.

The decision-making process for plant location involves the identification, examination, assessment, and selection of alternatives. Given that the selection of a location entails a long-term commitment of resources and substantial investment, it carries significant strategic implications for a firm's competitiveness, flexibility, and timeliness. Therefore, the ultimate choice of a plant location must align with corporate strategic plans for production objectives, marketing, financing, and human resources (Sahin, 2021).

Certainly, when it comes to site selection, manufacturers consider a multitude of key criteria to ensure optimal decision-making. The complexity of the location selection problem arises from several factors. Firstly, there is a wide variety of criteria to be considered, ranging from quantitative metrics that can be easily measured numerically to qualitative factors that heavily rely on the subjective judgments of decision makers (Bhatnagar et al., 2011; Ozdemir & Sahin, 2018a; Ponhan & Sureeyatanapas, 2022). Moreover, information related to many of these criteria may be subject to frequent changes or may not be readily accessible. Consequently, the process of gathering relevant information can be time-consuming and resource-intensive. This leads to situations where decision makers may hesitate in their decision-making due to the incompleteness or uncertainty of available information (Sequeira & Hilletofth, 2019). Additionally, the importance levels of these criteria typically vary, depending on individual concerns and the variability and complexity of the context (Bait et al., 2022). Finally, it's important to recognize that various industries may have unique sets of criteria guiding their corporate decisions when establishing new plants in different locations (Sureeyatanapas et al., 2020).

Scholars have identified various criteria that play crucial roles in determining the suitability of a location for manufacturing activities. These criteria encompass a wide range of factors, which will be listed below for further discussion.

2.3.1 Connectivity

Previously discussed, Malaysia holds a strategic advantage due to its favourable geographical location. With short flight times of approximately 6-8 hours to major countries such as Shanghai, Hong Kong, and Melbourne, coupled with proximity to Malaysia's premier port facilities, including the bustling Port Klang in Selangor, Johor Port, Port of Tanjung Pelepas in Johor Bahru, Port of Penang and other port facilities, the country emerges as a key hub for import and export activities, particularly within the manufacturing sector. Arunyanart et al. (2021) emphasize that companies engaged in international production fragmentation prioritize locations with sufficient transport and logistics infrastructure. Leveraging Malaysia's logistical advantages, companies seamlessly manufacture goods, ranging from raw materials to fragmented products and final goods, which are then distributed to various countries for sale. Once Malaysia is selected as the business destination, the focus shifts to identifying the optimal site for the manufacturing plant.

Primarily, the decision-making process revolves around quantitative factors such as time and cost. Hence, proximity to airports and seaports becomes a paramount consideration for investors. This has been further supported by evaluations from logistic experts conducted by Nong (2022), Bhatnagar et al. (2011) and Sahin (2021) who found that transportation services were ranked among the most significant factors in the selection of distribution centre locations. However, depending on the nature of goods produced and the logistics involved, the choice of selecting the site location closer to the airport or seaport may vary. Light products utilizing the just-in-time method are usually required to be closer to the airport, whereas heavier and bulkier products often rely on port facilities.

Additionally, due to urbanization and the increasing value of land, industrial lands are often relocated to suburban or newly developed areas to mitigate costs. This necessitates access

to highways to facilitate the movement of goods, making highway connectivity a crucial factor. Lack of highway connectivity renders a piece of land unsuitable for investment.

Furthermore, good connectivity encompasses accessibility to raw resources and upstream or downstream suppliers, directly impacting time and cost considerations. To foster competitiveness, ideal site selection should have an ecosystem integrating these elements to optimize costs for industries operating within them. This integrated approach ensures that businesses have efficient access to the necessary resources and suppliers, streamlining production processes, and enhancing overall competitiveness (Suman et al., 2021).

Moreover, to enhance the quality of life for workers and businesses alike, the selected site should be close to urban centres and amenities. Proximity to urban centres ensure convenient access to these amenities, enhancing the overall attractiveness of the site. These amenities, including canteens, grocery stores, financial institutions, hospitals, shopping malls, and public transport, are essential to support daily activities This notion is further supported by researcher Alberto (2000), who suggests that neglecting the quality of life could adversely impact both the turnover rate and productivity of workers.

2.3.2 Utilities

Industrial lands are usually used by the manufacturing activities and utilities is definitely one of the key elements needed by all industrialists. Therefore, utilities play a crucial role in the site selection process for manufacturing plants (Sihag et al., 2019). Access to reliable utilities such as electricity, water, gas, and water treatment facilities are essential for the smooth operation of manufacturing facilities. In this selection, industrialists are to seek utilities that are readily available based on timeline planned and that the costs are competitive and affordable.

A) Power supply

Every industry requires energy to operate efficiently. This factor is essential and must be taken into account during the site selection process (Suman et al., 2021). A stable and

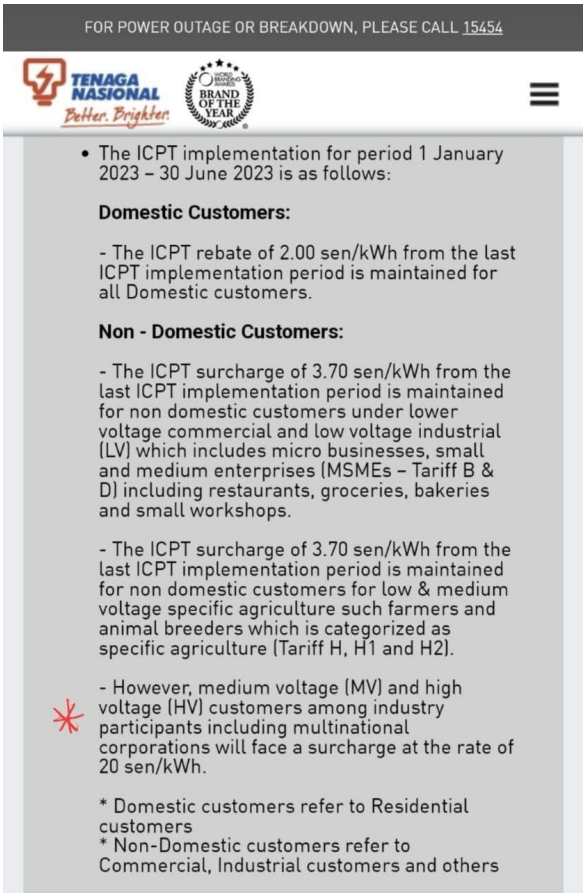
uninterrupted power supply is essential for manufacturing operations, as companies rely on electricity to power their machinery, equipment, and lighting systems. If electrical problem arises, it may halt or delay production and damage high technology machines (Arunyanart et al., 2021). In Malaysia, Tenaga Nasional Berhad (TNB) serves as the primary power supplier, renowned for its well-developed electrical infrastructure and robust grid network. TNB's primary objective is to ensure the provision of a consistent power supply to industrial zones, thereby minimizing disruptions and downtime in production processes. Recent data from TNB's annual report for the year 2022 indicates a positive performance, with the equivalent unplanned outage factor recorded at 7.37% and the system average interruption duration index (SAIDI) measured at 45.06 minutes per customer per year (TNB, 2022).

However, recent increases in electricity charges pose challenges for businesses, with rates rising from RM0.37 cents/kWh (Medium Voltage) as indicated in Figure 2.1 below to an additional surcharge of RM0.20 cents/kWh in Figure 2.2, totalling from RM0.57cents/kWh (Medium Voltage). This surge in costs is attributed to the present global energy crisis, which has resulted in increased gas, coal, and electricity costs (Office for National Statistic, 2002). This increase has made Malaysia less attractive compared to other countries.

Figure 2.1: Electrical Tariff

TARIFF CATEGORY	CURRENT RATE
TARIFF D - LOW VOLTAGE INDUSTRIAL TARIFF	
For the first 200 kWh (1 -200 kWh) per month	38.00 sen/kWh
For the next kWh (201 kWh onwards) per month	44.10 sen/kWh
The minimum monthly charge is RM7.20	
TARIFF E1 - MEDIUM VOLTAGE GENERAL INDUSTRIAL TARIFF	
For each kilowatt of maximum demand per month	29.60 RM/kW
For all kWh	33.70 sen/kWh
The minimum monthly charge is RM600.00	
TARIFF E2 - MEDIUM VOLTAGE PEAK/OFF-PEAK INDUSTRIAL TARIFF	
For each kilowatt of maximum demand per month during the peak period	37.00 RM/kW
For all kWh during the peak period	35.50 sen/kWh
For all kWh during the off-peak period	21.90 sen/kWh
The minimum monthly charge is RM600.00	
TARIFF E3 - HIGH VOLTAGE PEAK/OFF-PEAK INDUSTRIAL TARIFF	
For each kilowatt of maximum demand per month during the peak period	35.50 RM/kW
For all kWh during the peak period	33.70 sen/kWh
For all kWh during the off-peak period	20.20 sen/kWh
The minimum monthly charge is RM600.00	

Figure 2.2: Additional Surcharge Imposed to the Users



While similar trends of high tariff charges are observed worldwide (Makarevic & Stavrou, 2022), the Malaysian government must persist in and expand its proactive approach to provide uninterrupted power supply to industrialists. This entails continuing to rely on existing power sources such as coal (41.8%), Gas (34.4%), Hydro (17.8%), Renewable energy (4.6%) and others (1.4%) (TNB, 2022), while also expanding alternative power solutions or renewable energy sources, such as solar energy, hydropower, or other non-fossil fuel options. It's worth noting that TNB has committed to achieving Net Zero emissions by 2050. By implementing these measures, Malaysia can enhance its competitiveness and maintain its appeal as a manufacturing destination.

Industrialists need to bear in mind that not all industrial lands or buildings are equipped with ready power requirements. Therefore, it is advisable to mention and request the types of power sources available and the duration required for delivery.

B) Water supply

Secondly, water supply is another critical utility for manufacturing plants. Water is essential for various industrial processes, such as cooling, cleaning, and as a raw material in certain production processes (Sihag et al., 2019). Malaysia benefits from abundant water resources, supported by efficient water supply systems across different states. However, water providers vary between states in Malaysia, necessitating careful consideration before selecting a site. This is particularly important for industrialists requiring large amounts of water. Four states were selected for comparison under Table 2.1 due to their recent popularity among industrialists in Malaysia.

Table 2.1: Comparison of Water Tariff by States

States	Johor	Selangor	Penang	Pahang
Vendor	Ranhill Syarikat Air Johor	Air Selangor	Perbadanan Bekalan Air Pulau Penang	Pengurusan Air Pahang
Commercial Rate				
$0m^3$ to $35m^3$ (RM)	3.15	2.70	1.57	1.88
More than $35m^3$ (RM)	3.55	2.94	2.17	2.18
Minimum rate (Monthly) (RM)	36	31.50	15.70	30

Note. Adapted from Air Johor Water Tariff. (2024); Air Pahang Water Tariff. (2024); Air Selangor Water Tariff. (2024); Penang Water Tariff. (2024)

C) Gas supply

Access to natural gas is highly advantageous for manufacturing plants, especially those operating in energy-intensive industries such as petrochemicals and building materials manufacturing. Not only that, studies by Çebi, (2015) as well as Farahani et al. (2010 have found that gas supply facilities have a positive influence on plant location selection. Jiaqin, Y., & Juei, L. (1997) indicated that the availability of natural gas is a major factor in facility location. Gas Malaysia serves as a major supplier of natural gas in Malaysia, enabling industrial facilities to utilize this resource for power generation, heating, and as a feedstock for various manufacturing processes. While natural gas (Figure 2.3) availability depends

on proximity to distribution networks, Gas Malaysia also offers alternative options such as liquefied petroleum gas (LPG) (Figure 2.4). Industrialists can select the most suitable option based on their usage requirements and preferences. Table 2.2 shows Malaysia's gas rate as a reference.

Figure 2.3: Natural Gas Pipe

Figure 2.4: LPG Gas Tank

In comparison, energy-intensive industries need to be located closer to the natural gas source to directly access the gas line for their operations. On the other hand, liquefied petroleum gas (LPG) is suitable for less intensive production lines.

Table 2.2: Gas Rate in Malaysia

Type of Gas	Natural Gas	LPG
Gas Rate	RM 12.00 – 14.50/MMBtu	RM 2.50 – 3.00/kg

Note. Adapted from Gas Malaysia official website. Subject to tariff changes.

D) Telecommunications

Telecommunications infrastructure is increasingly becoming a vital utility for manufacturing plants, particularly in the era of Industry 4.0 and digitalization. High-speed internet connectivity and reliable telecommunications networks enable real-time monitoring of production processes, remote operation of machinery, and seamless integration with supply chain partners. For manufacturing plants transitioning to Industry 4.0, having all of these capabilities is essential. Failure to meet any of these requirements can result in the site being unattractive and unprepared for modern manufacturing practices. Cited by Jiaqin & Juei (1997), telecommunication techniques have emerged as a significant criterion for facility consideration. These technologies broaden business horizons by extending the reach over which labour, products, capital, and other elements can be moved around. They have reshaped the concept of time and distance in business, leading to shifts in the character, scale, and location of business operations. With the integration of such technology, distance no longer poses a significant obstacle to timely customer service, information sharing, and financial transactions.

In Malaysia, there are numerous telecommunications solutions providers catering to the needs of manufacturing plants. From established provider, Telekom Malaysia (TM) to newer entrants, Time dotcom, as well as other telco companies such as Digi, Maxis, U Mobile, and more, businesses have a range of options to choose from.

E) Water Treatment Facility

Environmental factors, such as waste disposal and treatment opportunities, play a crucial role in ensuring the smooth production processes of manufacturing plants. As a result, water treatment facility has become one of the important considerations for site selection. (Paul et al., 2022). Investors often prioritize the proximity of disposal and recycling facilities to the site, as well as the technologies employed in recycling processes (Sihag et. al., 2019). Water treatment facilities are essential infrastructure designed to purify water from various sources, like rivers, lakes, or underground aquifers, making it safe for human consumption or suitable for specific industrial processes. These facilities utilize processes such as filtration, sedimentation, disinfection, and chemical treatment to remove impurities, contaminants, and microorganisms, ensuring compliance with quality standards and regulatory requirements before distribution for use. They play a crucial role in providing clean and safe water for drinking, industrial operations, agricultural irrigation, and environmental conservation.

For investors considering expansion or relocation to Malaysia, two important factors need to be highlighted. Firstly, unlike many other developed countries, Malaysia lacks centralized water treatment facilities for manufacturing plants to discharge wastewater. Therefore, individual manufacturers are required to build its own water treatment facilities to treat process water to Malaysian standards before it can be discharged into drains or lakes. Secondly, the Department of Environment in Malaysia has established two types of water standards based on different locations for all manufacturers to comply with: Standard A or B water. Figure 2.5 below is an illustrative sample:

Figure 2.5: Discharge of Industrial Effluent

APPENDIX K2

Extracted from Environmental Quality (Industrial Effluents) Regulations 2009 (PU (A) 434)

FIFTH SCHEDULE
[Paragraph 11(1) (a)]

ACCEPTABLE CONDITIONS FOR DISCHARGE OF INDUSTRIAL EFFLUENT FOR MIXED EFFLUENT OF STANDARDS A AND B

	Parameter	Unit	Standard	
			A	B
	(1)	(2)	(3)	(4)
(i)	Temperature	°C	40	40
(ii)	pH Value	-	6.0-9.0	5.5-9.0
(iii)	BOD_5 at 20°C	mg/L	20	40
(iv)	Suspended Solids	mg/L	50	100
(v)	Mercury	mg/L	0.005	0.05
(vi)	Cadmium	mg/L	0.01	0.02
(vii)	Chromium, Hexavalent	mg/L	0.05	0.05
(viii)	Chromium, Trivalent	mg/L	0.20	1.0
(ix)	Arsenic	mg/L	0.05	0.10
(x)	Cyanide	mg/L	0.05	0.10
(xi)	Lead	mg/L	0.10	0.5
(xii)	Copper	mg/L	0.20	1.0
(xiii)	Manganese	mg/L	0.20	1.0
(xiv)	Nickel	mg/L	0.20	1.0
(xv)	Tin	mg/L	0.20	1.0
(xvi)	Zinc	mg/L	2.0	2.0
(xvii)	Boron	mg/L	1.0	4.0
(xviii)	Iron (Fe)	mg/L	1.0	5.0
(xix)	Silver	mg/L	0.1	1.0
(xx)	Aluminium	mg/L	10	15
(xxi)	Selenium	mg/L	0.02	0.5
(xxii)	Barium	mg/L	1.0	2.0
(xxiii)	Fluoride	mg/L	2.0	5.0
(xxiv)	Formaldehyde	mg/L	1.0	2.0
(xxv)	Phenol	mg/L	0.001	1.0
(xxvi)	Free Chlorine	mg/L	1.0	2.0
(xxvii)	Sulphide	mg/L	0.50	0.50
(xxviii)	Oil and Grease	mg/L	1.0	10
(xxix)	Ammoniacal Nitrogen	mg/L	10	20
(xxx)	Colour	ADMI*	100	200

ADMI- American Dye Manufactures Institute

Note. Adapted from *Department of Environment Handbook* (11th ed.). (2010). Ministry of Natural Resources and Environment.

These standards are crucial for ensuring environmental protection and sustainability in industrial operations.

In summary, utilities such as electricity, water, natural gas, telecommunications and water treatment infrastructure are essential considerations for manufacturing plant site selection in Malaysia. Access to reliable utilities providers ensure the efficient operation of industrial facilities and contributes to the overall competitiveness of Malaysia as a manufacturing destination.

2.3.3 Government Institutional Support

Governmental institutional support is essential for creating an enabling environment conducive to industrial site selection, development, and long-term success. Business-friendly policies ensure security when establishing manufacturing facilities (Suman et al., 2021). Criteria related to laws and regulations, such as taxation, tax incentives, and foreign ownership laws, political stability & robust legal framework are major concerns for companies operating across national borders (Arunyanart et al., 2021; Ponhan & Sureeyatanapas, 2022). According to the Conway Data global survey of development organizations (Venable, 1996), companies prefer sites with a wide range of tax incentives (Alberto, 2000). Shuyan & Fabuš, (2019) utilized a spatial economic model to analyse location selection problems and found that market size and investment freedom were the most critical factors for Chinese companies investing in the EU. The study also revealed that excessive taxation would deter companies from choosing locations in these areas. Therefore, by providing regulatory clarity, such factors can attract investments and promote industrial growth in Malaysia. The policies offered by the Malaysian government will be discussed in the following paragraph.

A) Policies

The Malaysian Government prioritizes the formulation of investor-friendly policies, aiming to provide clear and easily understandable guidelines for potential investors. These policies are crafted to create a conducive environment for investment, fostering confidence and facilitating business growth within the country. In addition to these policies, the government also establishes comprehensive regulations and standards pertaining to land use and zoning. These regulatory measures are designed to ensure efficient and sustainable development across various sectors of the economy, further enhancing the attractiveness of Malaysia as an investment destination.

i. Policies

Referring to the Malaysian Investment Development Authority (MIDA)'s official website, it explicitly outlines transparent guidelines for both local and foreign investors looking to

invest in Malaysia. Particularly in the Manufacturing sector, the investment climate is highly encouraging. Setting up a manufacturing plant is straightforward, requiring investors to incorporate a local company with 100% foreign ownership. Subsequently, upon acquiring land, investors can submit a Manufacturing License application for projects falling under the Industrial Coordination Act (IICA), 1975 with MIDA. Notably, there are no restrictions on foreign equity ownership. Moreover, the policies facilitate the free movement of funds for foreign investments in Malaysia. After establishing a Malaysian company, foreign companies can benefit from the same local corporate tax rate of 24%, while individual tax rates range from 0% to 30%. In summary, key transparency policies highlighted for both local and foreign investors include:

- Incorporation of a local company
- Manufacturing License application
- No restrictions on foreign equity ownership
- Liberal expatriate employment policy
- Free movement of funds for foreign investments in Malaysia
- Protection of intellectual property rights
- Corporate tax rate of 24%
- Individual tax rates ranging from 0% to 30%
- Minimum employment conditions under the Employment Act 1955
- Responsible trade unions and harmonious industrial relations
- Mandatory contributions to:
    - Employee Provident Fund (EPF)
    - Social Security Organisation (SOCSO)
    - Human Resource Development Fund (HRDF)
- Investment Guarantee Agreements (IGA)
- Double taxation agreements
- Controlled environmental management policy

Source: MIDA. (n.d.(c).). *Manufacturing Sector Policies*.

ii. Land Ownership

In Malaysia, two types of property ownership exist: freehold and leasehold. According to the National Land Code, both types of property ownership are permitted for foreign investors in the manufacturing sector. However, it's crucial to note that foreign investors are not permitted to purchase agricultural land in Malaysia. Such land must be fully converted to industrial land before it can be purchased. Before any foreign investor can acquire industrial land, State consent, known as 433B and Economic Planning Unit (EPU) approval must be obtained. Failure to obtain these approvals will result in the inability to own the land.

B) Political Stability & Robust legal framework

Secondly, political stability and a robust legal framework are crucial for fostering a conducive business environment. Investors require assurance that investments will be safeguarded, and contractual agreements will be upheld. Governments that prioritize the rule of law and maintain political stability instil confidence among industrialists, thereby encouraging investment in site selection. In Malaysia, the adoption of British law provides a familiar legal framework for many foreign investors, simplifying the application process and further enhancing investor confidence.

C) Tax Allowances and Subsidies

The Malaysian Government extends incentives such as tax allowances and subsidies to lure industrial investments, especially targeting specific industries. These incentives serve to substantially lower initial costs for industrialists, thereby bolstering Malaysia's appeal as a preferred destination for investment. Furthermore, favourable tax policies contribute to enhancing the overall competitiveness of industrial operations when compared to other countries.

In terms of attractive incentives, Malaysia offers a diverse array of options. For instance, in the manufacturing and services sector, MIDA provides comprehensive incentive

packages tailored to key sectors. Alternatively, companies operating in the life sciences and biotechnology fields have the opportunity to attain alternative incentives, also known as BIONEXUS status, through the Bioeconomy Corporation. Investors in the digital industry can explore digital grants provided by the Malaysia Digital Economy Corporation (MDEC). According to statistics from the MIDA's official website, major industries in Malaysia entitled to incentives include Building Technology, Chemical & Advanced Materials, Electrical & Electronics, Food Technology, Halal Food Products, Life Sciences & Medical Technology, Machinery & Metals, Transportation Technology, and many more (MIDA, 2023b). All these incentives are subject to approval.

Generally, there are three types of incentives available: Pioneer Status, Investment Tax Allowances, or customized tax incentives for specific industries that the Malaysian Government aims to attract.

Pioneer Status:

When a company is granted Pioneer Status (PS), it benefits from a partial exemption from income tax for a period of five to ten years. During this period, the company is only taxed on 0% or 30% of its statutory income, with the exemption period starting from its Production Day (defined as the day when its production level reaches 30% of its capacity).

Any unabsorbed capital allowances incurred during the pioneer period can be carried forward and deducted from the company's post-pioneer income. Likewise, accumulated losses incurred during the pioneer period can be carried forward and deducted from the company's post-pioneer income for a consecutive period of seven years.

Investment Tax Allowance:

Alternatively, instead of opting for Pioneer Status, a company may choose to apply for Investment Tax Allowance (ITA). A company granted ITA is eligible for an allowance of 60% to 100% on qualifying capital expenditure (such as factory, plant, machinery, or other

equipment used for the approved project) incurred within five to ten years from the date of the first qualifying capital expenditure.

This allowance can be offset against 70% to 100% of the company's statutory income for each year of assessment. Any unused allowance can be carried forward to subsequent years until fully utilized. The remaining 30% of the company's statutory income will be taxed at the prevailing company tax rate (MIDA, n.d.(b).).

2.3.4 Facilities & Services

A good industrial site or land is significantly enhanced by a well-conceived concept and integrated facilities. In comparison to old and traditional industrial estates in Malaysia, there is no facilities provision, the entire industrial estate eventually becomes dodgy and poor in infrastructure. Despite this, there is a lack of significant studies in scholarly literature regarding the inclusion of facilities and services as criteria. However, Figures 2.6 and 2.7 respectively illustrate the vibrancy of developers, indicating that foreign companies prefer industrial developments with better concepts and integrated facilities. A Managed Industrial Park is a service provided by developers, offering a wide array of facilities including gated and guarded compounds, 24-hour security features, green initiatives, worker dormitories, truck parking bays, and more. These facilities are typically overseen by the park manager or management company appointed by the industrial developers.

Figure 2.6: Eco Business Park V @ Puncak Alam

Managed Industrial Park: Eco Business Park V @ Puncak Alam

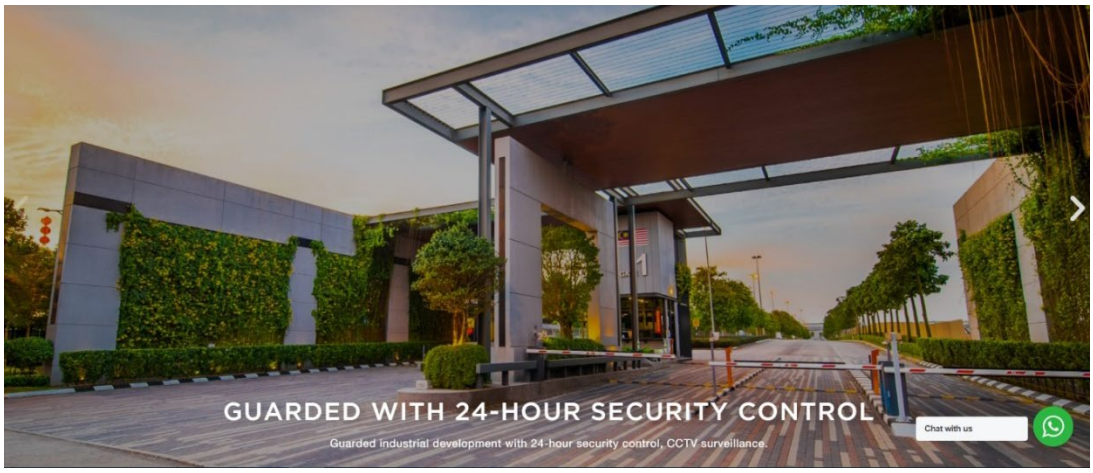
24-hour Security Guard House @ Eco Business Park V

Lush Greenery Landscape @ Eco Business Park V

Modern Façade, 80 x 200 Semi Detached Factories @ Eco Business Park V

Figure 2.7: I Park @ Senai Airport City

Managed Industrial Park: I Park @ Senai Airport City



24-hour Security Guard House @ I Park

Recreational Facilities @ I Park

Workers' Dormitory Facility @ I Park

In Malaysia, several notable industrial developers spearhead this concept and offer it to foreign investors. Thanks to the state's initiative of Invest Selangor, which recognizes the significance of Managed Industrial Parks, collaboration with Plan Malaysia @ Selangor has been established to develop this scheme.

The components of the Managed Industrial Park (MIP) that industrial developers are required to comply with are depicted in **Appendix A**. Industrial developers must adhere to the outlined guidelines in order to design the industrial park. The developers are mandated to submit proposals to Invest Selangor Berhad for approval and certification.

Additionally, industrial parks certified under this scheme, or investors who purchase industrial land from these industrial developers, are entitled to a range of incentives, outlined in Table 2.3:

Table 2.3: Managed Industrial Park Incentives

The Developer or Park Manager
1.0 Land premium 1.1 Payment of land premium change according to development phase 1.2 Extension of land premium payment period 1.3 Special Premium Scheme 2.0 Interest-free development fee instalment payments 3.0 Exemption from low-cost factory setup 4.0 Quota for ownership of property by citizens/permanent resident foreign companies 4.1 Vacant land: 100% of non-bumiputera quota 4.2 Empty buildings: 100% of non-bumiputera quota 5.0 long-term lease for non-strata development 6.0 exemption of first-year quit rent (land tax) 7.0 Assessment tax 7.1 vacant land: exemption from payment (5 years) 7.2 empty buildings: 50% discount (5 years)
Investor within Managed Industrial Park
1.0 Fast Track Process 2.0 Approval Period 2.1 Development Approval: Technical review within 7 working days 2.2 Land Matters Approval: Application submitted directly to the Selangor PTG 3.0 Assessment Tax 3.1 Vacant Land: Exemption from payment (5 years) 3.2 Empty Buildings: 50% discount (5 years) 4.0 Business License Fee Exemption (5 years)

Note. Adapted from Invest Selangor Berhad. (2023). *Manage Industrial Park Incentives.*

2.3.5 Physical Site

The physical attributes of a site significantly impact the feasibility and success of industrial operations, particularly in the selection of sites for manufacturing plants. The flatter and more rectangular or square the land, the more desirable it is for manufacturers. However, this isn't universally true, as different industries have varying requirements for land acquisition. In some cases, oddly shaped or elevated land may be suitable for certain industries based on their specific business needs. For example, according to Graciele et al (2018), the best locations for photovoltaic projects or renewable energy projects are determined by factors such as solar irradiation, substation distance, slope, and so on. Hence, the following general physical site characteristics are crucial in site selection:

Firstly, the size and shape of the land dictate the capacity and layout of the industrial facility. Larger land areas may be needed for expansive manufacturing plants or future expansion plans, while the shape affects layout efficiency and workflow. Scholars such as Mousavi et al. (2013) & Yildirim & Önder (2014) specifically indicate that opportunities for possible site expansion are significant criteria in site selection for logistic distribution centres or manufacturing industries.

Secondly, elevation and slope impact construction costs and facility layout. Steep slopes require more earthwork and grading, affecting construction timelines and expenses. Elevation differences influence drainage patterns and flood risk, requiring appropriate mitigation measures. However, different type of industrial favour different type of the topography features. For example, photovoltaic industries require flat land as high slope result in low economic viability (Graciele et al., 2018)

Thirdly, greenery and landscaping significantly influence site selection for investors by enhancing aesthetics, improving the quality of life, supporting sustainability, and fostering community engagement. These factors contribute to the overall desirability and sustainability of a site, making them essential considerations for investors. One researcher who supports this notion is Cristea, M., & Cristea, C. (2016).

Fourth, the impact of climate and natural forces, such as flood risk and pollution levels, may disrupt production and distribution. Suman et al. (2021) suggested that environmental factors become one of the criteria for site selection.

Lastly, Graciele et al. (2018) highlight the significance of land use, which is determined by the activities taking place in a specific area. It's crucial to consider land carefully due to potential restrictions, such as reserves, forests, water bodies, wetlands, and urban areas, which may be off-limits due to economic, environmental, zoning, or community concerns.

Understanding these factors is essential for selecting optimal industrial sites, ensuring operational efficiency, regulatory compliance, and resilience against environmental challenges and natural disasters.

2.3.6 Labour

Based on the research study conducted by Arunyanart et al. (2021), labour emerges as a significant concern, particularly within labour-intensive sectors like electronics. Therefore, when choosing an industrial site, it becomes imperative to assess the skill and competency levels of the local workforce. This consideration is crucial as the quality of labour directly impacts both productivity and product quality. Expanding on Nong (2022, Sahin (2021) and Singer & Ozsahin (2020), factors such as the availability of qualified individuals, the abundance of human resources, and the characteristics of the labour force all play critical roles in the decision-making process before initiating a move.

Malaysia is a multiracial country with three major ethnic groups: Malay, Chinese, and Indian. The population is highly multilingual, with most individuals proficient in at least two to three languages, including Malay, Mandarin, and Tamil. This diverse linguistic landscape presents a significant market opportunity for industrialists seeking to engage with a wide range of international partners, including those from the United States, Europe, India, Indonesia, China, and beyond.

According to a report by Invest Selangor, Malaysia boasts a remarkable literacy rate of 98.7%, indicating a high level of proficiency in reading, writing, and communication among its populace (Invest Selangor Berhad, n.d.). This high literacy rate underscores the abundant local talent pool available to industries operating in Malaysia, offering a substantial advantage to businesses seeking skilled labour.

Furthermore, Selangor, Malaysia's leading economic state, hosts more than 184 institutional of higher learning, producing a large number of graduates annually (Invest Selangor Berhad, n.d.). This robust educational infrastructure ensures a steady supply of qualified labour to meet the needs of various industries.

Moreover, the Malaysian government plays an active role in supporting foreign companies by facilitating access to talented candidates. Agencies such as Malaysian Investment Development Authority (MIDA) offers assistance programs designed to connect companies with qualified personnel. For local talent, MIDA facilitates foreign companies to match make and organise various information sharing sessions such as monthly industry career talk and open interview series.

The Malaysian government aims to ensure that Malaysians are adequately trained and employed across all levels of the workforce. To achieve this goal, companies are encouraged to prioritize the training and employment of Malaysians, aligning the workforce composition with the diverse demographics of the country.

However, in cases where there is a shortage of trained Malaysian personnel, companies are permitted to hire expatriates for specific roles known as 'key posts' or 'time posts'. Key posts are permanent positions filled by foreigners, essential for safeguarding the interests and investments of the companies. Time posts, on the other hand, are positions filled for a specified period (MIDA, n.d.(c).).

There are two types of expatriate posts:

Key Post: These are high-level managerial positions in foreign-owned private companies and firms operating in Malaysia. Expatriates in key posts play a crucial role in formulating company policies to achieve its goals and objectives.

Time Post: These are intermediate-level managerial and professional positions that require professional qualifications, practical experience, and expertise relevant to the job. Expatriates in time posts are responsible for implementing company policies and supervising staff.

Additionally, the government has implemented policies to address labour shortages by opening blue-collar positions to foreign workers. This approach helps companies maintain a competitive edge by ensuring an adequate workforce while managing costs effectively.

2.3.7 Investment Cost

Investment cost is the primary concern in the overall cost associated with relocation or expansion. This encompasses expenses like land acquisition, building construction (including architectural fees and permits), property tax, maintenance (including insurance premiums), and operational costs (Labour & Utility) (Alberto, 2000).

Likewise, a similar criterion found in Paul et al. (2022)'s research study, in the economic category, selection criteria are related to different types of costs and expenses, such as site development, production, materials, labour, maintenance, utilities, transportation, land prices, and taxation. Notably, both land acquisition and building construction entail substantial investments.

Site selection ultimately determines the financial investment required for projects. Whether a business relocates or expands, the amount of money invested will determine its viability and potential profitability in the long run.

The other investment costs include:

- Infrastructure Development
- Equipment Procurement
- Installation Costs
- Environmental Assessments and Remediation
- Consulting and Professional Services
- Financing Costs
- Contingency Funds
- Other Miscellaneous Expenses

Considering investment costs during plant relocation or expansion is crucial for various reasons. Firstly, it helps assess the project's financial viability by ensuring that expected returns justify the initial capital outlay. Secondly, accurate cost estimation facilitates effective budget planning, reducing the risk of cost overruns and financial setbacks. Additionally, it enables proactive risk management by identifying potential financial risks and uncertainties and implementing appropriate mitigation strategies. Moreover, understanding investment costs allows for efficient resource allocation, optimizing operational efficiency, and maintaining cost competitiveness in the market. Ultimately,

careful consideration of investment costs ensures the long-term sustainability and profitability of the project, supporting strategic growth and operational excellence. That is why, according to Weber's theory, transportation costs, labour costs, and agglomeration factors are considered significant factors for site selection. The literature review revealed that scholars such as Arunyanart et al. (2021), Makarevic & Stavrou (2022) and Sahin (2021) share a similar opinion regarding investment costs as significant criteria to consider in site selection.

The above summary highlights the myriad factors influencing investors when selecting industrial land for investment, underscoring the significant and crucial role each factor plays in investment decisions. While extensive discussion surrounds the importance of these factors, achieving perfection in selection remains elusive. Investors must strike a delicate balance and make informed choices from a plethora of options available. Ultimately, the primary determinant remains profitability. Therefore, considering these factors is paramount for accurate financial planning and informed decision-making during the relocation or expansion process.

2.4 Synthesizing factors influencing site selection based on different industries

Through literature reviews, valuable insights have been gleaned into the factors influencing site selection across various industries. Scholars have conducted in-depth studies across different industry sectors of the market, highlighting the importance of specific factors unique to each industry. Synthesizing the findings from these studies reveals that the requirements and priorities of industries vary significantly based on their business operations and needs.

The focus is directed towards several key industries and the corresponding key points, including Electronics and Electrical (E&E), Photovoltaic and renewable energy projects, Chemical Industry, General Manufacturing, Furniture, Logistics, Distribution, and Automotive Manufacturing. Each of these sectors presents distinct challenges and opportunities in site selection, influenced by factors such as proximity to suppliers and

customers, access to transportation networks, availability of skilled labour, infrastructure, regulatory environment, cost considerations and many more.

Let's delve deeper into the unique characteristics and specific requirements of each industry to gain insights into what investors and businesses prioritize when selecting a site.

Delving into the E&E industry, as studied by Arunyanart et al. (2021). This research identified a total of 18 criteria and ranked them based on its importance. These criteria encompass various aspects such as labour cost, availability of labour force, skill and competency level of labour, labour laws and regulations, foreign ownership laws, taxation and tax incentives, government structure and stability, stability of government policy, adequacy of energy and electricity, efficiency of electrical supply systems, price of electricity, variety of transport modes, efficiency of transportation systems, availability of land, efficiency of telecommunication and network systems, land price, stability of financial institutions, and risk of natural disasters. Previously discussed, it's often not feasible for investors to prioritize all criteria when selecting a site. Therefore, based on the findings, the top 7 criteria for industrial location selection, as per the rankings, are as follows:

1. Skill and competency level of labour
2. Adequacy of energy and electricity
3. Taxation & incentives
4. Foreign ownership law
5. Efficiency of electrical supply systems
6. Labour cost
7. Availability of labour force

The furniture industry, as examined by Singer & Ozsahin (2020) presents a unique perspective. Being a labour-intensive and dynamic sector encompassing both the manufacturing of furniture parts and assembly, its criteria for facility location selection differ. In the Turkish furniture industry, specific criteria were evaluated to determine the most suitable location. These included proximity to raw materials, the availability of qualified individuals, proximity to markets, population density, and distance to provinces.

Another study conducted by Sahin (2021) focused on evaluating potential site locations for automotive manufacturing plants in Turkey. This study became particularly pertinent as the Turkish government initiated the production of national automobiles in Bursa. Sahin's

research identified six main criteria and sixteen sub-criteria for this purpose, providing valuable insights into the factors influencing site selection in the automotive manufacturing industry.

Main Criteria	**Sub criteria**
Cost	Labour cost Land cost
Labour Characteristics	Unemployment rate Education level
Quality of life	Average age Climate Schools Well-being index
Infrastructure	Availability of Air, Sea and land freight Highway facilities
Economic Factors	Investment and tax incentives Regional price level of the city
Suppliers	Numbers of supplier in the city Proximity to supplier

For logistic and distribution site location studies, researchers such as Nong (2022) and Ulutaş et al. (2020) have conducted comprehensive investigations. These studies have revealed that location, cost, and services emerge as the main factors influencing site selection decisions in this industry. Further examination of these main criteria reveals several sub-criteria, as outlined in the table below.

Main Criteria	**Sub Criteria**
Location	Distance to suppliers Distance to market Distance to airport Distance to highway Distance to port Distance to railway
Cost	Land Cost Installation Cost Logistic Cost Labour Cost
Services	Storage convenience Forwarding services

The intense competition prevalent in today's market has compelled businesses to prioritize and invest significantly in their logistics networks. This shift is primarily driven by customers' increasing demand for fast and efficient delivery services. Consequently, it has

become imperative for logistics companies and distribution centres to streamline operations, minimize costs, and enhance overall logistical efficiency. This underscores the critical importance of the land selected by investors, as it directly impacts the ability of these entities to meet customer demands and operational objectives.

Although the factors mentioned above are crucial, Ulutaş et al. (2020) also emphasize the significance of considering additional factors. These include the proximity to forested areas, which poses risks such as fire and explosion hazards, as well as the distance to surface water bodies, which could potentially lead to contamination. Moreover, the distance to settlement areas is essential to account for, especially considering the transportation of hazardous materials. Lastly, the proximity to disaster centres is crucial, as any untoward incidents could result in casualties, injuries, and damage to the workplace. Neglecting these factors could potentially translate into significant costs for the company, underscoring the importance of comprehensive site selection assessments.

In an extensive literature review conducted by Makarevic & Stavrou (2022), a thorough summary of key factors categorized under Social, Economic, and Environmental aspects was provided. These factors are highly relevant to the research concerning industrial site selection. In this specific study, the focus will be on the chemical industry. Therefore, in addition to social and economic factors, environmental considerations become paramount in the site selection process. This is due to the inherent sensitivity of chemical operations to environmental conditions and regulations, making it imperative to thoroughly evaluate environmental factors when selecting an industrial site for chemical manufacturing. To attract this industry to Malaysia, a centralized water treatment plant becomes a unique and significant feature for any industrial developers. An overview of site selection criteria collected by Makarevic & Stavrou for chemical industry business are:

Category	Criteria
Social	Labour availability Government policy and incentives Quality of life
Economic	Market volume Investment costs Production and operation costs Logistic activity costs Global competition Safety and security cost
Environmental	Resources Waste Disposal Climate

Next, the renewable energy site selection criteria were studied by Graciele et al. (2018) and Shao et al. (2020). With the global energy crisis looming, concerns about the shortage of power using coals have become a pressing global issue. As a result, alternative energy sources such as solar energy, wind energy, water energy, biomass energy, geothermal energy, marine energy, and other non-fossil energy sources have emerged as viable substitutes. For the purpose of this research, solar plants will be the primary focus due to several favourable conditions in Malaysia. The country's landscape, characterized by numerous flat lands and a lack of significant mountainous regions, makes it particularly suitable for solar power generation. Additionally, Malaysia's tropical climate, which lacks distinct seasonal changes, ensures consistent sunlight throughout the year, resulting in higher yields for power generation. The site selection criteria for solar plants can be broadly divided into four main aspects:

Category	Criteria
Technical	Solar Radiation Slope Aspect Air Temperature Sunshine Duration Elevation Humidity Cloudiness Distance to waterway, dams and underground water Land surface temperature Climatic conditions
Economic	Distance from roads Distances from transmission lines Distances residential areas Costs

	Distances from railways Distance from electricity substations Population density Electricity demand Payback period
Environment	Land use Pollutant emission reduction benefits Agrological capacity Land Availability Ecological Damage Energy saving Wildlife impact Visual impact Noise
Social	Public transport Impact on local economy Policy support Impact on local tourism Political risk Effect on progress of surrounding region Local government support Regulatory boundaries Resettlement and rehabilitation Population Public security Impact on local residential life

Finally, a comprehensive analysis of four literature reviews was conducted within the general manufacturing sector. It was discovered that the site selection factors across these studies were relatively similar and did not deviate significantly from each other. According to Bhatnagar et al. (2011), key factors include costs, infrastructure, business services, labour, government support, and proximity to customers, suppliers, and competitors. Similarly, Sihag et al. (2019) emphasized proximity to raw material suppliers and customers, availability of transportation facilities such as ports, airports, and railways, and access to utilities such as water, energy, and waste recycling technology. In addition to these factors, Paul et al. (2022) highlighted the importance of labour availability, labour skills and competence, and investment costs in site selection. Lastly, Sun Weng et al. (2020) stressed the need to assess both quantitative and qualitative factors simultaneously for site selection in order to make informed and sound decisions. This underscores the complexity and multifaceted nature of the site selection process in the manufacturing sector.

By delving into the specifics of each industry, a better understanding of the nuances of site selection criteria is achieved, allowing for tailored strategies. This comprehensive overview

serves as a valuable resource not just for investors but also the policymakers, and industry stakeholders seeking to make informed decisions regarding site selection for industrial investment.

2.5 Conclusion

Back in Malaysia, considering the interests of all stakeholders mentioned above, the question arises: which site locations should the investor be chosen and any industrial developers or the government has the land to offer? Unlike China, where dedicated industrial themes are created for each industry due to their large population and market size, Malaysia faces different challenges. With our GDP significantly smaller than that of China or other major countries, developing theme-based industrial parks such as Electrical & Electronic Hub, Automative Hub, Food & Beverage Manufacturing Hub for the investors become nearly impossible. Therefore, the focus shifts towards establishing generic industrial parks with competitive unique features, which can serve as a significant advantage.

While the insights gleaned from the literature review offer valuable guidance, it is essential to recognize that the investment landscape in Malaysia may differ from other countries. The investors may prioritize certain factors over others, influenced by unique market trends and regulatory frameworks.

Now, we have identified all the criteria that customers will consider during site selection. In the subsequent chapter, we will discuss the type of research method to be used to analyse which of the criteria are most and least sought after by investors.

CHAPTER 3

RESEARCH METHOD

3.1 Introduction

In this chapter, the research methodology involves several stages in obtaining the results. The stages include explaining the Analytic Hierarchy Process (AHP) as the research method, identifying target respondents, sampling methods, data collection, data analysis, and conclusion.

The objectives of this research are to: (i) examine site selection criteria influencing investors' site selection decisions and (ii) identify the weighting of site selection criteria in investors' decisions during the site selection process. This research will be achieved by collecting secondary data, where the site selection criteria have been identified through literature review. Subsequently, primary data will be collected from the opinions of key experts obtained through pairwise questionnaires.

To achieve the outlined objectives, a systematic research methodology approach will be employed to derive results and findings. The methodology will follow the steps outlined below:

Step 1: Identification of Factors:

Factors influencing investors' site selection decisions have been identified through an extensive literature review in chapter 2. This step will involve reviewing existing research, scholarly articles, and industry reports to compile a comprehensive list of relevant factors.

Step 2: Sampling and Data Collection:

A purposive judgment sampling technique will be employed to select key experts in the field. Survey questionnaires will then be distributed to these experts to gather primary data regarding their opinions on the identified factors. This approach ensures that insights are collected from individuals with expertise and experience in the subject area.

Step 3: Weighting of Factors:

The Analytic Hierarchy Process (AHP) will be utilized to assign weights to the identified factors. AHP is a structured decision-making technique that allows for the prioritization of criteria based on their relative importance. Factors will be categorized and ranked according to their significance in influencing investors' site selection decisions.

Step 4: Data Analysis:

The feedback obtained from the survey responses will be analyzed in chapter 4. This analysis will involve summarizing and interpreting the data to identify key insights regarding the importance of different factors in the site selection process.

By following this systematic research methodology approach, comprehensive and actionable findings will be derived, contributing to a deeper understanding of the factors influencing investors' decisions during the site selection process.

3.2 Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) was introduced by Thomas L. Saaty in 1977 as a mathematical tool for decision-making in management. This method is designed to handle numerous decision factors and offers a structured approach to ranking multiple variables. AHP serves as a decision analysis technique, particularly useful for measuring the consistency of judgments and establishing priorities among criteria and alternatives. Over

time, it has become a widely utilized tool among decision-makers and researchers for multi-criteria decision-making.

The key characteristic of AHP is its ability to integrate knowledge, expertise, individual opinions, and foresight in a logical manner. Therefore, it is crucial to select respondents with relevant expertise and knowledge pertaining to the subject area under study.

After conducting a literature review pertaining to the similar research paper, four journal articles were identified and utilized the AHP method in their research papers. These articles covered diverse topics related to site selection criteria, such as renewable energy, general manufacturing plants, furniture industry, and supply chain and logistics. These studies opted for AHP due to the complexity of their criteria selection processes. (Alberto, 2000; B. M. Suman & R. K. Srivastava, 2022; Ozdemir & Sahin, 2018; Sahin, 2021; Shao et al., 2020)

Moreover, it has been demonstrated that even with a small sample size of respondents, reliable results can be obtained in AHP surveys (Cheng & Li, 2002; Lam & Zhao, 1998). For instance, Cheng & Li (2002) have invited 9 respondents to perform a test in comparing critical success factors, only 10 local governments were selected for the Solar PV power plant site selection (Ozdemir & Sahin, 2018b). Suman et al. (2021) collected a total of 34 data samples for facility location selection in the furniture industry in Bangladesh. Additionally, there was a low response rate of 12.8% out of 2,556 companies approached in another previous research paper regarding the choice of industrial site between Singapore and Malaysia (Bhatnagar et al., 2011). Despite the limited number of respondents, these studies were able to extract valuable insights regarding site selection preferences between Singapore and Malaysia.

Furthermore, various studies outside the primary scope of AHP have also shown success with small sample sizes. These studies underscore the effectiveness of AHP in extracting meaningful conclusions from limited respondent pools, contributing to robust discussions and final results.

3.2.1 Advantages & Setbacks

The Analytic Hierarchy Process (AHP) has been chosen as the analytical method for this study. Both its advantages and drawbacks aim to provide researchers with insights, enabling them to make informed decisions for similar extensive studies.

Advantages:

1) Appropriateness for complex decision problems with multiple criteria and compatibility with other multi-criteria decision-making techniques
2) The AHP is simple to understand and apply to complex issues
3) The process decomposes a large problem into smaller sub-problem at hierarchical levels
4) The process introduces the comparative importance of the criteria, showing a more reliable representation of the decision goals
5) The process is applicable for both quantitative and qualitative criteria; and
6) The process checks the consistency of the decision, thus reducing the bias in the decision-making progression.

(Sahin, 2021; Shao et al., 2020)

Setbacks

1) Possibility that a rank reversal problem might occur when a near copy of an existing option is added to the set of alternatives;
2) Cause the judgement task lengthy
3) Cumbersome to the decision maker if there is a large number of a pairwise comparison due to large number of criteria.

Despite these limitations, AHP remains a valuable tool for decision-making, particularly in situations where multiple criteria need to be considered and balanced to reach optimal decisions.

3.2.2 Steps of implementing Analytic Hierarchy Process (AHP)

The process of applying AHP involves several fundamental steps, as outlined by Zahedi (1986). Firstly, the decision problem must be structured which outlined in Table 3.1. For the purpose of this research paper, the criteria and sub-criteria prepared are based on the research topic.

Table 3.1: Outline Main Criteria and Sub-criteria

Main Criteria	Sub-criteria
A	A1
	A2
	A3
	A4
B	B1
	B2
	B3
	B4
C	C1
	C2
	C3
	C4

Secondly, pairwise comparisons are made to establish a judgmental matrix. During this phase, a matrix of size n x n is created by comparing each cost category to the others using Saaty's 1 to 9 scale. Reciprocals are applied in each comparison, and respondents assign values ranging from 1/9 to 9. A questionnaire is then distributed to gather respondents' opinions and judgments on these pairwise comparisons, with each comparison represented on a 9-point scale (Table 3.2).

Saaty developed a scale for quantifying these comparisons, allowing decision-makers to assign discrete numbers to signify the importance of different choices. Consequently, the weights assigned to each component can be derived from these discrete numbers chosen by the decision-maker.

Table 3.2: Scales of 1 to 9 for Pairwise Comparisons

Intensity of relative importance	**Definitions**	**Explanation**
1	Equal importance	Two activities contribute equally to the objectives.
3	Moderate importance of one over another	Experience and judgement slightly favoured one activity over another.
5	Essential or strong importance	Experience and judgement strongly favoured one activity over another.
7	Demonstrated importance	An activity is strongly favoured and its dominance is demonstrated in practise.
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation.
2,4,6,8	Intermediate values between the two adjacent judgements	When compromise is needed.

Note. From Saaty, T. L. (1980). *The Analytic Hierarchy Process*. McGraw-Hill.

The process involves comparing each element with every other element and recording these judgments in a square matrix outlined in Table 3.3. This pairwise comparison matrix has dimensions of n x n, where n represents the number of elements being compared (Chakraborty et al., 2011). To construct a complete matrix, a total of n x (n - 1) / 2 comparisons are needed, where n is the number of criteria being compared. From these comparisons, weights for each evaluation criterion are derived based on the decision maker's pairwise judgments. As highlighted by Saaty (1980), a higher weight assigned to a criterion indicates its greater importance in the decision-making process.

Table 3.3: Example of a Set of Pairwise Comparison Matrix

	A	B	C	D
A	1			
B		1		
C			1	
D				1

Next, these pairwise comparison results are transformed into a judgmental matrix. Thirdly, local weights and the consistency of comparisons are computed. Using the judgmental matrix, the weight for each criterion is derived through the eigenvector method (Peaw & Mustafa, 2006). Additionally, after completing the pairwise comparisons, the consistency of judgments is assessed using the eigenvalue, λmax. This step is crucial for ensuring that the original preference ratings remain consistent. To determine consistency, the consistency index (CI) must be calculated.

$$CI = \frac{\lambda \max - n}{n - 1}$$

The CI calculation indicates the consistency level of one's judgment. As highlighted by (Saaty, 1980), ideally, a perfectly consistent decision maker should consistently achieve a CI value of 0. However, small inconsistencies may be acceptable to some extent. Once the CI is determined, the next step involves computing the consistency ratio (CR), where:

$$CR = \frac{CI}{RI\ (random\ index)}$$

The CR serves as a metric to evaluate and justify the inconsistency in the pairwise comparisons made by respondents. If the calculated CR is less than or equal to 0.1 ($CR \leq 0.1$), it indicates that the judgments are deemed consistent and acceptable. Conversely, if the CR calculated is greater than or equal to 0.1 ($CR \geq 0.1$), it suggests that the judgments are inconsistent and unreliable, necessitating a re-examination (Tomar & Borad, 2012).

However, Satty (2001) & Cheng & Li (2002) have contended that the acceptable CR value of 0.1 is applicable primarily to matrices larger than 4 x 4. For smaller matrices, such as 3 x 3, the acceptable CR value should be 0.05, and for 4 x 4 matrices, it should be 0.08. Nevertheless, the AHP analysis performed by Ho et al. (2005) accepted a Consistency Ratio (CR) value of less than 0.2. Additionally, the Random Index (RI) serves as the CI of a randomly generated pairwise comparison matrix. The values of RI outlined in Table 3.4, as derived by Saaty, are determined based on the order of the matrix (n).

Table 3.4: Random Consistency Index (RI)

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49
	11	12	13	14	15					
	1.51	1.48	1.56	1.57	1.59					

Note. From Saaty, T. L. (1980). *The Analytic Hierarchy Process*. McGraw-Hill.

Finally, the priorities for each criterion can be ranked based on the derived weightages. These weightages, calculated through AHP, will be converted into percentages. Consequently, by analysing the weightages of each category, researchers can determine which criteria were most favoured among the respondents. These weightages also highlight the key factors most desired by investors, which industrial developers should prioritize when considering the purchase of new land for developments.

In AHP, two different methods are employed to calculate pairwise comparison matrices: the eigenvector method (EM) and the weighted geometric mean method (WGMM) (Escobar et al., 2004). The EM is utilized to compute individual judgment matrices, while the WGMM is employed to calculate group judgment matrices. A group judgment matrix represents the averaged values assigned to each criteria category, computed using the WGMM. In this study, a group judgment matrix will be constructed using the WGMM method. This approach is preferred because relying solely on individual judgments may not adequately explain the priorities and weightages of the identified criteria.

Pairwise comparisons between criteria obtained through the Eigenvector method and the total number of respondents are needed to determine the average weightage. The geometric mean for the criteria is computed using the following formula.

$$\sqrt[n]{R1 \times R2 \times R3 \times R4 \times R5} = WGMM$$

After the geometric mean is derived, the same process of computing the pairwise comparison matrix, the priority vector, consistency index (CI), and Consistency Ratio (CR) for each criterion will be calculated.

3.3 Respondents

In this research, three groups of target respondents are identified. The first group comprises industrial developers and agents with extensive experience in dealing with local and foreign investors. These sales representative of industrial developers and agents possess invaluable insights into the factors sought by clients.

The second group consists of government authorities, particularly those involved in promotion or investment sectors. Similarly, they regularly engage with local and foreign investors and are well-versed in relevant regulations, standards, policies, and guidelines set by state or federal governments.

Thirdly, survey questionnaires will be distributed to existing investors and occupiers who have established their plants in Malaysia. Engaging with these individuals are crucial as they possess firsthand knowledge of the factors influencing site selection within their respective industries. Their input will greatly enrich the survey findings.

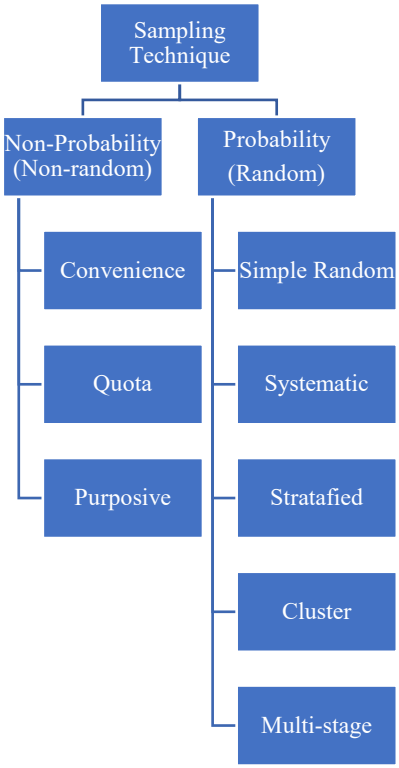
All selected respondents are not only experts in their respective fields but also possess a good number of industry experience. To ensure the accuracy and comprehensiveness of the survey data, face-to-face meetings will be arranged to address any queries or concerns that may arise from the questionnaire.

Keeney et al. (2001) recommend selecting respondents who are knowledgeable and experienced, open-minded towards research findings, and capable of providing current insights. These experts, referred to as "informed individuals" or "specialists" in their field play a pivotal role in enriching research outcomes. While it is not mandatory for respondents to be experts, as suggested by Yüksel (2007), they should possess some level of knowledge about the discussed issue.

3.4 Sampling methods

In broad term, sampling methods can be categorized into two main categories: nonprobability sampling (non-random sampling) and probability sampling (random sampling). Each of these categories can be further subdivided into several sampling techniques, as illustrated in Figure 3.1:

Figure 3.1: Sampling method



Note. Source from Teddlie, C., & yu, F. (2007). Mixed Methods Sampling: A Typology With Examples. *Journal of Mixed Methods Research*, *1*(1), 77–100.

In this research, the utilization of the random sampling method is excluded due to the specific nature of the research questions and design. As previously clarified, the survey questionnaire is intended to be distributed to key experts whose responses to the pairwise questionnaire, as the respondents will furnish genuine and relevant insights, thereby

facilitating more accurate findings in the later chapter. Consequently, respondents are selected through purposive judgment sampling.

Purposive judgment sampling requires the non-random selection of participants based on the researcher's judgment regarding the population under study. This method proves invaluable when seeking the participation of experts to validate research information or when a specific group of respondents is required to provide insights into the research inquiry.

3.5 Data Collection

Data collection could be conducted through either a qualitative or quantitative approach. For this research, only quantitative methods will be employed to collect data, utilizing only survey questionnaires. This decision is driven by the research objectives. By opting for survey questionnaires, the aim is to gather structured, numerical data conducive to quantitative analysis. This approach facilitates the examination of patterns or trends within the data, thanks to its efficiency in collecting responses from the target respondents. The quantitative approach through survey questionnaires aligns well with the study's objectives, ensuring the acquisition of robust and reliable data to support the research findings.

3.5.1 Quantitative Research Approach (Questionnaire Survey)

The survey questionnaire is widely employed in social research methodologies. It consists of fixed-format, self-report items completed by respondents. In this study, questionnaires serve as the primary research instrument for data collection. These questionnaires have been meticulously designed by the researcher based on insights gleaned from the literature review.

The questionnaire developed for this research is referred to as a pairwise questionnaire, specifically designed to determine the weighting of each selection criterion. In this questionnaire, pairwise comparisons are utilized, ensuring that each selection criterion is

compared only to another criterion. Respondents are instructed to select a single value from a scale of 1 to 9, as recommended by Saaty and listed within the questionnaire. Subsequently, a matrix, as illustrated in Table 3.6, will be created to calculate the weightage for each selected criterion.

Table 3.5: Matrix Design for Industrial Site Selection Criteria

	A	**B**	**C**
A	1		
B		1	
C			1

3.6 Data Analysis

For AHP, data is collected through pairwise questionnaires and will be analysed using quantitative techniques or pre-formulated table with Microsoft Excel. Once the data is broken down into sections, it will then be employed to analyse its results.

The questionnaire consists of a total of 12 questions in section A, aimed at understanding more about each respondent based on demographics. Sections B to G require respondents to make choices between two criteria on a scale of 1 to 9. There are 6 main aspects to choose from in these sections.

This approach ensures a comprehensive understanding of respondents' preferences and demographics, facilitating the analysis of factors influencing decision-making in the context of AHP.

3.7 Findings Presentation before Conclusion

After completing the data analysis, the findings will be presented in two formats. Firstly, the results will be displayed in a table format that covers each detail discussed in the previous sections. This includes the priority vector, consistency index (CI), and

Consistency Ratio (CR). Secondly, many radar diagrams will be created to assist readers in visualizing which selected criteria are most favoured and which are least favoured. This chart offers readers a quick overview of the findings in a graphical format.

In Chapter 4, the findings will be presented in detail with comprehensive discussions. Figures and diagrams mentioned earlier will be included to further illustrate the findings, enhancing readers' understanding of the research outcomes.

3.8 Conclusion

In overview, this chapter discusses the research methodology for this survey which consists of literature review, Analytic Hierarchy Process (AHP), questionnaire designation, data collection, sampling method and data analysis. This survey was created to first read relevant literature review, forming the potential criteria related to the research paper, allowing the selected key experts to answer the question set by the researcher, and subsequently find out the key findings based on the criteria.

CHAPTER 4

RESEARCH RESULTS

4.1 Introduction

Chapter 4 holds significance as it presents the analyzed results, thereby concluding the analysis process. These results are important in attaining the study's objectives. This chapter outlines the application of the Analytic Hierarchy Process (AHP) to ascertain the weightages of various criteria. Discussion and conclusions are drawn from these analyses, aligning with the research's secondary objective of identifying the weightage of site selection criteria in investors' decision-making during the site selection process.

4.2 Background of Respondents

In this research, 18 respondents from diverse companies/agencies, backgrounds, and experiences were chosen to respond to the pairwise questionnaire. All respondents possess extensive experience in the relevant field. Details of the selected respondents from each group are provided in Table 4.1:

Table 4.1: Respondents

Group/ Agencies	No of respondents
Industrial developers	5
Property Agent	4
Government authorities	4
Investors & Occupiers	5

13 out of the 18 respondents are key experts who regularly interact with investors interested in purchasing or leasing industrial land or buildings. This group possesses an average of more than 5 years of working experience. By soliciting their input through the pairwise questionnaire, accurate insights into industrial site selection criteria, particularly in Malaysia, can be obtained.

The remaining 5 respondents, on the other hand, are existing occupants in the manufacturing and logistics/warehousing sectors. With an annual turnover exceeding RM50 million, they are intent on owning and expanding their businesses in the coming years. Administering the questionnaire to these potential clients allows for precise answers based on their actual needs, enabling the derivation of accurate results using the AHP methodology.

4.3 Result of the study

Below are the findings pertaining to the second objective, obtained through the Analytic Hierarchy Process (AHP). A total of 5 main criteria and 19 sub-criteria were selected for calculating the respective weightages, as listed in the table 4.2 below. Feedback was gathered from 18 respondents with extensive experience in the industrial sector, selected through purposive judgment sampling. The results were analyzed using Microsoft Excel.

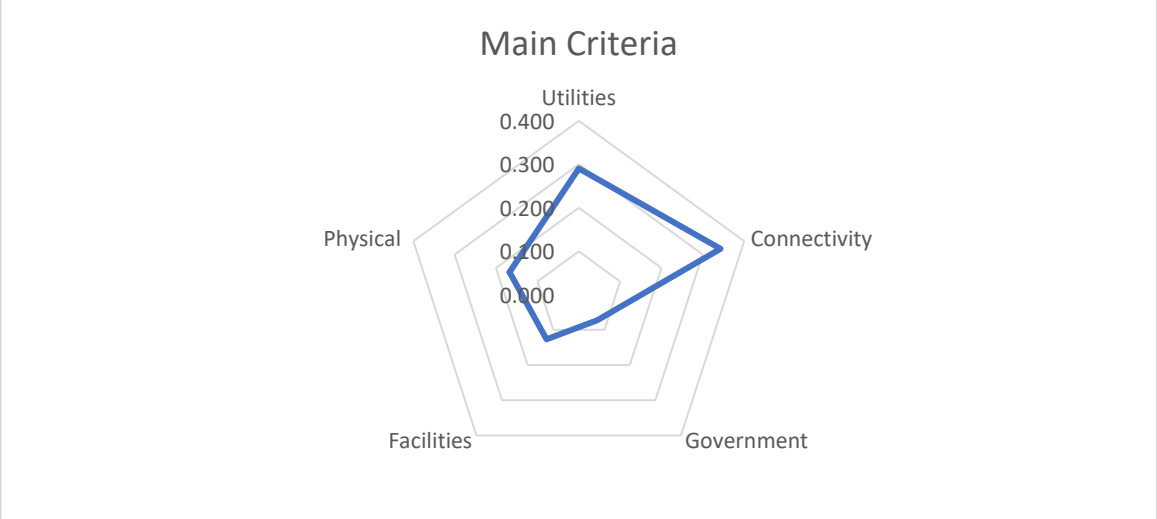
Table 4.2: Criteria Selected for Pairwise Questionnaire

Main Criteria	**Sub-Criteria**
Site Connectivity	Connectivity with Major Highways Proximity to Airport/Seaport Proximity to Raw Material Proximity to Urban Centre
Supply of Utilities	Electricity Supply Water Supply Telecommunication & Network Waste disposal & Collection
Governmental Institutional Support	Property Ownership Policy Tax Allowance & Subsidies Permissible Zoning & Land Use Supportive State Administrative
Facilities & Services	Workers' Accommodation Management Services Safety Measures & Services Security Measures & Services
Physical Site Characteristic	Size of the Site Landscape & Greenery Site Topography

Table 4.3: Results Computed from the AHP Survey on the Selected Main Criteria

	Utilities	Connectivity	Government	Facilities	Physical	Priority Vector	Weighted Sum Matrix	Consistency Measure	RANK
Utilities	1	1.087	3.752	2.551	1.328	0.290	1.481	5.098	2
Connectivity	0.920	1	4.259	3.721	2.183	0.343	1.756	5.120	1
Government	0.267	0.235	1	0.544	0.409	0.073	0.368	5.069	5
Facilities	0.392	0.269	1.839	1	1.044	0.127	0.641	5.061	4
Physical	0.753	0.458	2.446	0.958	1	0.167	0.842	5.029	3
							λ max	5.076	
						Consistency Index		0.019	
						Consistency Ratio		0.017	

Figure 4.1: Radar Chart for the Weight of Selected Main Criteria Elements



Based on the calculated results using the weighted geometric mean method (WGMM), Table 4.3 and Figure 4.1 illustrate the main criteria of site selection based on priority vector values, Consistency Index (CI), and Consistency Ratio (CR). From both the table and the figure, it is evident that site connectivity holds the highest priority value at 0.34, corresponding to a weight of 34%. Utility supply ranks second with a value of 0.29 or 29%, followed by Physical Site Characteristics at 0.17 or 17%, Facilities and Services at 0.13 or 13%, and Government Institutional Support at 0.07 or 7%. The Consistency Index (CI) and Consistency Ratio (CR) stand at 0.019 and 0.017 respectively, which falls within acceptable limits.

Among all the journal articles reviewed, these studies have yielded similar results, with site connectivity consistently rated as having the highest weightage compared to other criteria. The findings also highlight site connectivity as the most significant factor, underscoring its critical importance in business activities. According to Yildirim & Önder (2014), their study analyzed seven criteria, with three criteria which is proximity to airport, harbour, railway

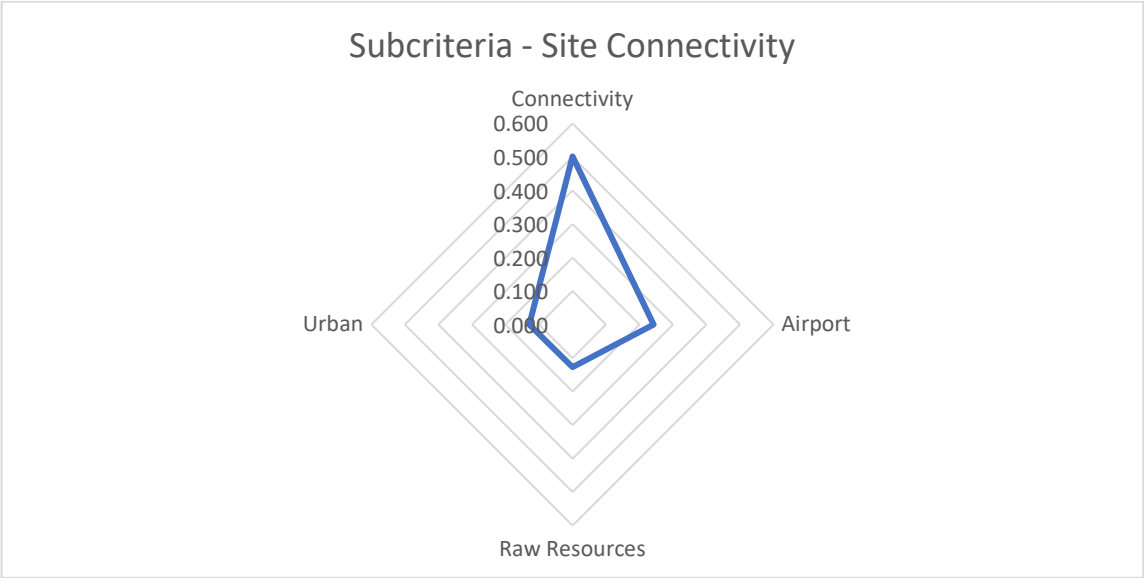
system, and highway system comprising 57% of the total weightage. Similarly, in another study by Ulutaş et al. (2020), the top four criteria out of eleven were related to proximity to highway, railway, and airport. Another study by Nong (2022) found that out of 15 criteria, diversity of transportation services ranked highest. This suggests that the availability of various transportation modes in the vicinity of the factory positively impacts business operations. Finally, research by Graciele et al. (2018) on determining factors in site selection for photovoltaic projects also emphasized the importance of site connectivity as the primary consideration. Ultimately, it boils down to the distance and proximity to the destination that matters most.

Interestingly, the scenario differs when considering criteria for government institutional support. While the current findings indicate that government institutional support ranks last, another research study revealed that respondents considered government-related support and offerings important. It ranked items such as foreign ownership law and tax incentives at positions 3 and 4, respectively out of 18 criteria (Arunyanart et al., 2021). However, this does not negate the importance of considering these criteria. It is essential to delve deeper into the sub-criteria of government institutional support to determine their relative importance to investors. It will be discussed in results computed from the AHP survey on the sub criteria, Governmental Institutional Support.

Table 4.4: Results Computed from the AHP Survey on the Sub criteria – Site Connectivity

	Connectivity	Airport	Raw Resources	Urban	Priority Vector	Weighted Sum Matrix	Consistency Measure	RANK
Connectivity	1	2.470	4.384	2.991	0.502	2.043	4.072	1
Airport	0.405	1	1.921	2.229	0.242	0.977	4.033	2
Raw Resources	0.228	0.521	1	1.129	0.127	0.513	4.034	4
Urban	0.334	0.449	0.885	1	0.129	0.518	4.021	3
						λ max	4.040	
						Consistency Index	0.013	
						Consistency Ratio	0.015	

Figure 4.2: Radar Chart for the Weight of Site Connectivity Elements



The sub criteria of the first main criterion is Site Connectivity. Table 4.4 and Figure 4.2 depict the priority vector values, Consistency Index (CI), and Consistency Ratio (CR). These findings reveal that industrial land with connectivity to major highways has the highest priority value at 0.5, equivalent to a weight of 50%. Proximity to Airport/Seaport follows closely with a value of 0.24 or 24%, while proximity to Urban Centres is next at 0.13 or 13%. Lastly, Proximity of Raw Resources holds a priority value of 0.13 or 13% as well. Both the Consistency Index (CI) and Consistency Ratio (CR) are within acceptable limits, standing at 0.013 & 0.015, respectively.

Among the various journal articles examined, a consistent theme emerges: both the logistics and manufacturing sectors rely heavily on excellent site connectivity. The closer a company is to its end destination, the more control it has over costs, enhancing its competitiveness in the market. Therefore, proximity to major highways becomes a significant factor in site

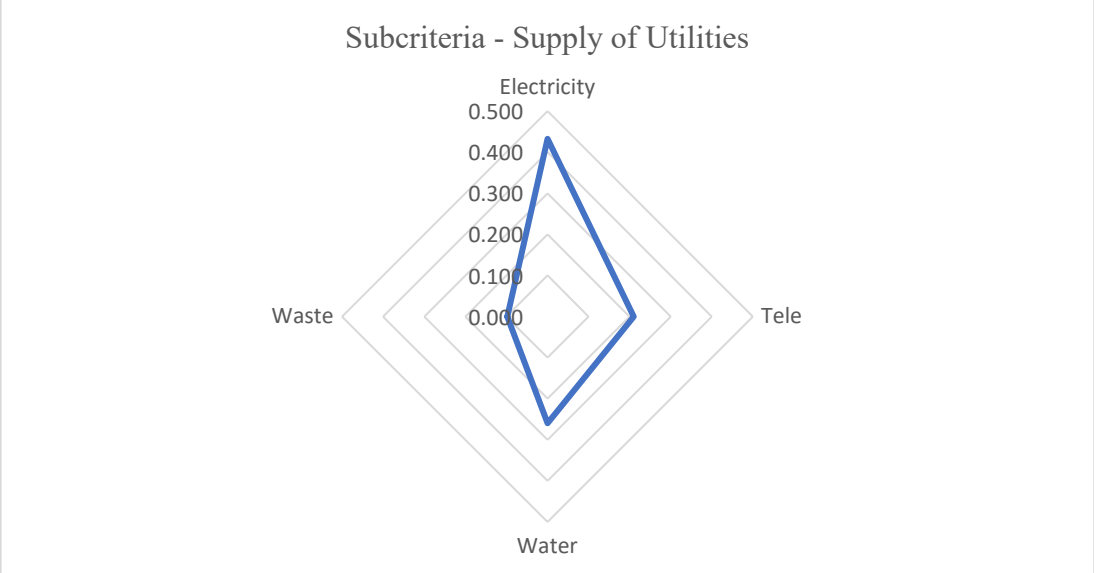
selection. Additionally, the distance to airports or seaports holds considerable importance for many industries. Taking the electrical and electronic industry as an example, once products are ready, they are typically exported to major markets such as the United States, Hong Kong, Singapore, China, and Japan. In such cases, shorter distances to airports and seaports are crucial to ensure speedy delivery times. Interestingly, research by Yildirim & Önder (2014) revealed that the weightage of proximity to harbours and airports is 17% and 4%, respectively. It is believed that the manufacturing sector tends to prefer seaports, as they are better equipped to handle bulk shipments.

Back to the results of this study yield an intriguing finding: the proximity to raw resources ranks last. This finding contradicts the approach taken by industrial parks in Penang, which strategically gather upstream and downstream suppliers of the electrical and electronic industry to ensure a cost-competitive advantage. Further to the research findings by B. M. Suman & R. K. Srivastava (2022), the availability of raw materials ranks number 2 out of 7 criteria, which shows its significant importance in site selection. This suggests that while raw materials are essential, other factors such as connectivity may take precedence in certain contexts. Therefore, a nuanced understanding of site selection criteria is crucial for decision-makers in both the logistics and manufacturing sectors.

Table 4.5: Results Computed from the AHP Survey on the Sub criteria – Supply Utilities

	Electricity	Tele	Water	Waste	Priority Vector	Weighted Sum Matrix	Consistency Measure	RANK
Electricity	1	1.960	1.954	3.979	0.432	1.741	4.024	1
Tele	0.510	1	0.778	2.143	0.210	0.842	4.011	3
Water	0.512	1.285	1	2.984	0.260	1.043	4.014	2
Waste	0.251	0.467	0.335	1	0.098	0.391	4.006	4
						λ max	4.014	
						Consistency Index	0.005	
						Consistency Ratio	0.005	

Figure 4.3: Radar Chart for the Weight of Supply Utilities Elements



Focusing on each main criterion's sub criteria, the second one examines Utilities supply. Table 4.5 and Figure 4.3 depict the priority vector values, Consistency Index (CI), and Consistency Ratio (CR). These findings reveal that Electricity supply has the highest priority value at 0.43, equivalent to a weight of 43%. Water supply follows closely with a value of 0.26 or 26%, while Telecommunication and network rank next at 0.21 or 21%. Lastly, Water Disposal & Collection Management holds a priority value of 0.1 or 10%. Both the Consistency Index (CI) and Consistency Ratio (CR) are within acceptable limits, standing at 0.005 each.

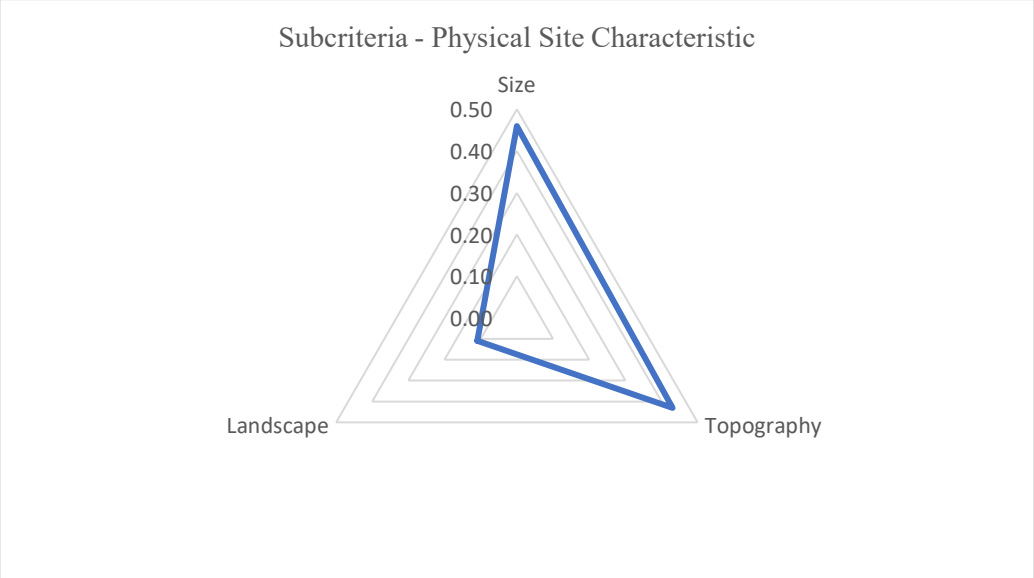
In the results derived from the AHP survey focusing on the selected main criteria, the supply of utilities emerges as the second-ranked factor out of five. This underscores its significance, particularly within the manufacturing sector, where efficient utility provision is crucial. For instance, in industries such as electrical and electronic manufacturing, all four identified

sub-criteria play a vital role. Should any of these sub-criteria be overlooked, the entire production process could face significant challenges. For instance, machines require electricity to operate, water for cleaning purposes, waste management services for treating waste, and telecommunications and network systems to function effectively in the era of Industry 4.0. In international production settings, internet connectivity is indispensable for seamless communication among staff and suppliers. Research conducted by (Arunyanart et al., 2021) indicates that the adequacy of energy and electricity, the efficiency of the electrical supply system, the price of electricity, and the efficiency of telecommunication and network systems rank second, fourth, eleventh, and fifteenth, respectively, out of eighteen criteria identified in the survey findings. Furthermore, the conclusion by B. M. Suman & R. K. Srivastava (2022) ranks Energy Availability as number 1 out of 7 criteria. This highlights the critical importance of utilities supply in the decision-making process for investors.

Table 4.6: Results Computed from the AHP Survey on the Sub criteria – Physical Site Characteristics

	Size	Topography	Landscape	Priority Vector	Weighted Sum Matrix	Consistency Measure	RANK
Size	1	1.0872	4.1194	0.4597	1.3794	3.0005	1
Topography	0.9198	1	4.0013	0.4306	1.2921	3.0004	2
Landscape	0.2428	0.2499	1	0.1096	0.3288	3.0001	3
					λ max	3.0003	
				Consistency Index		0.0002	
				Consistency Ratio		0.0003	

Figure 4.4: Radar Chart for the Weight of Physical Site Characteristics Elements



The sub criteria under the third main criterion pertain to Physical Site Characteristics. Presented in Table 4.6 and Figure 4.4 are the priority vector values, Consistency Index (CI), and Consistency Ratio (CR). These results indicate that the size of the site holds the highest priority value at 0.46, representing a weight of 46%. Site Topography follows closely at 0.43 or 43%. Lastly, Landscape & Greenery hold a priority value of 0.11 or 11%. Both the Consistency Index (CI) and Consistency Ratio (CR) stand at 0.0002 and 0.0003, indicating acceptable consistency.

In the realm of physical site characteristics, occupying a middle ground remains somewhat critical during the investor decision-making process. Site characteristics hold paramount importance as they encompass underlying costs that may not be immediately apparent on the surface. Therefore, the roles of land surveyors and soil investigators are crucial in

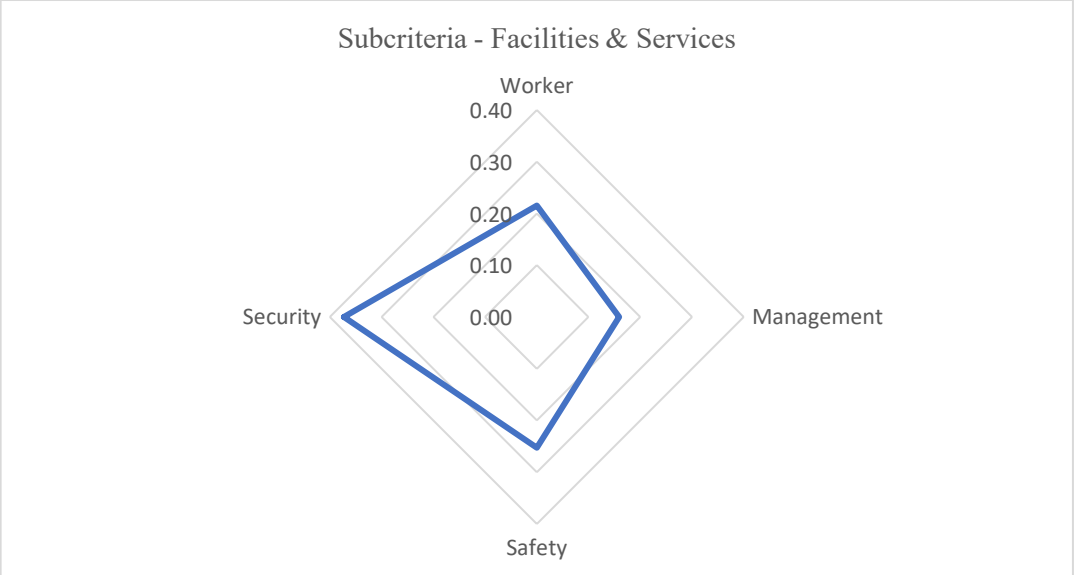
ensuring the land's condition is optimal and the purchased land size is accurate. Businesses always consider the longevity of operations and anticipate future expansions, making the availability of nearby land for potential extensions significantly important.

Moreover, the flatter the land, the more preferable it is for manufacturing plant businesses, as construction costs are typically lower without the need for extensive construction work. This rationale aligns with the high weightage attributed to both the size of the site for potential future expansion and the topography of the land, accounting for 46% and 43%, respectively, totalling 89%. This assertion is further supported by a study conducted by Graciele et al. (2018), Ponhan & Sureeyatanapas (2022), Sirawadee et al. (2021), Ulutaş et al. (2020) and Yildirim & Önder (2014), where the availability of land, the slope of the land, and the opportunity for possible site expansion were identified as part of the selected criteria.

Table 4.7: Results Computed from the AHP Survey on the Sub criteria – Facilities & Services

	Worker	Management	Safety	Security	Priority Vector	Weighted Sum Matrix	Consistency Measure	RANK
Worker	1	1.327	0.921	0.544	0.215	0.862	4.004	3
Management	0.754	1	0.593	0.446	0.159	0.637	4.004	4
Safety	1.085	1.687	1	0.688	0.253	1.011	4.003	2
Security	1.837	2.245	1.454	1	0.373	1.493	4.004	1
						λ max	4.004	
					Consistency Index		0.001	
					Consistency Ratio		0.001	

Figure 4.5: Radar Chart for the Weight of Facilities & Services Elements



The sub criteria within the fourth main criterion pertain to Facilities and Services. Illustrated in Table 4.7 and Figure 4.5 are the priority vector values, Consistency Index (CI), and Consistency Ratio (CR). According to these findings, Security Measures & Services hold the highest priority value at 0.37, equivalent to a weight of 37%. Safety Measures & Services closely follow with a value of 0.25 or 25%, while Workers' Accommodation ranks next at 0.22 or 22%. Lastly, Management Services hold a priority value of 0.16 or 16%. Both the Consistency Index (CI) and Consistency Ratio (CR) stand at 0.001 each, indicating acceptable consistency.

Reflecting on the literature review conducted in Chapter 2, it is notable that there were no related criteria selected and studied. The reason for including this criterion in our research study is to ascertain its significance in site selection for industrial land. Moreover, Invest

Selangor Berhad, in collaboration with Plan Malaysia @ Selangor, actively advocates for industrial developers to adhere to and implement guidelines for managed industrial parks in the future. The aim is to elevate the overall landscape of industrial development to a world-class standard, enabling competitiveness on the global stage. It is believed that by adhering to the guidelines of industrial parks, development can become more sustainable and enhance its value.

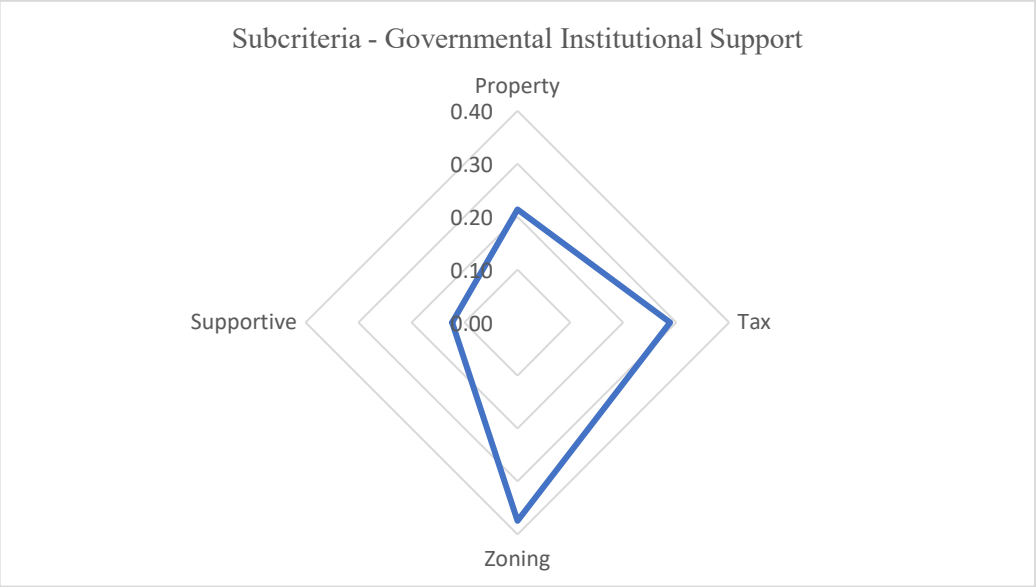
Interestingly, out of the 5 respondents selected as existing occupiers, 100% expressed their intention to opt for a managed industrial park in the future if there is any expansion. Despite facilities and services ranking fourth out of the 5 main selected criteria, all respondents still prioritize a better security and safety environment for their operations. Moreover, investors also prefer having worker dormitories within close proximity to ensure convenient commuting between the workplace and accommodation, facilitating easy control.

Furthermore, a managed industrial park typically includes a park manager responsible for overseeing its operations. An experienced park manager plays a crucial role in providing and managing park facilities, ensuring the industrial park remains in optimal condition for an extended period.

Table 4.8: Results Computed from the AHP Survey on the Sub criteria – Governmental Institutional Support

	Property	Tax	Zoning	Supportive	Priority Vector	Weighted Sum Matrix	Consistency Measure	RANK
Property	1	0.696	0.567	1.857	0.214	0.856	4.003	3
Tax	1.438	1	0.763	2.225	0.289	1.156	4.004	2
Zoning	1.765	1.311	1	2.993	0.374	1.499	4.003	1
Supportive	0.538	0.449	0.334	1	0.123	0.493	4.002	4
						λ max	4.003	
						Consistency Index	0.001	
						Consistency Ratio	0.001	

Figure 4.6: Radar Chart for the Weight of Governmental Institutional Support Elements



The sub criteria under the final main criterion pertain to Governmental Institutional Support. Within Table 4.8 and Figure 4.6, the priority vector values, Consistency Index (CI), and Consistency Ratio (CR) are depicted. These results indicate that Permissible Zoning & Land Use is assigned the highest priority value at 0.37, representing a weight of 37%. Tax Allowances & Subsidies offered by the government closely follow with a value of 0.29 or 29%, while Property Ownership Policy ranks next at 0.21 or 21%. Lastly, Supportive State Administration holds a priority value of 0.12 or 12%. Both the Consistency Index (CI) and Consistency Ratio (CR) stand at 0.001 each, indicating acceptable consistency.

Last but not least, according to the AHP survey focusing on government institutional support, it ranks last out of the 5 main criteria selected in terms of respondents' views on site selection. This indicates that respondents believe government support is relatively less

important compared to the other 4 selected main criteria. Our research findings align with two articles which suggest that government-related support carries relatively low weight compared to other important criteria. The first study by Alberto (2000) found that local incentives carry a weight of only 5.9%, while another study, conducted by Graciele et al. (2018), ranks political criteria last at only 2.3%.

In contrast, a study in the Electrical & Electronic industry by Arunyanart et al. (2021) presents a different perspective, highlighting the significant importance of foreign ownership laws and tax incentives, ranking them third and fourth out of 18 criteria. Government institutional support should not be taken lightly, especially given the tense US-China trade war climate. Currently, many Chinese investors are actively seeking opportunities in Southeast Asian countries to relocate their production from China. Southeast Asian countries have become accessible destinations for Chinese investors. By establishing manufacturing plants in Southeast Asia, Chinese investors can take advantage of lower tariffs and consequently offer more competitively priced products in the US market.

This underscores the importance for the Malaysian government to pay attention to this factor. Only through transparent policies, speedy approval processes, and attractive tax incentives offered to foreign investors can Malaysia compete effectively with other Southeast Asian countries. Conversely, if the government fails to improve in these areas, foreign investors may opt for other developed countries with more favourable investment policies.

In summary, the use of AHP tools provides insight into the weightage of selected criteria and sub-criteria, distinguishing those with higher weightage from those with lower weightage. However, it would be inaccurate to conclude that criteria with lower weightage are unimportant. Rather, there are other criteria that need to be addressed before selecting a suitable country location. For example, if Vietnam and Malaysia offer similar land characteristics, prices, and good infrastructure, but Vietnam provides better government support and packages, foreign investors are likely to choose Vietnam.

4.4 Conclusion

The AHP analysis provides insights into the weightage assigned to each main criterion and sub-criterion, accompanied by a brief explanation of the results. This weighted assessment offers stakeholders valuable guidance in designing industrial developments with greater precision and relevance.

It's essential to note that higher-ranked criteria aren't necessarily mandatory, nor should lower-weighted factors be disregarded in industrial development planning. Instead, these weightages serve as signposts for industrial developers and government bodies, highlighting which criteria are of paramount importance to investors when selecting industrial sites.

While each main criterion and sub-criterion holds significance for investors, their importance varies based on individual requirements and business needs. Ultimately, the bottom line often revolves around investment costs; if the costs aren't substantial, certain criteria may be deemed less critical.

However, it's important to acknowledge the limitations of this study, notably the constraints of time and resources. With only 18 respondents from diverse backgrounds, the accuracy of the priority vector could be enhanced with a larger and more varied sample size.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

The chapter primarily centres on presenting the findings derived from the study. It will delve into a detailed discussion of the identified criteria and their respective weightages as revealed through the analysis. Moreover, it will explain how the research objectives were met and the methods employed to achieve them. Alongside, the chapter will also address the limitations encountered in the study. Furthermore, it will encompass relevant insights and recommendation for future research to build upon the findings and address any gaps identified.

5.2 Findings of the study

5.2.1 Findings of the first objective

The primary aim of this research is to thoroughly investigate the site selection criteria that impact investors' decisions. This objective was accomplished through an extensive literature review. After analysing 51 articles (A Summary table outlined in **Appendix B**), the findings were synthesized and presented in Table 5.1, based on the emphasis placed by

scholars in their respective studies. This visual representation has provided readers with a clear understanding of the factors influencing investors' site selection decisions.

Table 5.1: Criteria Selected for Site Selection Based on Each Industry

Ranking	Criteria	Weightage (unit)	Weightage (%)
1	Proximity to highways, airport & seaport	33	14%
2	Availability, education level, wages, skills & competency	30	13%
3	Utilities, labour, Land price	28	12%
4	Proximity to natural resources, raw materials, suppliers, assemblers and automakers	26	11%
5	Industrial Sites & Expansion possibility	18	8%
6	Access to market	16	7%
7	Power, water, telecommunication, fiber optic, water treatment plant.	15	7%
8	Tax structure & Tax Incentive	13	6%
9	Government support & political Stability	12	5%
10	Environmental aspect	10	4%
11	Access to public facilities	7	3%
12	Climate	7	3%
13	Economy factor	6	3%
14	Security	5	2%
15	Foreign ownership law	1	1%
16	Stability of financial institution	1	1%
17	Risk of natural disaster	1	1%

From Table 5.1, it is evident that the most concern factor picked by investor when select a site is (1) proximity to highways, airports, and seaports and (4) proximity to natural resources, raw materials, suppliers, assemblers and automakers. This is linked to globalization factors discussed in Chapter 2, driving many businesses to relocate production to other countries for lower competitive costs, subsequently selling to other countries.

Next, labour emerges as the second significant concern in site selection, especially for labour-intensive sectors. Therefore, assessing the skill levels of the local workforce is crucial in industrial site selection, as it directly affects productivity and product quality. It doesn't make sense to relocate workers to a new plant, as it would increase overall costs.

Subsequently, among the top criteria chosen by investors is (3) investment cost, which encompasses various factors including the cost of utilities, labour expenses, and land prices. It's noteworthy to consider how previous studies have identified a link between government regulations and investment costs. For instance, in response to global warming concerns, governments may impose regulations promoting sustainable environments, which can result in increased electricity costs. As a consequence, businesses, particularly manufacturers, may find it economically advantageous to explore alternative locations where operating expenses are lower. This connection echoes Weber's theory, which underscores the importance of cost considerations in site selection decisions. Ultimately, the profitability of the company stands as an important factor influencing such decisions. However, it's crucial to acknowledge that the decision to relocate or expand into new areas involves a comprehensive evaluation of all other investment costs, ensuring a well-informed decision-making process.

while the summary table indicates which criteria are most and least selected by scholars, it is important to note that the importance of these criteria can vary depending on the industry. In other words, what is considered crucial for site selection in one industry may not hold the same significance in another. However, all criteria listed in the table are deemed important. By examining the specifics of each industry, a deeper understanding of site selection criteria should be studied, enabling the development of tailored strategies. This overview is beneficial not only for investors but also for policymakers and industry stakeholders who need to make well-informed decisions about site selection for industrial investment.

5.2.2 Findings of the second objective

The second objective of this research is to identify the weightage of site selection criteria in investors' decisions during the site selection process. The Analytic Hierarchy Process (AHP) tools were utilized to prioritize criteria based on data collected from key respondents. A total of 5 main criteria and 19 sub-criteria were selected for this analysis. The eigenvector method (EM) was initially used to determine individual respondents' results for each main criterion and sub-criterion. Subsequently, the weighted geometric mean method (WGMM) was employed to aggregate all respondents' results and calculate the average score.

Based on the findings, the main criteria were ranked in terms of weightage from high to low priority vector, with connectivity (34%) being the most significant criterion, followed by utilities (29%), physical sites (17%), facilities (13%), and lastly, government institutional support (7%).

Further delving into each main criterion, the AHP tools enable the researcher to explore its sub-criteria to address multi-criteria decision-making by the respondents. Regarding connectivity, the weightage spans from connectivity with major highways (50%) and proximity to airport/seaport to proximity (24%) to urban centre (13%) and availability of raw resources (13%). Similarly, for utilities, the weightage ranks from electricity supply (43%) and water supply (26%) to telecommunications & network infrastructure (21%) and waste disposal/collection management (10%). In terms of physical site attributes, it ranges from size of the site and site topography to landscape/green features. As for facilities, the ranking includes security measures (37%), safety measures (25%), worker accommodation (22%), and management services (16%). Finally, in terms of government institutional support, permissible zoning and land used (37%) emerges as the most significant factor, followed by tax incentives offered by the government (29%), property ownership policy (21%) and supportive state administrative (12%).

5.3 Limitation of the study

Due to time constraints, this study is limited to a sample size of 18, resulting in a smaller pool of respondents. To enhance the quality of findings, it would have been beneficial to distribute more questionnaires to the target respondents to increase the sample size and obtain more accurate results.

Secondly, due to limited time, resources, and the scope of the research study, a broader spectrum of research should be conducted. For instance, while concentrating on the overall and general manufacturing, researchers could delve into specific industries. Such an approach would yield greater benefits in terms of findings. This would provide industrial developers or government agencies with a clearer understanding of their requirements, thereby facilitating more effective project development in the future.

Thirdly, this research does not delve deeper into two additional key factors which was discussed in chapter 2. For instance, Labour (labour requirements, availability of skilled workers) and investment costs (cost incurred by investors, and the type of investment costs that are closely monitored by investors). Furthermore, the emerging trend of managed industrial parks in Malaysia should also be considered for further study. However, due to limitations in time and resources, this aspect could not be pursued.

Fourthly, while limiting the study to Malaysia provides valuable insights into investor preferences within the country, it fails to provide a comparative analysis of Malaysia against other countries in Southeast Asia. The policymakers, industrial developers, and agents lack crucial information on Malaysia's competitive position. By broadening the scope to include other countries in the region, this research could offer a comprehensive understanding of Malaysia's strengths and weaknesses in comparison to its neighbours. Such a comparative analysis is essential for identifying areas where Malaysia excels and where it lags behind, enabling targeted efforts to enhance its attractiveness to investors.

5.4 Future recommendations

It is important to acknowledge the small sample size of respondents. To address this limitation, it is recommended that future research endeavours involve larger sample sizes to ensure the robustness and generalizability of findings. It includes more collaboration with the government authorities, industrial developers and agents from different states. Additionally, collaborating with governmental agencies such as the Malaysian Investment Development Authority (MIDA) and the Ministry of International Trade and Industry (MITI), which are aligned with making Malaysia an attractive investment destination, to conduct face-to-face interviews and roundtable discussions can provide valuable insights for policymakers and industry stakeholders. This collaborative approach can foster a more comprehensive understanding of site selection dynamics and facilitate evidence-based decision-making processes for industrial development in Malaysia.

Additionally, it suggests incorporating more critical criteria and conducting deeper research in future studies to provide a comprehensive understanding of investor decision-making

processes. For example, labour related issues and investment costs are significant criteria for investors in site selection, yet there has been limited research in this area to date.

A further research study should be conducted to compare site selection criteria particularly on the investment policy and the investment cost with those of Southeast Asian countries to determine Malaysia's strengths. It is imperative to recognize the competitive landscape among Southeast Asian countries, including Vietnam, Indonesia, Thailand, the Philippines, and Cambodia. Proactively identifying these key elements influencing investor decisions can offer valuable insights for the Malaysian government and industrial developers. By strategically targeting key investors and addressing potential weaknesses, Malaysia can enhance its competitiveness on the global stage. Therefore, future research endeavours should consider expanding the scope to include comparative analyses with other Southeast Asian countries, providing a more comprehensive understanding of Malaysia's position in the region's investment landscape.

Finally, this study makes a significant contribution to the academic field by addressing a gap in existing literature. While previous studies have predominantly concentrated on other countries, our research sheds light on the distinctive factors influencing site selection in Malaysia. By refining existing methodologies, future research endeavours can delve deeper into this subject matter, thus enriching our understanding and advancing knowledge in this area.

5.5 Conclusion

In essence, Malaysia's strategic location, proactive engagement in international trade agreements, and commitment to infrastructure development render it a premier destination for both local and foreign investors. Positive performance indicators and substantial investments underscore confidence in the country's economic potential.

However, as Malaysia continues to attract foreign capital, the role of industrial parks has become increasingly crucial. Recognizing this trend, the Selangor government, as pioneers, has taken proactive steps by implementing guidelines for managed industrial parks. This proactive approach sets an example for other states to follow in the long run.

Furthermore, this research highlights the importance of understanding the key factors that investors prioritize. Incorporating these factors into industrial park development enables stakeholders to showcase unique selling points (USPs) that resonate with investors. This informed approach leads to the creation of more competitive industrial parks in Malaysia, attracting investment and bolstering Malaysia's standing on the global stage.

Nonetheless, to truly establish Malaysia as a prime destination for foreign investors, concerted efforts from various stakeholders are essential. A multidimensional approach is recommended, involving the government, industrial developers, utility service providers, and other relevant parties.

Firstly, the government should establish robust guidelines for industrial developers to adhere to. While managed industrial parks are beneficial, ensuring minimum infrastructure standards, such as utilities, can reduce waiting times for investors. Secondly, learning from other countries' investment policies can further enhance Malaysia's attractiveness to investors.

Additionally, utility service providers play a crucial role in supporting industrial development. Collaborating with these providers to ensure reliable and efficient utility services within industrial parks can significantly enhance their appeal to investors. Access to electricity, water, telecommunications, and other essential services is vital for the smooth operation of businesses within industrial parks.

Lastly, developers must prioritize responsible practices to foster sustainable development and investor confidence. By adopting environmentally friendly initiatives and adhering to high standards of corporate governance, developers can create a conducive environment for long-term investment and growth.

By implementing these strategies collaboratively, Malaysia can strengthen its position as a premier destination for foreign investment, driving economic growth and prosperity for the nation.

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APPENDIX A

MANAGED INDUSTRIAL PARK GUIDELINES

8.0 GARIS PANDUAN KHUSUS

8.1 Komponen-Komponen Pembangunan MIP

8.1.1 Proses perancangan pembangunan bagi cadangan pembangunan hendaklah merujuk dan mengguna pakai Garis Panduan Piawaian Perancangan Negeri Selangor serta garis panduan lain yang diterima pakai (contohnya Garis Panduan Perancangan Laluan Kemudahan Utiliti, Garis Panduan Perancangan Tanah Lapang dan Kawasan Rekreasi, dan sebagainya).

8.1.2 Antara komponen-komponen pembangunan serta status komponen pembangunan kawasan MIP adalah seperti berikut;-

Jadual 5 : Komponen-Komponen Kawasan MIP

Bil	Cadangan Komponen Pembangunan	Konsep MIP			
		Strata		Bukan Strata	
		Landed Strata Multi - Storey Strata		*Individual Title Block Title*	
		Penyediaan	Selenggara	Penyediaan	Selenggara
A. FIZIKAL					
1.	Keluasan Tanah	Keluasan minima: 200 ekar atau tertakluk kepada keluasan yang dicadangkan oleh pihak pemaju			
B. KESELAMATAN					
2	Berpagar & Berpengawal	√	√	√ & Opt *Guarded for individual title	√
3.	Perkhidmatan Kecemasan (Bomba sukarela/ Polis bantuan/ Ambulans)	Opt	Opt	Opt	Opt
4.	Penerapan *Elemen Crime Prevention Through Environmental Design (CPTED)*	√	√	√	√

Petunjuk:
(√) Keperluan asas
(Opt) Keperluan pilihan

Bil	Cadangan Komponen Pembangunan	Konsep MIP			
		Strata		Bukan Strata	
		Landed Strata Multi - Storey Strata		*Individual Title Block Title*	
		Penyediaan	Selenggara	Penyediaan	Selenggara
C. PENGINAPAN PEKERJA					
5.	Asrama Pekerja Berpusat	√	√	√	√
D. INFRASTRUKTUR					
6.	Jalan (Jalan Konkrit/ Material yang bersesuaian)	Opt	Opt	Opt	Opt
7.	Saliran	√	√	√	√
8.	Lampu Awam	√	√	√	√
9.	Perabot Jalan & Peranti Keselamatan Jalanraya	√	√	√	√
10.	Cerun **Basic Maintenance (drainage/grass/ berm drain)*	√	√	√	√
11.	Kolam Tadahan Air/ Banjir	√	Opt	√	Opt
12.	Sistem Pengumpulan Air Hujan (SPAH)	√	√	√	√
13.	Tempat Letak Lori Berpusat/Depoh Lori	√	√	√	√
14.	Laluan Pejalan kaki dan Basikal	√	√	√	√

Petunjuk:
(√) Keperluan asas
(Opt) Keperluan pilihan

Bil	Cadangan Komponen Pembangunan	Konsep MIP			
		Strata		Bukan Strata	
		Landed Strata Multi - Storey Strata		*Individual Title Block Title*	
		Penyediaan	Selenggara	Penyediaan	Selenggara
E.UTILITI					
15.	Pencawang Masuk Utama (PMU) / Pencawang Pembahagi Utama (PPU) / Sistem Suis Utama (SSU) / Pencawang Elektrik (PE).	√	√	√	Opt
16.	Bekalan Tenaga Alternatif (Solar dsb)	Opt	Opt	Opt	Opt
17.	Penjana Tenaga Sokongan (*Generator*)	Opt	Opt	Opt	Opt
18.	Tangki Sedut / Tangki Air	√	√	√	Opt
19.	Loji Rawatan Kumbahan Berpusat	√	Opt	√	Opt
20.	Loji Rawatan Air Sisa Berpusat	Opt	Opt	Opt	Opt
21.	Bekalan Gas	Opt	Opt	Opt	Opt
22.	Telekomunikasi & Internet (Fiber Optik)	√ > 30mbps	√ > 30mbps	√ > 30mbps	√ > 30mbps
23.	Tapak pemancar komunikasi (Telco)	√	Opt	√	Opt
24.	Rizab Utiliti	√	√	√	√

Petunjuk:
(√) Keperluan asas
(Opt) Keperluan pilihan

Bil	Cadangan Komponen Pembangunan	Konsep MIP			
		Strata		Bukan Strata	
		Landed Strata Multi - Storey Strata		*Individual Title Block Title*	
		Penyediaan	Selenggara	Penyediaan	Selenggara
F. AMENITI (KEMUDAHAN AWAM)					
25.	Rumah kelab / Kemudahan Rekreasi	Opt	√	Opt	√
26.	Landskap & Kawasan Hijau	√	√	√	√
27.	Medan Selera	√	√	√	√
28.	Pusat Komersial	Opt	√	Opt	√

Petunjuk:
(√) Keperluan asas
(Opt) Keperluan pilihan

Bil	Cadangan Komponen Pembangunan	Konsep MIP			
		Strata		Bukan Strata	
		Landed Strata Multi - Storey Strata		*Individual Title Block Title*	
		Penyediaan	Selenggara	Penyediaan	Selenggara
G. PERKHIDMATAN PENGURUSAN					
29.	Pusat Informasi & Perkhidmatan *I Command Centre* (Pejabat Pengurusan Taman Perindustrian)	√	√	√	√
30.	Perkhidmatan Pengangkutan Pekerja	Opt	Opt	Opt	Opt
31.	Pusat Pengurusan Data	√	√	√	√
32.	Perkhidmatan Pembersihan Awam	Opt	√	Opt	√
33.	Stesen Pemindahan Sisa Pepejal	√	√	√	√

Petunjuk:
(√) Keperluan asas
(Opt) Keperluan pilihan

Bil	Cadangan Komponen Pembangunan	Konsep MIP			
		Strata		Bukan Strata	
		Landed Strata Multi - Storey Strata		*Individual Title Block Title*	
		Penyediaan	Selenggara	Penyediaan	Selenggara
G. PERKHIDMATAN PENGURUSAN					
34.	Perkhidmatan Pengurusan Sisa (Domestik)	√	√	√	√
35.	Perkhidmatan Pengurusan Sisa (Industri)	Opt	Opt	Opt	Opt
36.	Penerapan elemen *Low Carbon City Facilities*	√	√	√	√
37.	Penerapan elemen *Universal Design Guideline*	√	√	√	√
38.	Penerapan Elemen *Smart City*	√	√	√	√
39.	Penerapan elemen *Low Carbon City* - Stesen Pengecasan Kenderaan EV - Konsep *Park & Ride*	√	√	√	√

Petunjuk:
(√) Keperluan asas
(Opt) Keperluan pilihan

APPENDIX B

SUMMARY OF
SELECTED CRITERIA FOR SITE SELECTION BASED ON EACH INDUSTRY

Categories	Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	Total
Connectivity	Proximity to highways, airport & seaport	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes								Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes						Yes	33
	Proximity to natural resources, raw materials, suppliers, assemblers and automakers			Yes			Yes	Yes	Yes				Yes	Yes		Yes			Yes			Yes									Yes		Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	26
	Access to market			Yes	Yes			Yes		Yes	Yes									Yes			Yes								Yes	Yes		Yes	Yes	Yes	Yes		Yes							Yes							15
	Access to public facilities							Yes	Yes						Yes				Yes			Yes																					Yes			Yes							7
Utilities	Power, Water, Telecommunication, Fiber optic, water treatment plant.	Yes		Yes		Yes												Yes			Yes												Yes			Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes		Yes		Yes	16
Government support	Tax structure & Tax Incentive	Yes	Yes	Yes											Yes									Yes					Yes									Yes				Yes		Yes		Yes		Yes	Yes		Yes		13
	Government support & Political Stability	Yes		Yes		Yes			Yes		Yes	Yes				Yes			Yes																					Yes			Yes			Yes			Yes		12
	Foreign ownership law	Yes																																																		1
Facilities & Services	Security																									Yes	Yes		Yes											Yes							Yes		5
	Environmental aspect														Yes		Yes	Yes	Yes					Yes		Yes	Yes					Yes				Yes					Yes									10
Labour	Availability, Education level, wages, skiils & competency	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes								Yes			Yes		Yes					Yes	Yes	Yes	Yes	Yes				Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	30
Investment cost	Utilities, labour, Land Price	Yes	Yes			Yes				Yes			Yes	Yes	Yes	Yes			Yes	Yes			Yes		Yes	Yes	Yes	Yes		Yes		Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes			Yes		28
	Economy factor		Yes	Yes		Yes						Yes					Yes																											Yes								6
	Stability of financial institution	Yes																																																	1
Physical Site	Industrial Sites & Expansion possibility	Yes	Yes	Yes								Yes	Yes	Yes			Yes	Yes		Yes	Yes	Yes			Yes					Yes		Yes	Yes		Yes	Yes					Yes									18
	Climate		Yes	Yes									Yes								Yes																			Yes							Yes		7
	Risk of natural disaster	Yes																																																1

Ref no	Reference Name
1	(Ponhan & Sureeyatanapas, 2022)
2	(Graciele et al., 2018)
3	(Arunyanart et al., 2021; Badri et al., 1995)
4	(Arunyanart et al., 2021; Jiaqin & Juei, 1997)
5	(Arunyanart et al., 2021; MacCarthy & Atthirawong, 2003b)
6	(Arunyanart et al., 2021; Kim, 2005)
7	(Arunyanart et al., 2021; Ertuğrul & Karakaşoğlu, 2008)
8	(Arunyanart et al., 2021; Feng et al., 2010)
9	(Arunyanart et al., 2021; Banomyong & Ishida, 2010)
10	(Arunyanart et al., 2021; Banomyong & Ishida, 2010)
11	(Arunyanart et al., 2021; Paulrajan, n.d.)
12	(Arunyanart et al., 2021; Gupta et al., 2016)
13	(Arunyanart et al., 2021; Tavakkoli-Moghaddam et al., 2011)
14	(Alberto, 2000; Arunyanart et al., 2021)
15	(Amindoust et al., 2012; Arunyanart et al., 2021)
16	(Arunyanart et al., 2021; Wang et al., 2018)
17	(Arunyanart et al., 2021; Ozdemir & Sahin, 2018a)
18	(Farahani et al., 2010; Ulutaş et al., 2020)
19	(Turskis & Zavadskas, 2010; Ulutaş et al., 2020)
20	(Li et al., 2011; Ulutaş et al., 2020)
21	(Elevli, 2014; Ulutaş et al., 2020)
22	(Tadić et al., 2014; Ulutaş et al., 2020)
23	(Ulutaş et al., 2020; Uysal, 2014)
24	(Ulutaş et al., 2020; Yildirim & Önder, 2014)
25	(Ulutaş et al., 2020; Zak & Węgliński, 2014)
26	(Rao et al., 2015; Ulutaş et al., 2020)
27	(Stevic et al., 2015; Ulutaş et al., 2020)
28	(Cristea & Cristra, 2016; Ulutaş et al., 2020)
29	(Özceylan et al., 2016; Ulutaş et al., 2020)
30	(Komchornrit, 2017; Ulutaş et al., 2020)
31	(Pham et al., 2017; Ulutaş et al., 2020)
32	(Ulutaş et al., 2020)
33	(Singer & Ozsahin, 2020)
34	(Anh Tuan & Thi Hien, 2017; Nong, 2022)
35	(Nong, 2022; Quynh et al., 2020)
36	(Nong, 2022; Suman et al., 2021)
37	(Mihajlović et al., 2019; Nong, 2022)
38	(Nong, 2022; Peker et al., 2019)
39	(Mousavi et al., 2013; Paul et al., 2022; Yang & Hung, 2007)
40	(Farahani & Asgari, 2007; Paul et al., 2022)
41	(Beskese et al., 2015; Chou et al., 2008; Dogan, 2012; Paul et al., 2022)
42	(Chen et al., 2014; Paul et al., 2022)
43	(Sahin, 2021)
44	(Bhatnagar et al., 2011)
45	(Ballou et al., 1993; Bhatnagar et al., 2011)
46	(Bhatnagar et al., 2011;)
47	(Bhatnagar et al., 2011; MacCornmack et al., 1994)
48	(Bhatnagar et al., 2011; Ferdows, 1997)
49	(Bhatnagar et al., 2011; Coughlin & Segev, 1997)
50	(Makarevic & Stavrou, 2022)
51	(Sihag et al., 2019)

Note. References of criteria selected for site selection based on each industry in Appendix B.