# Enhancing Innovation in the Manufacturing Industry: Antecedent Factors

By

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## DECLARATION

The author hereby declares that this project paper is the original study undertaken by his unless stated otherwise due to acknowledgment has been given to references quoted in the bibliography. The views and analyses in this study are that of author's based on the reference made; and this does not constitute an individual to use this study as technical tool for investment.



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| | |
|---|---|
| AFTA | ASEAN Free Trade Area |
| DNA | Deoxyribonucleic Acid |
| DOSM | Department of Statistic Malaysia |
| GDP | Gross Domestic Product |
| MAA | Malaysian Automotive Association |
| MASTIC | Malaysian Science and Technology Information Centre |
| MATRADE | Malaysian External Trade Development Corporation |
| MIDA | Malaysian Investment Development Authority |
| MOSTI | Ministry of Science Technology & Innovation |
| MPC | Malaysia Productivity Corporation |
| MRA | Multiple Regression Analyses |
| SAS | Statistical Analysis System |
| SME | Small and Medium Enterprise |

## LIST OF APPENDICES

Abstract of the thesis presented to the Senate of University Tun Abdul Razak in fulfillment of the requirements for the degree of Master of Business Administration

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## ABSTRACT

The manufacturing industry is important for a nation's advancement. This research will consider the impact of organizational expertise in manufacturing. The intrinsic application of knowledge and information management within those environments will be examined. The perception for employees of employee engagement for that industry will be considered. Overall, the corporate culture aspect of the organization will also be taken into consideration. This study specifically examines SMEs, start-ups with over 100 employees, publicly listed companies, and private manufacturing firms. 450 questionnaires were distributed to manufacturing companies, yielding 200 responses. The outcomes demonstrate a positive correlation between the independent variables and the dependent variable (innovation). The results of the multiple regression analysis suggest that organizational factors are crucial in promoting innovation. Future research could review the impact of providing specialized training to employees to encourage them to be more creative and innovative in innovation.

# CHAPTER 1: INTRODUCTION

## 1.0 Introduction

The main purpose of this research is to conduct a comprehensive analysis of the complex factors that have an impact on innovation in the manufacturing industry of Malaysia. The manufacturing industry is a crucial contributor to a nation's economic progress and development. Therefore, this study aims to examine the influence of organizational expertise in manufacturing, and how it contributes to innovation. Furthermore, this research will look into the intrinsic application of knowledge management within the manufacturing industry and how it affects innovation. Additionally, the study will consider the perception of employee engagement for the industry and how it influences innovation. Lastly, the research will evaluate the culture aspect of the organization and its impact on innovation within the industry.



In this chapter, I provide an overview of this research, beginning with a brief background that contextualizes this study. I then articulate the problem statement, which identifies the research gap that led us to undertake this study. Next, we outline the research objectives, questions, and hypotheses, which will guide this investigation. I also describe the broad and narrow scope of this research, which will help us stay on track. This problem statement sets the foundation for this study and establishes the boundaries for this research without specifying the type of research we will undertake.

These research objectives and questions provide a clear perspective on the main purpose of this study and help generate interest among reviewers. These hypotheses are based on

a thorough review of existing literature, which we summarize in this chapter. Additionally, I discuss the significance of this study, highlighting its relevance, importance, and potential contributions to the field of manufacturing innovation. Finally, we provide an overview of the chapter layout and conclude this introductory chapter.

## 1.1 Research Background

Malaysia's economy has undergone significant changes in recent times, transitioning from an agricultural-based economy to a newly industrialized market economy. The country's industrial sector, which consists of the electronic, automotive, and construction industries, has played a crucial role in driving this change. In 2022, the industrial sector contributed to 36.8% of the country's GDP and employed almost 36% of the labour force.

Among the industries in the manufacturing sector, the electrical and electronics industry (E&E industry) has emerged as the dominant player in Malaysia. This sector accounted for 32.8% of the country's exports and 27.3% of employment in 2021, according to the Malaysian Investment Authority (MIDA). The E&E industry has been instrumental in driving Malaysia's manufacturing industry, which has contributed to a 30.1% share of GDP in 2010 and a 27.8% share of employment in 2021.



The increase in demand for mobile devices such as tablets and smartphones, storage devices like cloud computing and data centers, and optoelectronics, which include fiber optics, photonics, and LEDs, has fueled the growth of Malaysia's manufacturing industry. Embedded technology like LEDs, PCBs, and integrated circuits have also played a crucial role in this development.

These developments have created numerous employment opportunities and facilitated the application of new technologies, which are essential for Malaysia's Vision 2030 to become a fully developed nation.

Table 1.1.1: Performance of various countries in Global Innovation Index

| Country / Economy | Income | 2022 | | 2021 | | 2020 | | 2019 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rank | Score (0-100) | Rank | Score (0-100) | Rank | Score (0-100) | Rank | Score (0-10) |
| Switzerland | HI | 1 | 64.78 | 1 | 66.59 | 1 | 68.20 | 1 | 63.82 |
| Sweden | HI | 3 | 62.29 | 2 | 61.36 | 2 | 64.80 | 2 | 62.12 |
| Finland | HI | 4 | 60.67 | 6 | 59.51 | 4 | 61.80 | 5 | 57.50 |
| USA | HI | 6 | 60.09 | 5 | 60.31 | 10 | 57.70 | 7 | 56.57 |
| Singapore | HI | 7 | 59.24 | 8 | 59.41 | 3 | 63.50 | 3 | 59.64 |
| Denmark | HI | 8 | 57.52 | 9 | 58.34 | 7 | 59.90 | 6 | 56.96 |
| Hong Kong (SAR) | HI | 10 | 56.82 | 7 | 59.43 | 8 | 58.70 | 4 | 58.80 |
| Spain | HI | 27 | 49.27 | 26 | 49.41 | 29 | 47.20 | 32 | 43.81 |
| Slovenia | HI | 28 | 47.23 | 30 | 47.32 | 26 | 49.90 | 30 | 45.07 |
| China | UM | 29 | 46.57 | 35 | 44.66 | 34 | 45.40 | 29 | 46.43 |
| Cyprus | HI | 30 | 45.82 | 27 | 49.32 | 28 | 47.90 | 28 | 46.45 |
| Portugal | HI | 32 | 45.63 | 34 | 45.10 | 35 | 45.30 | 33 | 42.40 |
| **Malaysia** | **UM** | **33** | **45.60** | **32** | **46.92** | **32** | **45.90** | **31** | **44.05** |



Source: National Survey of Innovation. *Malaysian Science and Technology Innovation [MASTIC] (2022*).

The table above presents the Global Innovation Index performance of different countries between 2019-2022. Malaysia is categorized as an upper-middle-income country based on its GDP per capita. In 2022, Malaysia ranked 33 out of all the countries, which is one rank lower than its position in 2021.

Malaysia has made significant strides in the automotive industry, ranking 22nd among automotive manufacturers worldwide. In 2021, the country produced a total of 596,418

vehicles, comprising 545,122 passenger cars and 51,296 commercial vehicles. These figures, as reported by the Malaysia Automotive Association (MAA) in 2022, demonstrate Malaysia's rapid advancement in the automotive sector and its increasing technological sophistication.

However, this development also implies a growing demand for a highly skilled workforce that can meet the industry's evolving needs and requirements. The manufacturing sector, according to New Industrial Master Plan 2030 (NIMP 2030) will likely only employ only 2.4% of engineers and technicians, representing 12,000 individuals. This figure is 6-8% lower than that of other developing countries, as highlighted by Hassan et.al., (2023). They also identified the shortage of engineers and technicians as a significant concern in Malaysia's industrialization program, which could potentially limit the country's ability to penetrate the technological market.



In today's global job market, having a higher level of education can significantly increase an individual's chances of being employed, no matter where they are located. This is particularly relevant for both industrial and developing countries, where a skilled and knowledgeable workforce is essential for sustainable economic growth.

To effectively navigate the diverse and constantly evolving economic conditions of the modern world, individuals must possess the knowledge and abilities required to manage and contribute to the development of advanced technologies. However, despite being well-prepared with theoretical knowledge from the technical curriculum, technical graduates often find it difficult to meet the practical requirements of employers. This is due to a lack of practical training, which is essential for effectively applying theoretical knowledge to real-world situations.

According to research conducted by Hassan in 2023, the number of technical graduates has continued to rise over the years. In 2019, there were 20,822 technical graduates, while in 2003 there were 41,283. This number continued to escalate until 2005, with an increase of 58.2%, resulting in a total of 65,304 technical graduates. Despite this increase, the unemployment rate for technical graduates remains high at 62.3%.

The absence of fundamental skills and knowledge among graduates has a significant impact on the innovation of products in the manufacturing industry. A firm's competitive advantage, productivity growth, and sustainability are highly dependent on its ability to enhance productivity capacity, devise new products, and make breakthroughs in technology. Despite its crucial role, the factors that are linked to the production of innovation in Malaysia's manufacturing industry remain inadequately understood. This lack of comprehension may impede the industry's potential for growth, productivity, and overall survival.



## 1.2 Problem Statement

Innovation is a dynamic process that involves the creation and introduction of new goods or services or the enhancement of existing ones. The primary objective of this process is to create value for companies and gain a competitive edge over others (Xiao, Yang, Yang & Wang, 2023). Innovation is a complex blend of various activities that interact to create a balance between time-to-market, product performance and quality, product and services value, and development costs (Policy Studies Institute, 2021).

Every aspect of a company plays a vital role in product development, including departments such as finance, purchasing, customer support, operations, sales, strategic planning, engineering, and R&D. All these functions work together to ensure that the innovation process is successful. Therefore, innovation is not just about creating new products; it is about a company's ability to integrate multiple functions seamlessly and create a product that meets the market's needs and demands.

Table 1.2.1: Innovative and Non-Innovative Companies Based on Business Sector

| Sector | Innovative | % | Non-Innovative | % |
|---|---|---|---|---|
| **Manufacturing** | **445** | **38** | **292** | **58** |
| Services | 733 | 62 | 212 | 42 |
| Total | 1178 | 100 | 504 | 100 |

Source: National Survey of Innovation 2021. *Ministry of Science Technology & Innovation [MOSTI] (2022).*



Table 1.2.1 provides valuable insights into the state of innovation activities in Malaysia. The table presents the response rate for these activities based on data gathered from 14 Malaysian states. The survey was conducted by MOSTI (2022) and included a total of 1178 innovative firms and 504 non-innovative companies.

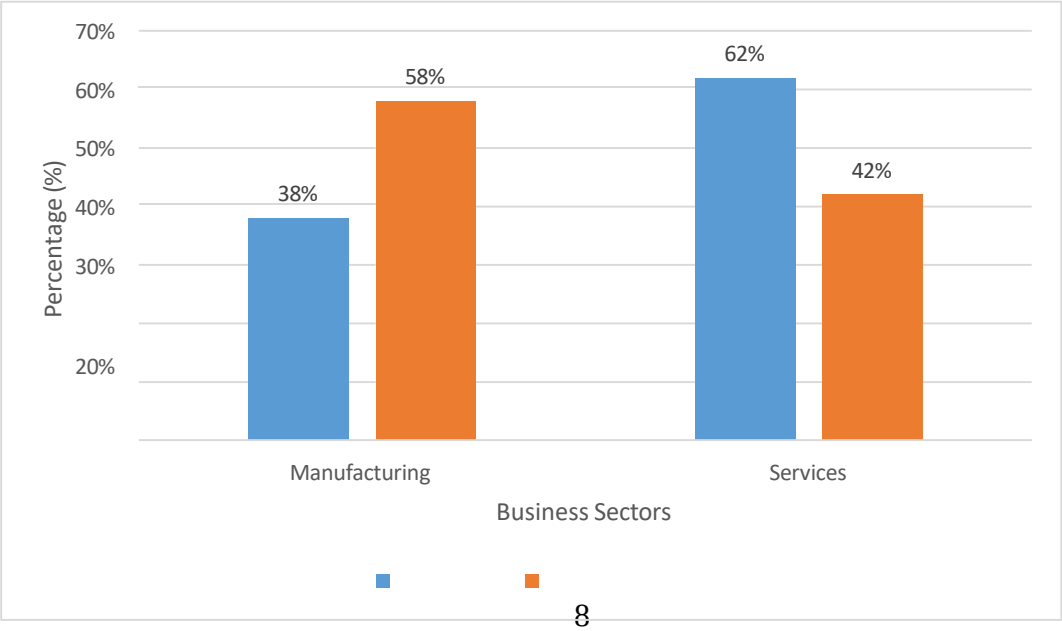
Malaysia is currently in the process of transitioning into a fully developed country by 2030. To this end, the country is taking various initiatives to enhance its national resilience and competitiveness despite the ever-changing domestic and global economic landscape. One of the primary goals of the country's Development Plan is to shift the economy towards higher-value activities, necessitating the establishment of more innovation-driven enterprises.

The Malaysia External Trade Development Corporation, also known as MATRADE, plays a crucial role in promoting Malaysia's exports and supporting local companies to explore new opportunities in the multinational market (MATRADE, 2021). One of MATRADE's key objectives is to showcase Malaysia's innovative capabilities to the world. By doing so, MATRADE aims to position Malaysia as a global hub for innovation and a leading player in the global economy.

Malaysia's ability to innovate and create products has been the focus of many initiatives. However, Malaysia's strong position in the overall electronic and electrical production, including office machines and radio broadcast receivers, is declining due to increased competition resulting from regionalization and globalization. Barba-Aragón, Jimenez-Jimenez, & Valle-Mestre's (2022) study suggests that the index for machinery, except electrical, is just slightly above 1 and exhibits a slight downward trend. Ishak & Thiruchelvam's (2023) study highlights two significant issues that SMEs in Malaysia's manufacturing industry face when it comes to innovation.



Figure 1.2.2: Innovative and Non-Innovative Companies Based on Business Sectors



Source: MOSTI, 2022. *National Survey of Innovation 2021*.

The graph labeled Figure 1.2.2 provides a visual representation of the percentage of respondents who consider themselves innovative or non-innovative based on their company's business sector. The data is drawn from a survey conducted in 14 different states of Malaysia, including Kelantan, Perak, Perlis, Melaka, Kedah, Negeri Sembilan, Terengganu, Pulau Pinang, Pahang, Sabah, Johor, Sarawak, Kuala Lumpur, and Selangor. The results are presented for both manufacturing and service companies.

The study identifies two significant challenges that companies face when attempting to foster innovation. The first challenge is internal resistance to innovation and organizational rigidities or traditionalism. This challenge can be attributed to the perception of the workforce and their reluctance to embrace change. The second challenge is global competition, which has allowed business resources to be more mobile and transferable across borders. This trend has negatively impacted local SMEs who have to compete against cheaper, more innovative, and creative foreign products or services, and also fight for scarce capital and resources.



The study highlights the importance of an innovative organization for a company's growth and value. Therefore, the objective of this research is to investigate the organizational factors that affect innovation in Malaysia's manufacturing firms.

Innovation, particularly cross-functional development, requires a thorough exchange of knowledge, an adaptive organizational design that is self-correcting and robust, and most

importantly, a company's ability to innovate faster. Therefore, this research focuses on four independent variables: organizational expertise, employee engagement, information management, and corporate culture. The dependent variable is innovation. The goal of the study is to assess the relationship between innovation and the four independent variables mentioned above.

## 1.3 Research Objectives

### 1.3.1 General Objectives

When it comes to conducting research on innovation, there are several objectives that researchers would generally consider. These objectives include identifying the market needs. To do so, the researchers should have a deep understanding of customer preferences, pain points, and unmet needs. They should also aim to determine emerging trends and changing market dynamics. Another objective is to generate innovative ideas. To achieve this objective, researchers must create a creative environment that fosters the exploration of various ideation techniques, such as brainstorming or design thinking.



Assessing feasibility is also a crucial objective in innovation research. In this regard, researchers would evaluate the technical, economic, and resource requirements of proposed innovations. Additionally, they would prioritize concepts based on criteria such as market potential, strategic fit, and competitive advantage. Furthermore, conducting market research is essential in validating concepts. Researchers can accomplish this through surveys, focus groups, and gathering feedback from potential customers and stakeholders.

Sustainability and ethical considerations are also crucial in innovation research. Researchers would assess the environmental and social impact of the innovation and ensure ethical practices throughout the product development process. Additionally, capturing lessons learned throughout the innovation process and sharing insights and knowledge within the organization for future projects is critical. Lastly, evaluating the long-term sustainability and evolution of the product and exploring opportunities for ongoing improvement and innovation is always essential.

However, the focus for this research is mainly on the factors that affect innovation. By considering these objectives, we can ensure that their research is comprehensive and that the findings are relevant and valuable to any organization.

### 1.3.2 Study Aim

The aim of this study is to investigate the various factors that influence innovation in the manufacturing industry.

### 1.3.3 Specific Objectives

In this research, we aim to explore the various factors that drive innovation. To achieve this objective, we have identified four specific goals that we will focus on. Firstly, we aim to investigate the impact of organizational expertise on innovation. Secondly, we intend to evaluate the effect of knowledge management on innovation. Thirdly, we will measure the influence of employee engagement on innovation. Finally, we will examine the impact of organizational culture on innovation. Through a detailed analysis of these factors, we hope to gain a better understanding of the drivers of innovation in this industry.

## 1.4 Research Questions

The following questions related to innovation for manufacturing industry:

1. What are the organizational factors that affect innovation in the manufacturing industry?

2. Does organizational expertise have an impact on innovation in the manufacturing industry?

3. How does knowledge management affect innovation in the manufacturing industry?

4. What is the effect of employee engagement on innovation in the manufacturing industry?

5. How does organizational culture impact innovation in the manufacturing industry?

## 1.5 Hypotheses of the Study

These hypotheses have been developed for this research study:

Hypothesis 1: Organizational factors are positively correlated with innovation.

Hypothesis 2: There is a positive correlation between organizational capabilities and innovations.

Hypothesis 3: Employee engagement is positively associated with innovation.

Hypothesis 4: Knowledge management is positively correlated with innovation.

Hypothesis 5: Organizational culture has a positive relationship with innovation.

## 1.6 Significance of the Study

The primary objective of this research is to explore the intricate relationship between organizational factors and innovation in the manufacturing industry. The manufacturing industry has always been a key contributor to overall Gross Domestic Product (GDP). This research aims to provide relevant researchers and laborers with the essential information, guidance, and evidence that they require to foster and shape the culture of companies that drive and cultivate internal innovation.



This research outcome will help develop employee skill sets required in this ever-demanding market and provide organizations with the necessary information to become more receptive and mindful of factors that encourage and motivate their employees to be innovative in product development. This will promote a shift from "the way things are" to "the way they could be". It requires embracing the unknown, facing multiple breakdowns and bumps on the road, and eventually allowing order and breakthroughs to emerge (Yang, Luu, & Qian, 2022 and Al-Khatib, Al-Fawaeer, Alajlouni & Rifai, 2022). The research conducted will offer enough support and structure to help employees handle

uncertainties and tap into their innovativeness and creativity.

To become a truly innovative enterprise, the DNA of innovativeness must be embedded in the underlying culture of the organization. This research will help organizations design cultural programs that foster innovation, encourage employees to think outside the box, and empower them to pursue an idea they are passionate about. Employee attitudes that instil innovation can be recognized, redefined, promoted, and rewarded accordingly (Arsawan, Koval, Rajiani, Rustiarini, Supartha, & Suryantini, 2022 and Ismail, 2023).

## 1.7 Chapter Layout

The research will have five chapters. The first will introduce innovation in manufacturing firms, providing background, problem statement, objectives, research questions, hypotheses and significance. The second will be a literature review summarizing factors affecting innovation, such as organizational capabilities, employee engagement, knowledge management, and organizational culture. It will also propose a theoretical or conceptual framework based on prior research objectives and questions. Chapter Three covers the research methodology, including data collection, variable measurement, and analysis methods. Chapter Four presents the research results. Chapter Five summarizes analyzed statistics, major findings, implications, limitations, and suggestions for future research.

## 1.8 Conclusion

The first chapter of this study provides a detailed overview of the current state of the manufacturing industry, with a specific focus on how innovation is shaping its future. The problem statement emphasizes the industry's challenges in keeping up with technological

advancements driven by innovation and highlights the interconnected factors that influence it. The research aims to fulfil one broad objective, supported by four specific objectives that provide a detailed view of the proposed general objective. The research questions are well-structured and enable a deeper understanding of the arguments and inquiries that will be explored in this study.

The stated hypotheses were developed after reviewing relevant literature and are based on the proposed theoretical or conceptual framework, along with the reviewed journal articles. The study's significance lies in its ability to help organizations in the manufacturing industry achieve innovation and gain a competitive advantage in the future. This chapter serves as a foundation for further research, and the following chapter will summarize relevant journal articles.

# CHAPTER 2: LITERATURE REVIEW

## 2.0 Introduction

Chapter 2 considers the topic of culture and its impact on innovation, analyzing the influence of various independent variables on the dependent variable. Drawing upon relevant theories and models from literature, the chapter provides a comprehensive review of literature. The section on the dependent variable, i.e., innovation, begins with a definition and explores the various theories associated with it. The definition of innovation covers new goods, methods of production, markets, and sources of support. The chapter then moves on to present the theoretical framework and the development of hypotheses. Finally, the last part of Chapter 2 provides a summary of the findings, bringing together the various threads of the analysis.



## 2.1 Review of Literature

### 2.1.1 Dependent Variable: Innovation

*Definition and Theories*

Innovation is a fundamental concept that lies at the heart of any thriving business. It involves the development and implementation of new ideas, products, and processes that can help a company stay ahead of the competition and meet the ever-evolving needs of its customers. As per Schumpeter (1934), innovation can take a variety of forms, including the introduction of a new product, a new method of production, a new market, a new source of supply, or a new organizational structure. On the other hand, Drucker

(1987) emphasizes that innovation is a continuous process of acquiring new and advanced competencies or improving the effectiveness of existing ones. Therefore, innovation is not just about creating something new but also about improving and refining the existing products, processes, and services (Zeb, Akbar, Hussain, Safi, Rabnawaz & Zeb, 2021 and Ismail, 2023).

*Type of innovation*

In his 1934 work, Schumpeter outlined the various dimensions of innovation, including product, process, organization and marketing. Building on this framework, Abernathy & Utterback in 1978 introduced two additional types of innovation - radical and incremental. Daft (1978) went even further by distinguishing between technical and administrative innovation, highlighting the diverse ways in which organizations can innovate. Overall, these contributions have helped to deepen our understanding of the multifaceted nature of innovation.



*Accessing innovation in management*

Innovation plays a crucial role in the growth and success of organizations. Technical and administrative innovation are two critical elements that organizations must consider enhancing their innovation capabilities. Hermann, Gassmann, & Eisert (2007) and Luna-Arocas (2023), have emphasized the importance of evaluating innovation at both the micro (company) and macro (industry) levels. This approach enables organizations to identify opportunities for growth, distinguish themselves in the market, and improve their long-term success prospects.

Burgelman (1986), Chesbrough (2000), and Zia, Zhang, & Alam (2023) have suggested that companies should adopt a forward-thinking approach to innovation. This means that companies should focus on innovative strategies that anticipate future market trends and customer needs. Such an approach enables organizations to remain competitive in the long run. Overall, these contributions have enhanced our understanding of the multifaceted nature of innovation in management.

*Consequences*

Based on previous research, it is evident that innovation has received a considerable amount of attention, and information related to it can be easily obtained. However, there has been little effort in elaborating on the determinants that impact innovation. Therefore, this research paper aims to address this gap by selecting innovation as our dependent variable and delving further into its determinants.



## Organisational Factors:

### 2.1.2 1st Independent Variable: Organisational Expertise

*Definitions and theories*

In his 1994 work, Day defines capabilities as intricate collections of skills and knowledge that an organization can utilize through its operational processes to effectively coordinate its activities and make the best use of its resources. This suggests that organizational capabilities create a distinct competitive advantage for companies by enabling them to

achieve superior performance and respond effectively to changes in the market.

*Dimension of organizational capabilities*

Organizational capabilities are critical for a company to succeed in an increasingly challenging business landscape. In a study conducted by Akgün, Keskin, Byrne, & Aren, (2007) and Wang, Huang, & Shrestha, (2023), it was suggested that an employee's learning capability plays a crucial role in developing innovation. The study highlighted the importance of organizational expertise in nurturing the innovativeness of its employees.

In another study, Hermann et al. (2007) divided organizational expertise into two distinct parts - the transformation of competencies and the transformation of the market. This study emphasized the importance of developing competencies and adapting to changes in the market to achieve organizational success.



However, Al Nuaimi et.al., (2023) argued that organizational expertise is not limited to these two dimensions. They proposed four additional capabilities - experimentation, integration, autonomy, and openness. These capabilities were seen as important for organizations to foster innovation and stay competitive.

Thus, organizational expertise is the core competency that enables companies to gather innovative ideas from their employees. It is important for companies to recognize the significance of developing these capabilities to achieve and maintain success in a rapidly evolving business environment.

*Contribution of organizational capabilities*

Hamel and Prahalad (1990) asserted that a company's core competencies are the driving force behind its ability to create new and innovations for the market. They emphasized the importance of these competencies in establishing a sustainable competitive advantage. On the other hand, Srivastava & Gnyawali (2011) and Al Nuaimi et.al., (2023) added that an open firm, which promotes knowledge sharing and collaboration, can leverage more sources of innovation. By encouraging employees to share ideas, knowledge and experiences, firms can improve their ability to innovate.

Furthermore, Kanter, North, Richardson, Inglos, and Zolner (1991) and Taghizadeh et.al., (2021) recommended that companies should provide better integration and autonomy capabilities to managers. It is essential to ensure that innovative ideas generated by the research and development department can be smoothly transferred to other business units. Integration expertise ensures that the process of transferring innovative ideas is seamless, while autonomy capability allows managers to make decisions and implement changes independently. By providing managers with these capabilities, a company can improve its innovation capacity and maintain a competitive edge in the market.

### 2.1.3 2nd Independent Variable: Knowledge Management

*Definition and Theories*

In today's business world, knowledge management is an essential aspect of organizational operations. It involves a range of strategies and techniques to create, distribute, identify, and facilitate the adoption of perceptions and practices that are vital to the success of a company (Vatuiu, 2010; Truong, Nguyen, Vrontis, & Ahmed, 2023).

The importance of knowledge in daily organizational operations cannot be overstated. Knowledge is a critical resource that enables organizations to implement effective strategies to solve problems, stay ahead of their competitors, and achieve their goals (Nazem, 2011). Camila and Luiz (2013) highlighted that human capital and tacit knowledge are the primary drivers of competitive advantage for organizations. Tacit knowledge is a type of knowledge that individuals possess, but they cannot articulate it in words other than through their own performance. In other words, tacit knowledge is a subjective insight that is difficult to share and explain, but it is an asset to organizations (Polanyi, 2002 and Zia, Zhang & Alam, 2023).



The term "knowledge management" was first introduced in the early 1970s and has since become an integral part of organizational practices. It is a practice that enhances the effectiveness of an organization and encourages employees to share their knowledge to solve problems (Nazem, 2011). Through knowledge management, organizations can achieve strategic objectives related to performance, improve procedures and methods, and leverage all available sources and types of knowledge within the organization to develop specific skills that can be used to create new products and processes (Nonaka & Takeuchi, 1997 and Al-Husseini, 2023).

*Factors of Knowledge Management*

Knowledge management plays a significant role in an organization's intellectual capital (Kamran & Sabir 2012 and Truong 2023). By fostering innovation and the development of new products to enhance profits, knowledge management can guide organizations towards competitive advancement. Knowledgeable employees contribute to organizational effectiveness, which can help increase an organization's profit and effectiveness. To achieve this, companies need to adapt to the environment, stay current with the latest technology, and be aware of current trends.

Knowledge management is particularly important when it comes to organizational adaptation, survival, and competence during rapid changes in the environment (Malhotra, 1964). By adopting and implementing different types of innovations, organizations can enhance their ability to efficiently achieve goals and increase organizational learning (Nonaka & Takeuchi, 1997 and Al-Husseini, 2023).



Moreover, modern technology provides opportunities for organizations to enhance their competitive positions by focusing on customer needs. By acquiring and fully utilizing knowledge in job tasks and responsibilities, companies can achieve greater innovative performance through sharing technological knowledge. Knowledge allocation strategies can help companies outline the established environment in favor of their specific technological and scientific design (Jennifer, 2003; AlMulhim, 2023).

Knowledge management involves creating new knowledge and using it within the organization when necessary (Kor & Maden, 2013). Managing the creation of new knowledge allows companies to respond quickly to customers, yield novel markets,

rapidly manufacture and produce new products, and achieve dominance (Nonaka & Takeuchi, 1997; AlMulhim, 2023 and Al-Husseini, 2023).

*Integrating Knowledge Management*

The results of the research suggest that knowledge management can provide an effective way for organizations to organize, govern, and allocate knowledge in a specific direction. This can lead to improved performance and efficiency. The use of knowledge is a crucial tool for enhancing productivity and effectiveness. Innovation and development are essential components for the continuous growth and success of an organization. Knowledge management plays a pivotal role in promoting innovation and improving organizational effectiveness. Furthermore, it provides direction to supervisors and managers in making informed decisions (Nonaka & Takeuchi, 1997; AlMulhim, 2023 and Al-Husseini, 2023)..



### 2.1.4 3rd Independent Variable: Employee Engagement

*Definition and Theories*

The concept of employee engagement, as described by Eisenberger and his colleagues in 1986, refers to employees' perception of how much their organization values their contributions and welfare. The level of employee engagement plays a crucial role in shaping the social relationship between employees and their managers. When employees feel that their organization values them, they are more likely to trust in the organization's actions and decisions.

Furthermore, Eisenberger, Huntington, Hutchinson, and Sowa's research in 1986 suggests that employee engagement leads to increased job dedication and proactive behavior from

employees, who are more likely to generate creative ideas during meetings. In other words, when employees feel that their organization cares about them, they are more likely to be motivated to contribute to the organization's goals (To & Yu, 2023).

Rhoades and Eisenberger (2002) further elaborate on the concept of employee engagement as a tool for organizations to ensure that their employees have access to the support they need to excel in their jobs and cope with challenging situations. By providing a supportive environment, organizations can create a culture of trust and loyalty among their employees, leading to better job performance and overall organizational success (Wang, Qin & Liu, 2023).

In the manufacturing industry, it is important to have a strong support system, particularly in terms of perceived supervisory support. Employees' views of their supervisors and their abilities have a significant impact on their employee engagement. According to Du Plessis (2010), PSS refers to the universal perceptions that employees have of their supervisors and their accomplishments. Supervisors play a crucial role in the organization by acting as representatives and providing sufficient support or guidance to employees to accomplish their tasks (Eisenberger et al., 2002). Employees rely on their supervisors for support, making them an essential part of the organization. Supervisors also have the responsibility of managing employee emotions positively and maintaining commitment to the organization (Dawley, Andrews & Bucklew, 2007; Wang et.al., 2023). Research has shown that workers who perceive supportive and engaging treatment and guidance from their immediate supervisors are more likely to be committed to the organization (Hutchison, 1997 and To & Yu, 2023). In addition, top management teams play a critical role in the search process, and their commitment is the most important factor for

successful new product development (NPD) (Rodriguez, 2008; To & Yu, 2023 and Wang et.al., 2023).

*Factors of employee engagement*

In the field of new product development, researchers have explored the significance of management control structures and participation. Studies have shown that these factors play a crucial role in constructing and creating knowledge while also reducing uncertainty (Richtner & Ahlstrom, 2010 and Wang et.al., 2023).

While the role of top management in motivating innovation is not direct, their participation in the NPD process helps inspire cross-functional teams. As a result, team members develop more intense passion and commitment to their roles, leading to enhanced productivity and positive outcomes.



Effective teams are those that are better equipped to acquire new knowledge and information. According to Katila, Chen, and Piezunka, organizational support theory suggests that supervisors' actions serve as a reference point for an organization's commitment to its employees. Administrators, as the closest secretarial relation to the employees, are able to communicate the organization's goals to their subordinates (Andrews & Henry, 1963 and To & Yu, 2023).

Employees form overall impressions of their organization based on the resources provided, the way they are valued as individuals, and the rewards for their performance. Rhoades and Eisenberger (2002) suggest that the positive impression employees have of their organization's support leads to more positive job attitudes, including job satisfaction,

which promotes employee motivation to work harder to achieve organizational goals and innovate in different areas.

In conclusion, identifying new information and data is a crucial input to new product development. The exploration of new knowledge and responsiveness to it leads to the development of new behaviors, interactions, strategies, and processes that are useful in NPD. The development of a positive impression regarding the support employees receive from their organization leads to better outcomes for both the employees and the organization (Eisenberger et al., 2002 and Zia et.al., 2023).

*Consequences of employee engagement*

Blau's (1964) norm of reciprocity suggests that employees feel the need to reciprocate the support they receive from their organization by performing well and caring about their organization. However, when employees feel unsupported, they may choose to withhold effort, leading to lower performance levels and negative job attitudes (Zia et.al., 2023). Research conducted by Rhoades and Eisenberger (2002) indicates a significant positive relationship between employee engagement perceived (EE) and job satisfaction and a positive correlation between job performance and EE.



While there is substantial research on innovation, the determinants that influence it have not been fully explored. This research paper aims to address this limitation by selecting innovation as the dependent variable and exploring its determinants further. By doing so, we hope to better understand the factors that drive innovation and its impact on organizational outcomes.

### 2.1.5 4th Independent Variable: Organisational Culture

*Definitions and Theories*

Organisational culture refers to the shared values, beliefs, and assumptions that guide the behavior of members within an organisation. It is a product of the collective experiences and interactions of the organisation's members. While there is no single agreed-upon definition of organisational culture, authors have attempted to describe it in different ways. Gonzalez (1987) characterises organisational culture as a set of symbols and meanings that help shape the organisation's ideas, decisions, and actions. Other researchers suggest that organisational culture can develop through shared experiences or may emerge from other sources. Schien's (1990) model provides a framework for understanding organisational culture by breaking it down into three levels: the visible and tangible artefacts of culture, such as stories, rituals, and heroes; the values and beliefs that are shared by members of the organisation; and the deeply embedded assumptions and beliefs that guide behaviour and shape the culture over time (Awaah, 2023 and Gregory, 2023).



*Factors of Organisational Culture*

In today's highly developed and rapidly changing world, innovation is a crucial factor in determining an organization's ability to compete in the market. The importance of organizational culture in fostering innovation is the focus of this study. With the market's ever-changing dynamics, products must adapt to the latest technological advancements to cater to customer needs (Skerlavaj, Song, & Lee, 2010 and Awaah, 2023). In Malaysia, in particular, organizational culture plays a vital role in driving innovation within the workforce. (Samad, 2012).

To succeed in the market, organizations must produce products and services that meet customer needs, leading to increased sales and customer loyalty. However, if a product or service is not well-received, it can result in decreased sales and a significant impact on the company's profits (Utterback & Suarez, 1993 and Gregory, 2023).

Innovation requires extensive creative ideas to generate new developments, and a culture that fosters creativity is vital (Ng, Singh, & Jayasingam, 2012 and Awaah, 2023). This culture includes specific behaviors, norms, and values that each individual employee brings to the table. The implementation of creative ideas is just as important as generating them, and a culture that encourages employee involvement and adaptability can cultivate creative ideas for future implementation.



Research has shown that adequate resources and opportunities, risk tolerance, communication, transfer of knowledge, trust, and strong teamwork are essential elements that support innovation (Dennison, 1996; Gregory, 2023). It is crucial for every individual to receive adequate support for their needs in an organization. Organizational culture not only focuses on core values for better performance and job satisfaction but also motivates employees to perform better when their needs are met (Luvić et.al., 2014; Kucharska & Bedford, 2023 and Dunger, 2023),

In summary, organizational culture plays a vital role in driving innovation within an organization. The creation of a culture that fosters creativity, encourages employee involvement, and provides adequate support for employees' needs can lead to successful innovation, increased sales, and customer loyalty.

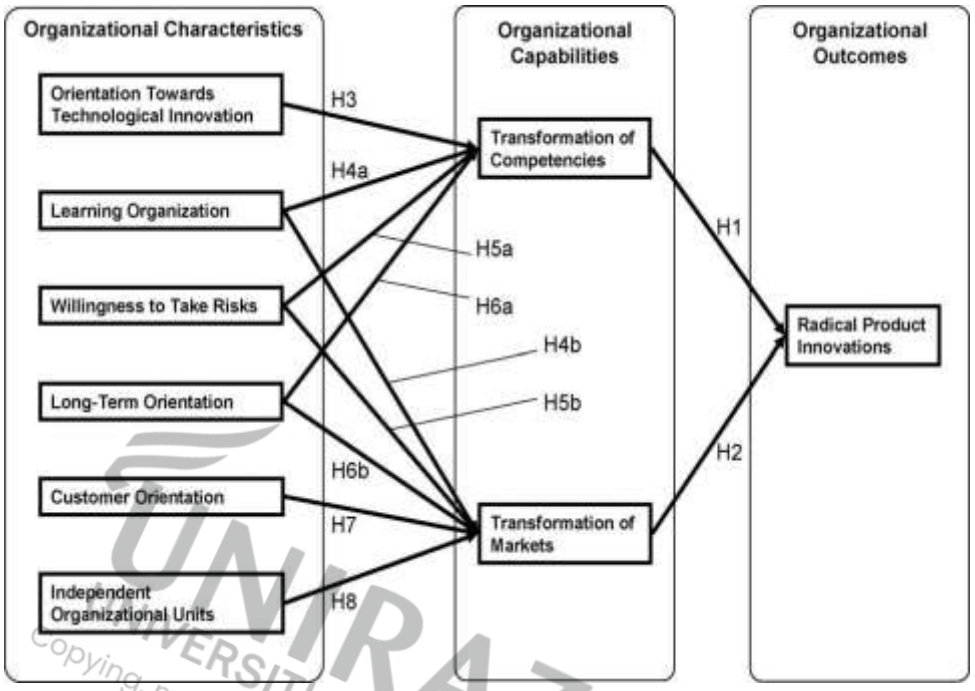
*Consequences of Organisational Culture*

Through this study, we aim to look deeper into the intricacies of the relationship between the dependent variable and its impact. The primary objective is to ascertain whether organizational culture is perceived as a participative factor or exclusively driven by business goals (Dunger, 2023). In the past, Dennison (1984) conducted a research study to identify the specific elements of organizational culture that have the greatest impact on organizational performance. This research focuses on analyzing the cultural aspect within an organization that influences employee creativity, which ultimately leads to the company's innovation. The question remains whether an organization's strong culture can persist despite a rigid, autonomous structure or an individualistic culture stance within the company. Specifically, we are investigating the impact of a strong culture on innovation in the manufacturing industry.

## 2.2 Review of Relevant Theoretical Models

### 2.2.1 Model1: Organisational Expertise and Innovation

Figure 2.2.1.1: Conceptual Model of Hermann, Gassmann, and Eisert (2007)




Source: Herrmann, Gassmann, & Eisert, (2007).



The year 2007 marked the development of a model by Herrmann et al. The purpose of this model was to analyze the connection between organisational expertise and radical innovation. The model identified organisational expertise as an independent variable that could be influenced by various antecedents. Additionally, the model highlighted the transformation of competencies and transformation of the market as the two fundamental components of organisational capabilities that could impact radical innovation.

However, in 2012, Chang et al. criticized Herrmann et al.'s model for being incomplete. They claimed that the model failed to consider several critical organisational capabilities that can impact the performance of radical innovation. Chang et al. proposed that

openness expertise, integration expertise, autonomy expertise, and experimentation expertise should also be considered as independent variables in the model.

Moreover, Ferreira, Fernandes, Alves & Raposo in 2015; Kucharska & Bedford in 2023, and Dunger in 2023 suggested that strategy, process, organization, learning, and networking are several other independent variables that can significantly impact innovation activities. Therefore, exploring the relationship between organisational expertise and innovation requires consideration of these variables.

### 2.2.2 Model 2: Information Management and Innovation



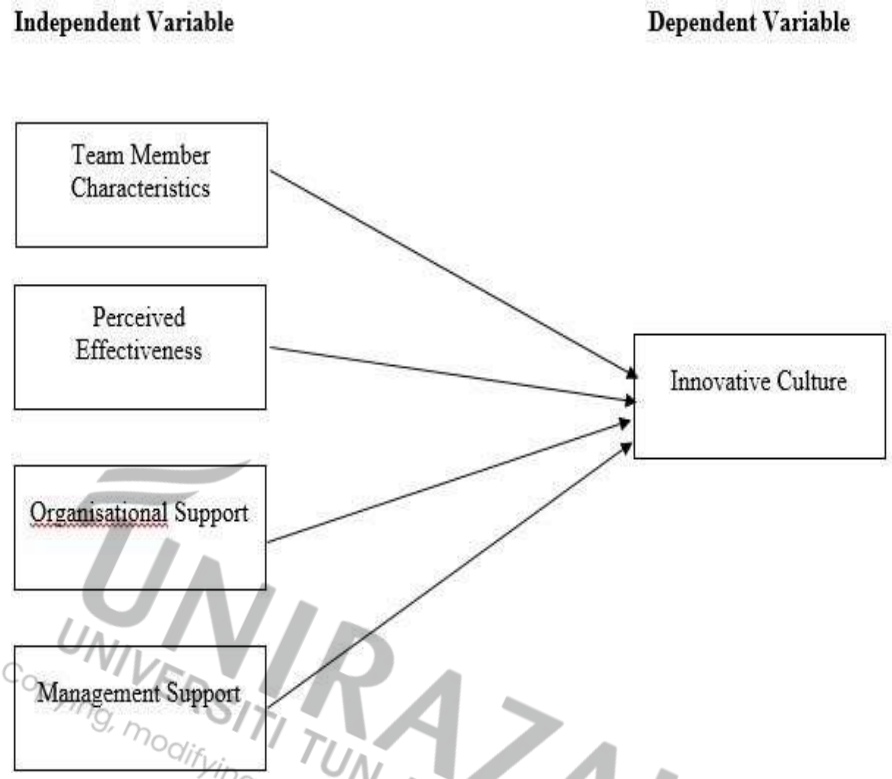
Kor and Maden (2013) conducted a comprehensive study to explore the dynamics of knowledge management. The study established a theoretical framework that identified three key variables in knowledge management, namely acquisition, sharing, and application. The researchers found that these variables are interrelated and have a significant impact on innovation.

The study revealed that acquiring and sharing knowledge is critical to fostering innovation in an organization. When an organization effectively applies or acquires knowledge, it leads to organizational learning, which in turn enhances openness to innovation. The researchers also found that effective management of knowledge can help elevate the standard of knowledge within an organization. This, in turn, creates a framework to support innovation in product development and increases the innovativeness of the organization as a whole.

Overall, the study emphasizes the importance of knowledge management in fostering innovation in organizations. It provides valuable insights into the interrelationships between knowledge acquisition, sharing, and application and their impact on organizational learning and innovation (Rashwan, & Ghaly, 2022 and Dunger, 2023).

### 2.2.3 Model 3: Employee Engagement and Innovation

Figure 2.2.3.1: Conceptual Model by Cramm, Strating, Bal, & Nieboer, (2013)




Source: Adapted from Cramm, Strating, Bal, & Nieboer (2013).

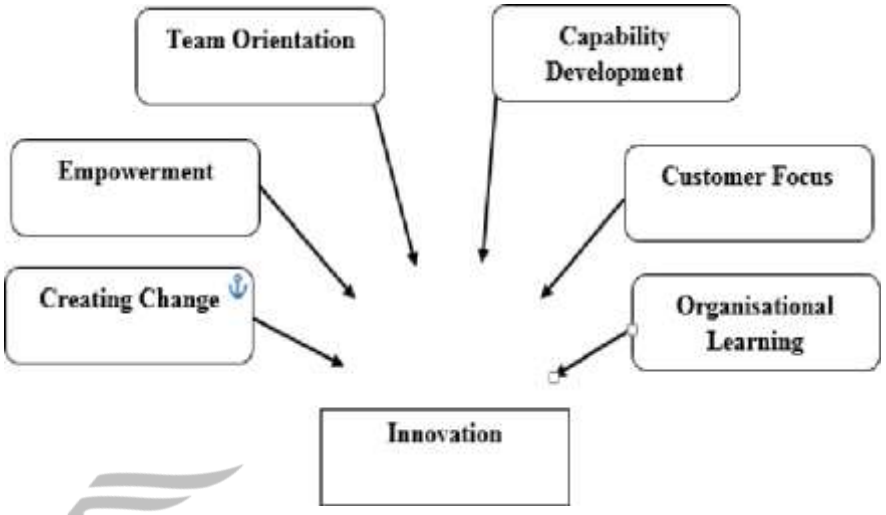
In their study, Senge and Scharmer (2001) assert that fostering a culture of innovation involves motivating and implementing quality improvement and innovation methods (Strating, Broer & Bal, 2011). Furthermore, it has been found that management support and employee engagement are crucial factors in developing an organization's innovative culture (Kaplan, Brady, Dritz, Hooper, Linam, Froehle & Margoli, 2010; Wang et.al., 2023 and Dunger, 2023). Amanile, Schatzel, & Moneta, (2004) and Rashwan & Ghaly, (2022) suggest that organizations can enhance their employees' freedom to be creative by offering sufficient support, such as training, organizational learning, and resources, which can motivate employees to contribute to an innovative culture.

In addition, support involves setting specific goals and creating an environment that encourages innovation, such as allowing teams to experiment with new approaches, promoting innovative solutions to problems, and offering opportunities and time to develop new ideas (Amabile, 2004 and Awaah, 2023). It has also been observed that management support and employees' recognition of new working approaches as effective can facilitate the benefits of an innovative culture.

Furthermore, Shortell, Marstellar, and Lin (2004) and Kucharska & Bedford, (2023) suggest that an organization's perceived effectiveness is a crucial factor in promoting changes and improvements in quality, which ultimately leads to a superior culture of innovation.

### 2.2.4 Model 4: Organisational Culture and Innovation

Figure 2.2.4.1: Conceptual Model of: Ng et al. (2012)




Source: Ng et al. (2012).



The study's conceptual model is represented in Figure 2.2.4.1, illustrating six dimensions that are presented as predictors of innovation. These dimensions include creating change, customer focus, expertise development, team orientation, empowerment, and organizational learning.

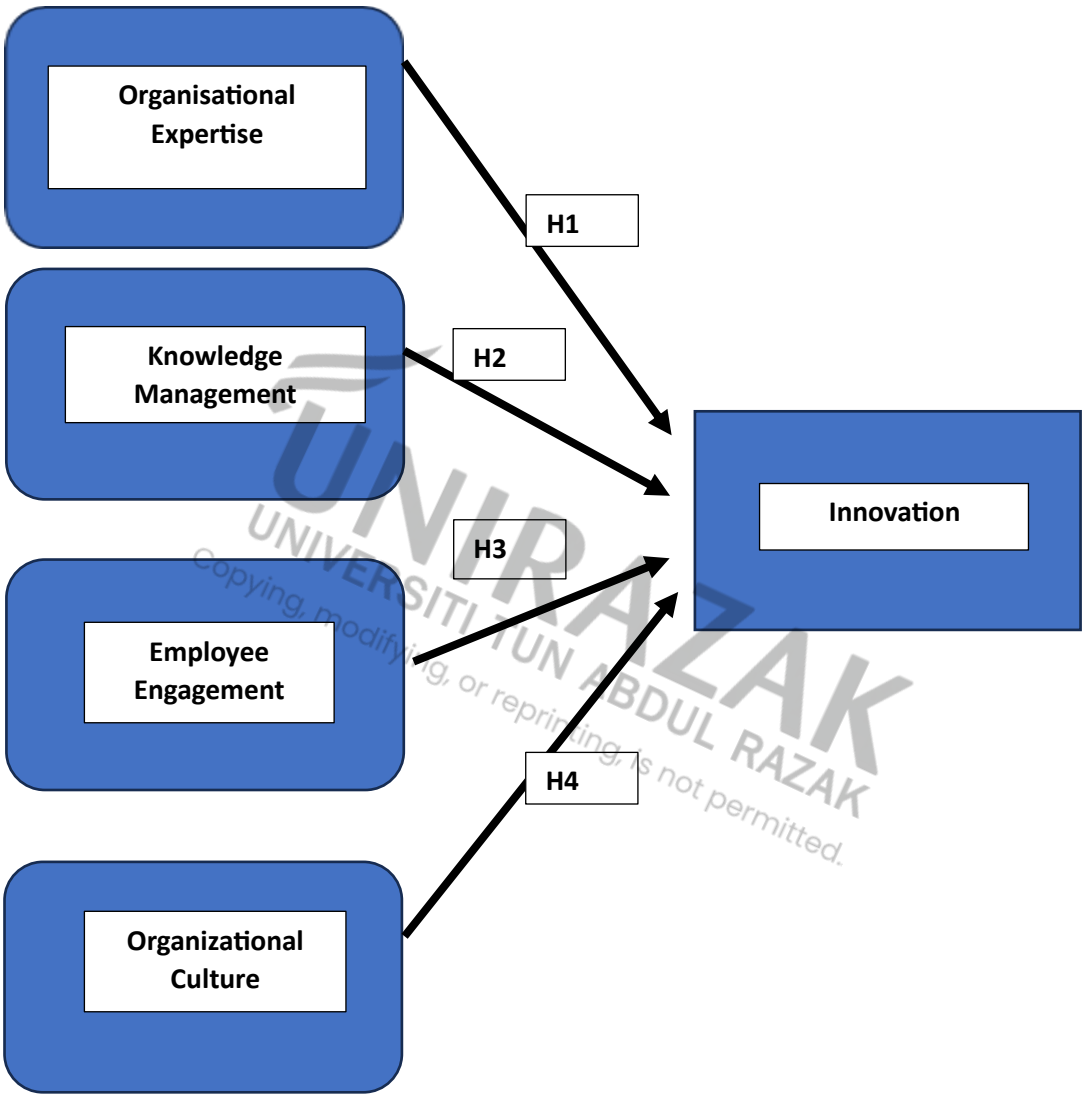
To measure these dimensions, Ng et al. (2012) developed a conceptual framework that is based on cultural variables to depict their impact on innovation. By asking related questions that are answered based on these six cultural dimensions, researchers can measure their effect through questionnaires given to respondents, generating significant results for their research.

In high-tech companies, innovation is a key priority, which is why understanding the impact of organizational culture is crucial. Successful implementation of creative ideas

can greatly improve a company's performance. This can lead to new ideas being used to develop new innovations, which can help the company stay ahead in the market (Al-Husseini, 2023)

## 2.3 Proposed Theoretical Framework

Figure 2.3.1: Proposed Theoretical Framework




Source: Figure 2.3.1 developed based on the research objectives and research questions.

The diagram presented above depicts the proposed theoretical framework that serves as the foundation for this research. The framework focuses on examining the positive effects of four independent variables, namely organizational expertise, knowledge management, employee engagement, and organizational culture, on the dependent variable of innovation.

A theoretical framework is a visual representation that explains how different concepts are related to each other (Sekaran & Bougie, 2010). It is frequently used to structure literature discussion and provide a better understanding of the theorized relationship (Sekaran & Bougie, 2010). This research examines the impact of organizational expertise, knowledge management, employee engagement, and organizational culture on innovation.



Previous theoretical models have shown that organizational expertise, knowledge management, employee engagement, and organizational culture have a significant impact on innovation (Dunger, 2023; Arsawan, 2022 and AlMulhim, 2023). Therefore, we have developed a theoretical framework to investigate these factors among innovative manufacturing firms in Malaysia. This framework visually illustrates the relationship between the independent variables and the dependent variable, which we will explore in this research.

There appears to be a scarcity of research on innovation in Malaysia, which makes this topic captivating and significant for further study.

## 2.4 Hypothesis Development

### 2.4.1 Organisational Factors and Innovation

The purpose of Hypothesis 1 is to determine if there are any connections between organizational factors such as organizational culture, employee engagement, knowledge management, and organizational capabilities, and their impact on innovation. If there is more than one independent variable that affects innovation, the hypothesis will be tested using the following formulation:

H1: Organizational factors are positively correlated with innovation.



### 2.4.2 Organisational Expertise and Innovation

The research conducted by Hermann et al. in 2007 suggests that there is a significant statistical link between a company's organizational expertise and its ability to innovate. Additionally, Chang et al. conducted a study in 2012 that involved 112 effective respondents from manufacturing firms and found a positive correlation between four components of organizational expertise (openness, integration, autonomy, and experimentation) and innovation performance. Drawing on these findings, we aim to test the hypothesis that there is indeed a relationship between a company's organizational expertise and its innovation. By building on the work of these past researchers, we hope to examine this relationship in greater detail and gain a deeper understanding of its significance.

H2: There is a positive correlation between organizational capabilities and the creation of innovation.

### 2.4.3 Knowledge Management and Innovation

According to a study conducted by Kamran and Sabir in 2012, knowledge plays a crucial role in improving the performance and effectiveness of an organization. Knowledge can be used to generate new ideas and upgrade products, and innovation is one of the outputs of knowledge management. By adopting acquired knowledge in products and services, organizations can achieve higher levels of innovation when there is a free flow of information within the company.

Nonaka and Takeuchi (1997) and Al-Husseini (2023) both stated that a successful organization is one that can create new knowledge, which leads to innovation of products and business. Companies that share knowledge have a better chance of achieving advanced innovative performance compared to those that don't. Additionally, Kor & Maden (2013) and Al-Husseini (2023) concluded that knowledge management has a significant impact on innovation.

H3: Knowledge management is positively correlated with innovation.

### 2.4.4 Employee Engagement and Innovation

In Hypothesis 4, Cameron and Quinn (1999) describe collaboration in an organization as a social interaction between employees working together towards a common objective and goal, which results in collective gains. For this to be successful, organizational support is crucial to enhance communication between employees and their organizational commitments. Additionally, creating a mutual trust among employees is vital for sharing knowledge and improving overall organizational performance (Schepers & Van den Berg, 2007 and AlMulhim, 2023).

Kull, Narasimhan, and Schroeder (2012) conducted a study that emphasizes the importance of shared organizational standards and beliefs in making teamwork more effective and developing organizational competences. This leads to organizational growth and expertise to develop new products. Collaborative cultures are essential for organizational support, which plays a significant role in creating a comfortable working environment (Awaah, 2003).

H4: employee engagement is positively associated with innovation.

### 2.4.5 Organisational Culture and Innovation

Ng et al. (2012) studied a few dimensions to measure an organization's culture towards innovation- empowerment, team orientation, expertise development, creating change, customer focus, and organizational learning. Based on the six dimensions, only two dimensions were not significant in Cronbach Alpha value: empowerment and expertise development.

Lukić et al. (2014), Kucharska & Bedford (2023) and Dunger (2023) also found that a strong culture can positively influence employees. When employees receive enough support towards team coordination and their personal needs, they will feel more motivated and positive, which often leads to creativity. Additionally, Denison and Mishra (1995) conducted research that focuses on integrating four culture traits into testing organizational effectiveness: adaptability, mission, involvement, and consistency. These traits are linked to an employee's creativity, which leads to innovation. Therefore, based on this information, the proposed hypothesis is that organizational culture has a significant impact on employee creativity and innovation.

H5: Organizational culture has a positive relationship with innovation.

## 2.5 Conclusion

This chapter provides an in-depth analysis of the independent variables and dependent variable by reviewing existing literature and exploring the relevant theoretical model. This analysis helps us gain a deeper understanding of the concept of innovation, leading to the development of a comprehensive conceptual framework. Additionally, we have formulated hypotheses based on previous research to better understand the relationship between each determinant factor and the dependent variable. The findings from this chapter will guide us in examining the relationships between the variables in this study context using research methodology in the following chapter.

# CHAPTER 3: RESEARCH METHODOLOGY

## 3.0 Introduction

Chapter 2 of the literature review has concluded that there is a positive correlation between innovation and variables such as organisational expertise, employee engagement, knowledge management, and organisational culture. Chapter 3 will cover the research methodology, including research design, data collection methods, sampling design, research instrument and constructs measurement, data processing, and analysis of the collected data. Each of these components will be discussed in detail in the following chapter.



## 3.1 Research Design

Research design is a crucial aspect of any research project, as it provides a logical and systematic approach for planning and directing the research towards achieving the desired objectives. As defined by Zikmund, Babin, and Carr (2009), it encompasses the overall plan of how the researcher intends to implement their projects in practice. The research design outlines the specific sequence of conditions for collecting and analyzing data in a way that is relevant to the research purpose and aligns with the research questions (Hafeezrm, 2011).

Yin (1989) emphasises that research design is a logical problem, not a logistical one, and its primary goal is to ensure that the collected data allows for accurate answering of research questions and examination of theories. Draper (2004) adds that research methods

determine the how, when, where, and feasible way that the researchers hope to collect and analyses the evidence. In general, research methods can be categorized into two ways: quantitative and qualitative. Quantitative research involves an organized, practical investigation of observable phenomena using statistical, mathematical, or computational approaches, while qualitative research is an investigative approach used in various academic disciplines, including social sciences and market research (Denzin et al., 2005). Draper (2004) further defines qualitative research as consisting of semi-structured or unstructured interviews, observation of candidates, historical analysis, and content analysis. Research design is concerned with practical adjustments for obtaining data from external sources, as Sekaran et al. (2010) argue. In this research, a survey was conducted by distributing questionnaires and emailing them to the targeted population in Malaysia.

This research is quantitative in nature, as it involves a predetermined number of respondents. Empirical assessment of research objectives is achieved by using numerical calculation and analysis. Mathematical and statistical methods are used to examine the relationships between all research hypotheses, and questionnaires were measured using numeric rating scales, which are categorised under quantitative research. The information collected is extracted from the administration of questionnaires and follow-up collections.

This study is causal research because it seeks to identify how independent variables such as organisational culture, organisational expertise, knowledge management, and employee engagement affect the innovation of manufacturing firms. Overall, research design is a crucial aspect of any research project, as it provides a roadmap for collecting and analysing data in a way that is relevant, rigorous, and aligned with the research objectives.

## 3.2 Data Collection Methods

Data collection plays a crucial role in a research project as it determines the cost and success of the project, as stated by Wilcox, Gallagher, Boden-Albala & Bakken (2012). The method used to interpret data is dependent on the data collection method employed in the research. Primary data and secondary data are the two categories of data collection methods, as classified by Kothari (2004). Primary data is collected directly from the source, while secondary data is obtained from sources like publications, reports, and databases. It is imperative to choose an appropriate data collection method based on the research objectives to ensure the validity and reliability of the research findings (Nii et.al., 2023).



### 3.2.1 Primary data

In the field of research, primary sources are of vital importance as they provide first-hand accounts of events or phenomena. According to the research conducted by Storey & Kelleher (1999), primary sources are derived from the time period that researchers are studying. These sources offer explicit information about a subject under investigation, and they are created by documenting the experiences of witnesses or recorders.

Kothari (2004) defines primary sources as information that is collected in the first place, without any processing involved. This type of data is widely used by many researchers as it helps to address the problem at hand. Data can be obtained through various means, such as observation, interviews with respondents or distribution of questionnaires. However, among these methods, questionnaires are commonly used as they are simpler, more efficient and more cost-effective (Nii et al., 2023). The use of questionnaires allows

researchers to analyse information or data productively and efficiently due to its traceability.

Table 3.2.1.1: Frequency of Respondents Based on Data Collection Methods

| Methods | N | % |
|---|---|---|
| Distribution of Questionnaire | 450 | 100 |
| Total | 450 | 100 |

Source: The total distributed questionnaires.



### 3.2.2 Secondary Data

In the field of research, secondary data is an invaluable resource for gathering information. This type of data refers to any information that has been previously collected by someone else rather than the researcher themselves. It is readily available and accessible from a variety of sources, including books, newspapers, journals, magazines, and online databases such as ProQuest, ScienceDirect, EBSCOhost, and Oxford Journals.

Acquiring secondary data is often quicker and less costly than collecting primary data first-hand. Researchers can obtain it through journals, directories, articles, and periodicals. In addition, with the advent of digital technology, secondary data can now be accessed and stored electronically, streamlining the process of data collection and analysis (Given et al., 2023).

## 3.3 Sampling Design

### 3.3.1 Target Population

The target population refers to a particular group of individuals that researchers are interested in studying and collecting data from (Hair & Bush, 2006). In the context of this research, the target population will be employees who work in a manufacturing firm. To determine the appropriate sample size, the researchers used the simplified decision model developed by Krejcie and Morgan (1970) and distributed 450 questionnaires to ensure the collection of reliable data (Sekaran et al., 2010).

The Department of Statistics Malaysia (DOSM) conducted a comprehensive study that encompassed all registered companies in the manufacturing and services sectors, as recorded in the 2021 Economic Census. The total number of registered companies was found to be 631,552 ("National Survey Innovation," 2022). The sampling frame is composed of three distinct categories, which will aid in ensuring the accuracy and validity of the research findings (Given et al., 2023).

Table 3.3.1.1: Definition of Small, Medium, and Large Industries.

| **Manufacturing Sectors** | |
|---|---|
| Small | Sales turnover between Rm250,000 and less than Rm10 million or full time employees of 5 to 50 |
| Medium | Sales turnover between Rm10 million and Rm25million or full time employees of 51 to 150 |
| Large | Sales turnover of more than Rm25million or full-time employees of more than 150. |

Source: "National Survey Innovation", 2022

Table 3.3.1.1 defines the types of manufacturing firms in Malaysia.



### 3.3.2 Sampling Frame and Sampling Location

A sampling frame serves as the foundation for obtaining the data for a research study. It represents the source of material from which the sample has been drawn. Additionally, the sampling location indicates the place where the research was conducted or where the information was obtained. In this study, we have selected four states: Bayan Lepas, Penang; Tasek Industrial Estate, Ipoh; and Perdana Industrial Park Skudai Johor. Table 3.2 provides a detailed breakdown of the total number of respondents we have gathered from each of these locations.

Table 3.3.2.1: Innovative Respondents Based on States.

| States | Innovative (N) |
|---|---|
| Pulau Pinang | 132 |
| Kuala Lumpur | 120 |
| Perak | 108 |
| Johor | 90 |
| **Total** | 450 |

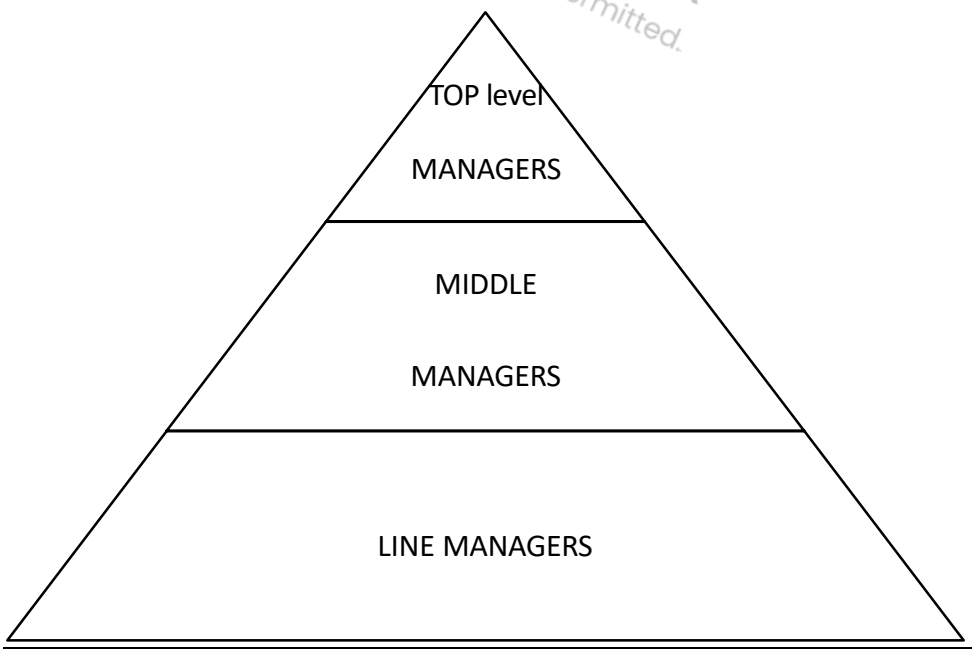
Source: Developed from received research questionnaire

### 3.3.3 Sampling Element

The research study involved a survey in where various personnel from manufacturing firms situated in Bayan Lepas, Penang; Tasek Industrial Estate, Ipoh and Perdana Industrial Park Skudai Johor participated. The respondents included managers, senior executives, junior executives, as well as permanent staff members. Their valuable insights and opinions were gathered to gain a detailed understanding of the manufacturing industry in these regions.



Figure 3.3.3.1: Types of Respondents Taking Part in this Study.




Source: Developed using sampling elements.

### 3.3.4 Sampling Technique

As part of this research, we have employed the method of probability sampling, which involves the selection of elements that have a known nonzero probability of being chosen at random (Given et al., 2023). We have chosen a hybrid approach that combines cluster and area sampling techniques. The first step involves cluster sampling, where we group various manufacturing firms located in Bayan Lepas, Penang; Tasek Industrial Estate, Ipoh; and Perdana Industrial Park, Skudai Johor based on their heterogeneity. The second step involves geographical cluster sampling, where we select respondents from highly concentrated industrial areas. This method was preferred since it was not economically feasible to collect samples from each firm in the designated location due to the dispersed locations of the manufacturing industries. By selecting several respondents within one cluster location area, we achieved greater economy than with simple random sampling. Additionally, this method was more feasible given the extensive scale of the manufacturing industries in various locations (Given et al., 2023).



### 3.3.5 Sampling Size

In order to ensure that the results of the study can be generalized to the entire population, it was necessary to carefully consider the size of the sample (Sekaran & Bougie, 2010). This research is focused on the staff working in the manufacturing industries, and the targeted population was determined by calculating the total number of individuals working in these industries.

To ensure the validity of the research, 30 questionnaires were distributed as part of a pilot test before the formal survey was conducted. This allowed for any necessary corrections to be made to the questionnaires before the formal survey began (Given et al., 2023).

A total of 450 questionnaires were prepared and randomly distributed to manufacturing firms in the selected region, with each employee being given the opportunity to participate. Ultimately, 320 questionnaires were successfully collected from the chosen firms, allowing for a comprehensive analysis of the data.

Table 3.3.5.1: Total Questionnaire Distributed

| Questionnaires | N | % |
|---|---|---|
| Distributed | 450 | 100 |
| Received *(% over Questionnaires Distributed)* | 200 | 45 |

Source: Based on Distributed and Received Questionnaires



## 3.4 Research Instrument

The primary research instrument for this study was a questionnaire that was created and are ready to distribute. I chose this method because it is cost-effective and time-efficient, and the fixed-alternative format of the questionnaire is easy for respondents to answer. I then used fixed-alternative questions, including simply dichotomy and determinant-choice questions.

The questionnaire is divided into two sections: Section A and Section B. Section A includes demographic questions that provide important basic information about the respondents. In Section B, we developed questions about the dependent and independent variables, specifically the four antecedents of innovation: organisation culture, organisation expertise, knowledge management, and employee engagement. This helps us identify the current state of innovation in the firm and the relationship between the four antecedents (Given et al., 2023).

## 3.5 Construct Measurement

### 3.5.1 Origin and Measure of Construct

Table 3.5.1.1: Source Model of Construct Measurement

| Items | Construct Measurement | Sources |
|---|---|---|
| Innovation | Our new products and services are often perceived as very unique by customers. | Wang & Ahmed (2004) |
| | Our company has introduced more innovative products during the past 5 years. | Wang & Ahmed (2004). |
| | Our company is rapidly bringing new products or services into the market. | Wang & Ahmed (2004) |
| | Our new products with functionalities that are totally different from the current one. | Gurhan et al. (2011) |
| | Our company develop new products with components and different from the current one. | Gurhan et al. (2011) |

| | | |
|---|---|---|
| Organisational expertise | The objective in our organisation is to help develops employees' competencies towards innovation. | Hase (2000) |
| | Training program is conducted to improve our ability to enhance the generation of the new idea. | Ouakouak, Ouedraogo, & Mbengue (2014). |
| | My firm has developed new management approaches to fulfil the changing needs of our customers. | Wang & Ahmed (2004) |
| | My firm's R&D is adequate to handle the development needs of new products and services. | Wang & Ahmed (2004) |
| | My firm utilises different strategy and seek unusual, novel solutions for our customers. | Wang & Ahmad (2004). |
| Knowledge Management | Employees have skills that contribute to the development of new products and opportunities. | Cummins, J.N. 2004 |
| | There is the free flow of relevant information in the organisation. | Miller and Morris, (1999). |
| | Employees have skills that are needed to maintain high quality products/services. | Cummins, J.N. 2004 |

| | | |
|---|---|---|
| | Employees have skills that enable our company to provide exceptional customer value. | Cummins, J.N. 2004 |
| | Employees exchange information for solving problems purposes. | Axley, 2000; Barua et al., 2007; Harshman & Harshman, 1999 |
| Organisation Culture | Employees with creative ideas can improve firm's innovativeness. | Ng et al. (2012) |
| | My leader established formal processes and activities to promote innovativeness. | Denison, D. R. (1990) |
| | Empowerment enables me to have a sense of ownership and responsibility toward the organisation, which results in greater organisational effectiveness. | Ng et al. (2012) |
| | Group learning enables me to share, acquire, and combine knowledge through experience with one another. | Denison, D. R. (1984) |
| | My firm tends to learn ways to understand and react to their customers need. | Lukić et al. (2014) |

| | | |
|---|---|---|
| Employee engagement | My supervisor contributes ideas regarding new product/services concepts that are helpful for my workgroup. | Michael P. O'Driscoll, Donna M. Randall (1999) |
| | The management is able to assist me further with new product development. | Robert Eisenberger, Peter Fasolo & Valerie Davis-LaMastro (1990). |
| | My company makes wise decisions on new product development in order to be more competitive in the marketplace. | Muse, L. A., & Stampler, C. L. (2007). |
| | My company provides sufficient resources and information to undergo research for new product/services generation. | Schaufeli, W. B., & Bakker, A. B. (2004). |
| | Support staff in my workplace have the skills and knowledge to provide effective guidance to the employees on pursuing their research on new innovation developments. | David D., Martha C., & Neil S. (2007). |

### 3.5.2 Scale of Measurement

Researchers use various methods to assign numerical values to measurements, with four commonly recognised types of scales: nominal, ordinal, interval, and ratio scales (SHIKEN, 2011). The process of measurement involves collecting data in the form of numbers that represent and convey important information, while a scale is a means of quantifying the degree of a variable or object being tested. Sekaran et al. (2010) suggest that the scale of measurement is a vital tool for determining the relationship between variables of different objects that have varying scale values. In other words, scales of measurement are important for researchers to measure and analyse data (Given et al., 2023) accurately and precisely.

#### 3.5.2.1 Nominal Scale

According to Zikmund and his colleagues (2010), the nominal scale is a categorization method that assigns a value to each subject without any quantitative or ranking function. It represents the most basic and straightforward level of measurement scale. In a nominal scale, candidates are only required to indicate their choice by circling or ticking the provided options. To illustrate, consider the following example of a nominal scale.

Gender:

□ Female

□ Male

#### 3.5.2.2 Ordinal Scale

Ordinal scales are a type of measurement scale that shares some similarities with nominal scales. However, unlike nominal scales, which provide simple identification and classification of subjects, ordinal scales allow for subjects to be ordered or ranked based on a particular variable. This means that ordinal scales can not only identify and classify subjects but also provide a relative order of their importance or value. For instance, a survey question that asks respondents to rank their level of agreement with a statement on a scale of 1 to 5 is an example of an ordinal scale. By using an ordinal scale, researchers can obtain more nuanced information about the preferences, attitudes or opinions of their subjects, making it a valuable tool in data analysis.

Highest education completed (Please state the fields of study):

Diploma _____

Degree _____

Master _____

PhD _____

Others _____

#### 3.5.2.3 Likert Scale

In Section B of the survey, respondents are asked to rate their perception of the organisation's innovativeness on a scale of 1 to 5. The five-point Likert scale is ideal for this section as it can accurately measure and express the respondent's attitudes and behaviours towards various Likert subjects. For instance, the question "Our new products and services are often perceived as very novel by customers" is a Likert question. The table below provides an overview of the Likert Scale in its entirety.

| Dimension: Innovation | SD | D | N | A | SA |
|---|---|---|---|---|---|
| Our new products and services are often perceived as very novel by customers. | 1 | 2 | 3 | 4 | 5 |

## 3.6 Data Processing

Data processing is the term used to describe the preparation of data for analysis. The process involves several steps, including transcribing, coding, editing, and identifying any unique or uncommon data treatments.

The first step in data processing is data checking. This is a critical step, as it allows researchers to ensure that there are no missing answers in the distributed questionnaire. Through this process, researchers can verify that the questionnaires have been completed by the respondents.

The second step of data processing is data editing. Scanning and editing the information in the questionnaire enables researchers to check and adjust data for omissions, consistency, and legibility. If an error is found in the questionnaires, for example, certain respondents have provided incomplete or multiple answers to certain questions, researchers will make adjustments to the data to make it more complete, accurate, and consistent.



The third step is data coding. Data coding is the process of identifying and classifying each answer with a numerical score or character symbol (Given et al., 2023).

In Section A of the questionnaire, the answer for each question is coded as below:

| | | |
|---|---|---|
| Q1. | Gender | "Female" is coded as 1<br>"Male" is coded as 2<br>"Missing Data" is coded as 99 |
| Q2. | Age | "18-20" is coded as 1<br>"21 – 30" is coded as 2<br>"31 – 40" is coded as 3<br>"41 – 50" is coded as 4<br>"More than 51" is coded as 5<br>"Missing Data" is coded as 99 |
| Q3. | Race | "Malay" is coded as 1<br>"Chinese" is coded as 2<br>"Indian" is coded as 3<br>"Others" is coded as 4<br>"Missing Data" is coded as 99 |
| Q4. | Marital Status | "Single" is coded as 1<br>"Married" is coded as 2<br>"Others" is coded as 3<br>"Missing Data" is coded 99 |
| Q5. | Highest education completed | "Diploma" is coded as 1<br>"Bachelor Degree" is coded as 2<br>"Master's /PhD Degree" is coded as 3<br>"Others" is coded as 4<br>"Missing Data" is coded as 99 |
| Q6. | Basic Monthly Income Level | "Below RM 2000" is coded as 1<br>"RM 2001 – RM 3000" is coded as 2<br>"RM 3001 – RM 4000" is coded as 3<br>"RM 4001 – RM 5000" is coded as 4<br>"RM 5001 – RM6000" is coded as 5<br>" RM6001 – RM 7000" is coded as 6<br>"Above RM 7000" is coded as 7<br>"Missing Data" is coded as 99 |

| | | |
|---|---|---|
| Q7. | Job Type | "Part - Time" is coded as 1<br>"Full Time" is coded as 2<br>"Internship" is coded as 3<br>"Temporary" is coded as 4<br>"Others" is coded as 5<br>"Missing Data" is coded as 99 |
| Q8. | Total Working Experience in Manufacturing Firm | "0 – 5" is coded as 1<br>"6 – 10" is coded as 2<br>"11 – 15" is coded as 3<br>"15 – 20" is coded as 4<br>"More than 20 years" is coded as 5<br>"Missing Data" is coded as 99 |

While in Section B of the questionnaire, the answer for each question is coded as below:

| |
|---|
| "Strongly Disagree" is coded as 1 |
| "Disagree" is coded as 2 |
| "Neutral" is coded as 3 |
| "Agree" is coded as 4 |

### 3.6.1 Data Transcribing

Last but not least, the coded data is transcribed into Statistical Analysis System 9.4M7 program.

## 3.7 Data analysis

Data analysis is a crucial process of correcting any inaccuracies present in the data that has been collected or coded incorrectly. The two key requirements of data analysis are editing and coding. The Statistical Analysis System (SAS) software is a powerful tool that can be utilised to analyse the collected data. However, data analysis is often cited as the most challenging aspect of quantitative research.



### 3.7.1 Descriptive Analysis

Descriptive analysis, a fundamental transformation of data, is used to define the essential characteristics such as tendency, distribution, and variability. (Zikmunds et al., 2010). The descriptive statistics used in this process include modes, median, mean variance, range, and standard deviation. Frequency analysis is employed in this study to convert data into various visualisations, including histograms, bar charts, and pie charts, for each variable. This analysis provides a clear picture of how the data was collected through the distribution of questionnaires.

According to Zikmunds et al. (2010), a histogram is a graphical representation that shows the frequency distribution of data, where the height of a bar corresponds to the observed frequency of the category. A bar chart is a fundamental numerical comparison that displays data in the form of bars, either vertically or horizontally. A pie chart is a circular

design, divided into sectors, with each sector representing a data set that matches the percentage of the total data set. These visualisations provide a better understanding of the collected data and help identify any patterns or trends.

### 3.7.2 Scale Measurement

The research utilised reliability and validity as the primary benchmarks for evaluating the measurement and capacity. A measurement is considered good if it is both consistent and accurate. Reliability refers to the consistency of the measurement, while validity refers to the degree to which the measurement accurately assesses the intended concept. Essentially, reliability and validity are two crucial factors in determining the quality and accuracy of the measurement (Given et al., 2023).

#### 3.7.2.1 Reliability test

The reliability test is a vital tool to measure the internal consistency of a scale. It is commonly used to ensure that the data collected from questionnaires produces reliable results. Reliability is an essential factor in determining the degree to which measurements are consistent and free from errors (Sekaran, 2003 and; Given et al., 2023). One of the most commonly used methods for estimating the reliability of a multiple-item scale is Cronbach's alpha (α). This method computes the average of all possible split-half reliabilities for a multiple-item scale (Zikmund et al., 2010).

To calculate the Cronbach's alpha, researchers typically use the Statistical Analysis System Software (SAS). A Cronbach's alpha score of 0 indicates no consistency, while a score of 1 represents complete consistency. According to Zikmund et al. (2010), the standard coefficient alpha (α) is expressed as follows:

| |
|---|
| α = 0.80 to 0.95, which considered as very good reliability |
| α = 0.70 to 0.80, which considered as good reliability |
| α = 0.60 to 0.70, which considered as fair reliability |
| α = <0.60, which consider as poor reliability |

**Validity Test**

Validity is an essential concept in research, as it determines whether a test measures what it claims to examine and whether the results obtained are accurate. As pointed out by Zikmund et al. (2010), validity tests allow researchers to examine variables for their level of accuracy and ensure that results are accurately tested and explained. This is important because inaccurate measurements and interpretations can lead to flawed conclusions and recommendations.

Table 1 shows the relationship between the strength of association and Cronbach's alpha coefficient, which is an important measure of reliability. Based on the table, variables with a Cronbach's alpha coefficient of more than 0.6 are considered reliable, while those with a coefficient of less than 0.6 are not reliable. The acceptable level of the average Cronbach's alpha coefficient is 0.7 or above, which indicates that the questionnaires designed have some degree of reliability and can be distributed to targeted respondents for the next full test. This helps researchers to ensure that their research findings are accurate and reliable and can be used to make sound conclusions and recommendations.

Table 3.7.2.3.1: Relationship between the strength of association and Cronbach's Alpha coefficient

| Part | Variable | Items | Scale | Reliability Result |
|---|---|---|---|---|
| A | Independent Variable | Employee engagement | Interval | 0.736757 |
| | | Knowledge Management | Interval | 0.819546 |
| | | Organisational Expertise | Interval | 0.799857 |
| | | Organisational Culture | Interval | 0.845611 |
| B | Dependent Variable | Innovation | Interval | 0.863551 |

Source: Developed for the research



### 3.7.3 Inferential Analysis

The research methodology includes the use of the Likert scale in the questionnaire to assess the relationship between variables. Specifically, the Likert scale is an interval scale that allows us to gauge the respondent's level of agreement with statements on a five-point scale. The research variables are classified as metric, which means that they can measure the size differences between items. To determine the relationship among organisation culture, organisation expertise, knowledge management, and employee engagement, we employed the Pearson Correlation Matrix and Multiple Regression

Analysis. These methods enable us to analyse the data and draw meaningful conclusions about the relationships between the variables under investigation.

#### 3.7.3.1 Pearson Correlation Coefficient

When examining the strength of association between two variables on a ratio or interval scale, Pearson Correlation is considered the most effective method. Sekaran et al. (2012) note that this approach can accurately determine the direction and strength of the variables, with a range of -1.0 to +1.0. A correlation coefficient of 1.0 indicates a perfectly positive correlation, signifying a positive linear relationship between the variables. Conversely, a coefficient of -1.0 suggests a perfectly negative correlation. A coefficient below 0.5 indicates a weak correlation, while a value above 0.8 represents a strong correlation.



It's important to note that a correlation coefficient implies that one variable is the mirror image of the other. For instance, if we measure variables X and Y, a higher value of X corresponds to a lower value of Y, indicating a proportional relationship in the opposite direction. The correlation coefficient reflects both the magnitude and direction of the linear relationship between the variables. If the values of X and Y differ from their means in opposite directions, their covariance is negative, and vice versa. Please refer to above Table  for guidelines and recommendations regarding the size of the correlation coefficient.

Table 3.7.3.1.1: Correlation Coefficient size

| Pearson Correlation Range | Strength of Association |
|---|---|
| ± 0.81 to ± 1.00 | Very Strong |
| ± 0.61 to ± 0.80 | Strong |
| ± 0.41 to ± 0.60 | Moderate |
| ± 0.21 to ± 0.40 | Weak |
| ± 0.20 | Very Weak |
| 0 | None |

Source: Sekaran, U. & Bougie, R. (2010).

In this research, the Pearson correlation coefficient is used to measure and identify the effects between the dependent variable with the four independent variables. Pearson Correlation Coefficient is used to test the following hypotheses:

Therefore, this test can demonstrate the significant impact, relationships, and strength between the independent variables and the dependent variable.



Hypothesis 1: Organisational factors are positively correlated with innovation.

Hypothesis 2: There is a positive correlation between organisational capabilities and innovation.

Hypothesis 3: Employee engagement is positively associated with innovation.

Hypothesis 4: Knowledge management is positively correlated with innovation.

Hypothesis 5: Organisational culture has a positive relationship with innovation.

### 3.7.3.2 Multiple Regressions Analysis

According to Sekaran and Bougie (2012), multiple regression analysis is a statistical technique that utilises multiple independent variables to account for the observed variance in the dependent variable. This approach examines the correlation between a single dependent variable and numerous independent variables simultaneously. The formula equation for multiple regression analysis is as follows:

$$Yi = b0 + b1X1 + b2X2 + b3X3 + ... + bnXn + ei$$

Multiple regression analysis is an expansion of simple regression analysis, which only permits one independent variable to forecast one dependent variable. For example, organisational expertise could be utilised as an independent variable to explain innovation (dependent variable). The multiple regression method facilitates the examination of two or more independent variables with one dependent variable concurrently. Therefore, the equation for multiple regression will reflect the values of multiple variables rather than solely one single predictor variable.

The above formula represents a multiple regression analysis aimed at testing the hypothesis that innovation can be predicted by a combination of factors, namely organisational expertise, knowledge management, employee engagement, and organisational culture. The equation indicates that the level of innovation (dependent variable) is influenced by the values of the coefficients b0, b1, b2, b3, and b4, which represent the weights assigned to each independent variable.

## 3.8 Conclusion

Chapter 3 plays a crucial role in the study by providing a comprehensive and detailed account of the research methodology employed. The chapter thoroughly discusses the research design and sampling design, which are two vital components of any research study, and enhances the readers' understanding by including relevant illustrations. It also elaborates on the various techniques and approaches used to acquire primary and secondary data, as well as the rationale behind choosing a specific research instrument.

Moreover, Chapter 3 provides valuable insights into the assessment of each variable, including the selection process, data collection, and analysis of primary and secondary sources. The chapter provides a clear and comprehensive picture of the methods used to obtain and analyse data, which is essential for any research study.

The forthcoming chapter will provide an in-depth explanation of the results obtained from SAS software, which will further enrich the readers' understanding of the research study. Overall, Chapter 3 serves as a crucial foundation for the study, providing a detailed and thorough account of the research methodology and the steps taken to ensure the study's validity and reliability.

# CHAPTER 4: RESEARCH RESULT

## 4.0 Introduction

In Chapter 4 of our research project, we meticulously scrutinized and evaluated the data gathered from the manufacturing industries situated in Penang;, Ipoh; and Johor. Our analysis of the collected data uncovered a multitude of outcome patterns that are highly pertinent to the hypotheses postulated in Chapter 1 and 2. Furthermore, we will present a comprehensive demographic profile of the respondents. By doing so, we aim to gain a deep and thorough understanding of the respondents' background, which will provide us with valuable insights into the research topic. Ultimately, this will contribute significantly to the existing knowledge base in this field.



## 4.1 Descriptive Analysis

The analysis of the respondents' demographic profile will be deliberated and discussed in this research.

### 4.1.1 Respondent Demographic Profile

To participate in the survey, respondents were asked to provide information on various demographic factors. These include gender, age, marital status, highest level of education completed, type of job, race, monthly income, and total work experience. The answers to these eight questions will help us better understand the characteristics of the survey population.

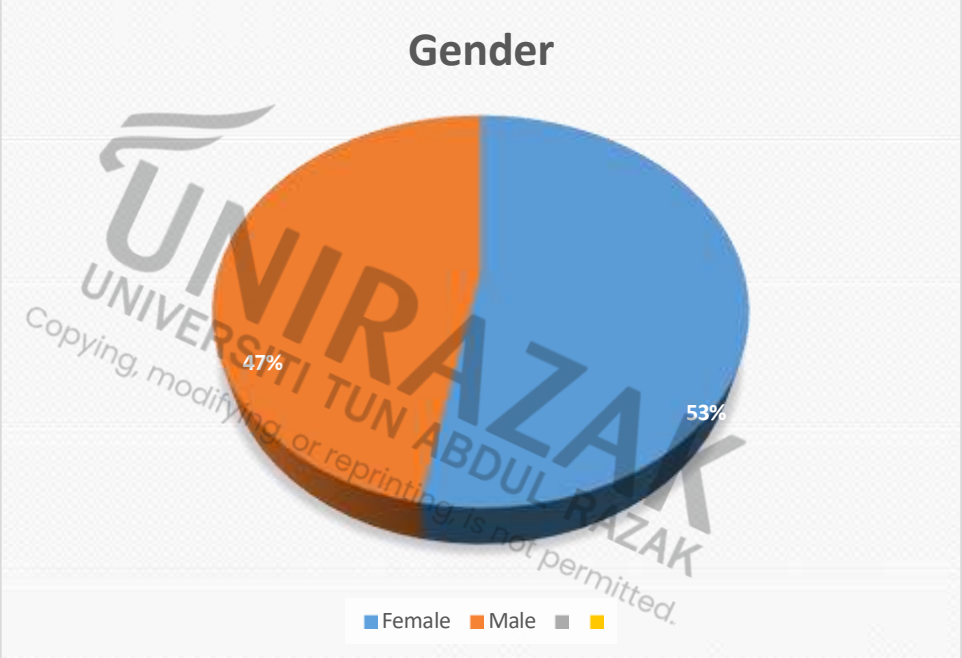
#### 4.1.1.1 Gender

Table 4.1.1.1.1: Gender of Respondents

| | Frequency | Percent (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| Female | 106 | 53.00 | 106 | 53.00 |
| Male | 94 | 47.00 | 200 | 100.00 |

Source: Generated from SAS

Figure 4.1.1.1.1: Descriptive analysis of the respondents' Gender






Source: Based on Research

The table provided above offers a visual representation of the gender distribution among the respondents who participated in the questionnaire survey. The survey received a total of 200 responses, with 106 of them coming from female respondents, accounting for 53% of the total. The remaining 94 responses came from male respondents, representing 47% of the total. The data indicates that there were more female participants in the survey than male

participants, as seen in the figure and table.

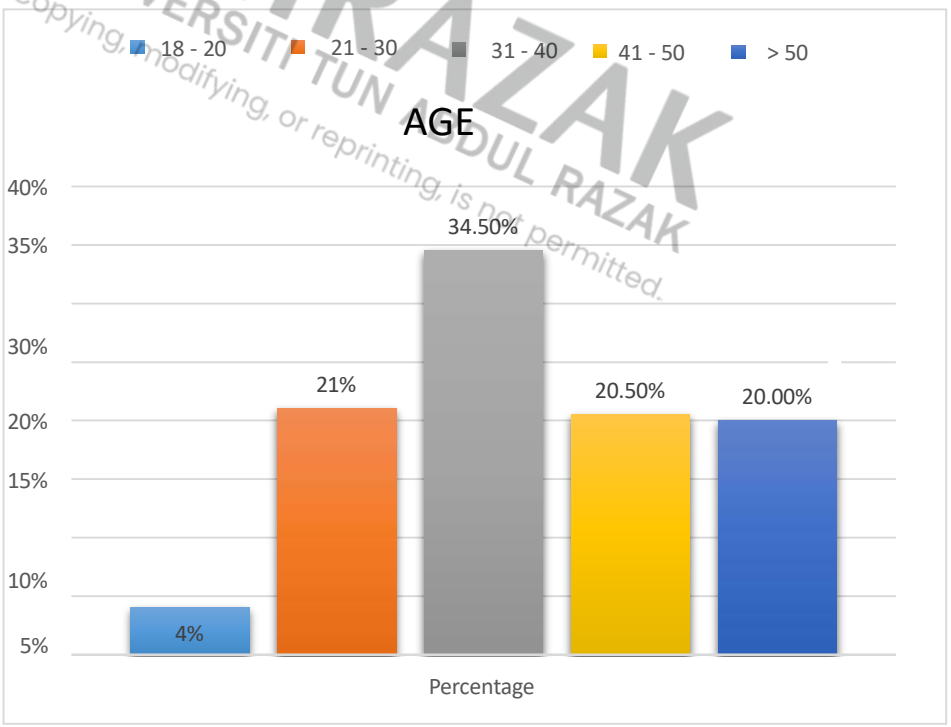
### 4.1.1.2 Age

Table 4.1.1.2.1: Descriptive analysis of respondents' age

| Age | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| 18 – 20 | 8 | 4.00 | 8 | 4.00 |
| 21 – 30 | 42 | 21.00 | 50 | 25.00 |
| 31 – 40 | 69 | 34.50 | 119 | 59.50 |
| 41 – 50 | 41 | 20.50 | 160 | 80.00 |
| More than 51 | 40 | 20.00 | 200 | 100.00 |

Source: Generated from SAS

Figure 4.1.1.2.1: Descriptive analysis of respondents' Age




Source: Developed from Research

The data in the table above provides valuable insights into the age distribution of the surveyed individuals. It is evident that the age group with the highest percentage of respondents, comprising 34.50% of the surveyed population, is between 31 to 40 years old. This age range is represented by 69 participants, indicating a significant portion of the total surveyed population. The next age group, from 21 to 30 years old, constitutes 21% of the surveyed population, with 42 individuals. The range of 41 to 50 years old represents 20.50% of respondents, which is 41 individuals. The age group over 51 years old has 40 respondents, or 20% of the total surveyed population. On the other hand, the age range of 18 to 20 years old has only eight respondents, accounting for only 4% of the total surveyed population and the least number of participants. This information can be useful in understanding the age demographics of the surveyed population and can help draw conclusions and make informed decisions based on it.

#### 4.1.1.3 Race

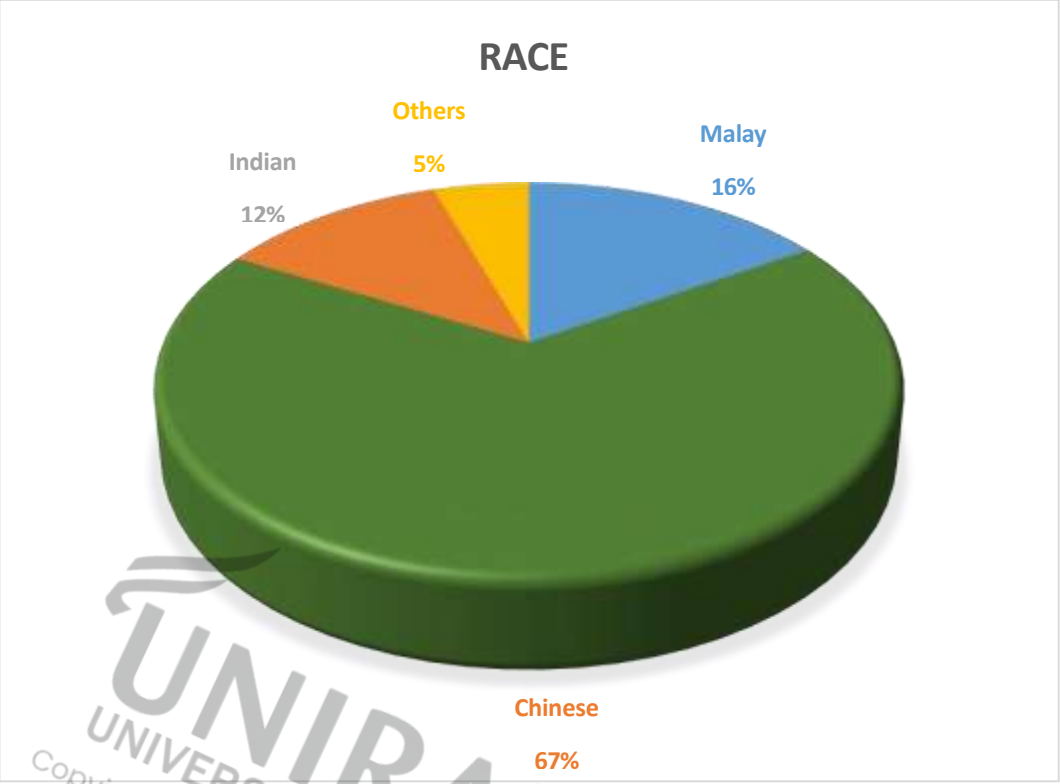
Table 4.1.1.3.1: Descriptive analysis of respondents' Race



| Race | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| Malay | 32 | 16.00 | 32 | 16.00 |
| Chinese | 134 | 67.00 | 166 | 83.00 |
| Indian | 24 | 12.00 | 190 | 95.00 |
| Others | 10 | 5.00 | 200 | 100.00 |

Source: Generated from SAS

Figure 4.1.1.3.1: Descriptive analysis of respondents' Race




Source: Developed for Research Purpose



The findings of the research show that the survey respondents can be categorized into four different ethnic groups, namely Chinese, Malay, Indian, and "other". The majority of respondents, accounting for 67% or 134 individuals, belong to the Chinese ethnicity. The Malay group is the second largest group with 16% or 21 respondents, and the Indian group is the third largest with 24% or 12 respondents. The "other" ethnic group, which includes respondents from various other ethnicities, is the smallest with only 5% or ten respondents. These findings provide valuable insights into the ethnic diversity of the survey participants and can be useful for further analysis and research.

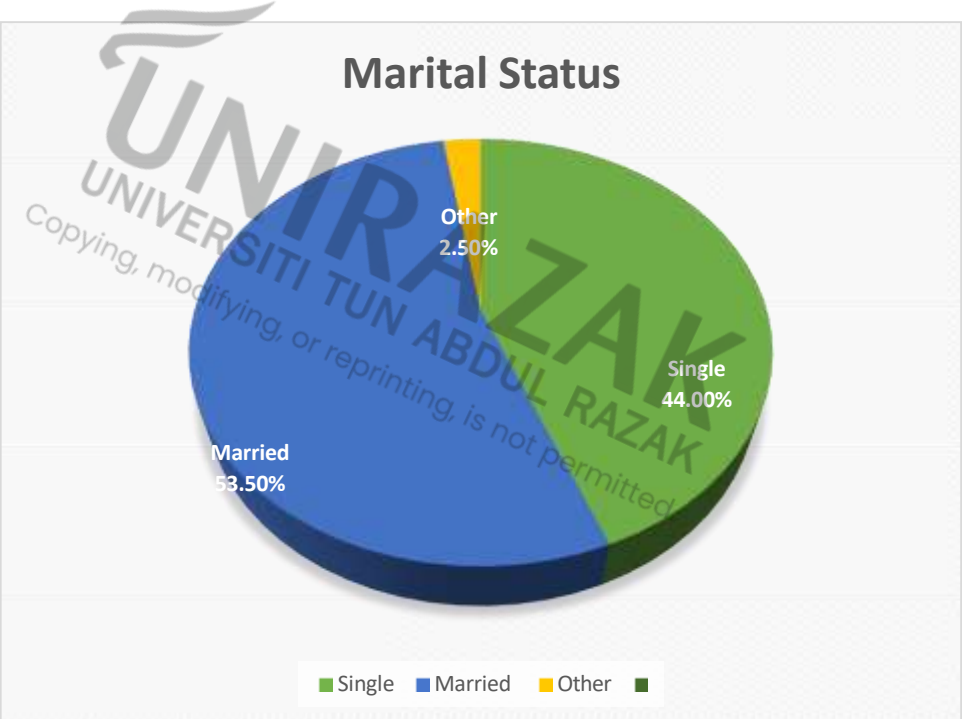
### 4.1.1.4 Marital Status

Table 4.1.1.4.1: Descriptive analysis of respondents' Marital Status

| Marital Status | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| Single | 88 | 44.00 | 88 | 44.00 |
| Married | 107 | 53.50 | 195 | 97.50 |
| Others | 5 | 2.50 | 200 | 100.00 |

Source: Generated from SAS Enterprise Guide 5.1

Figure 4.1.1.4.1: Descriptive analysis of respondents' Marital Status






Source: Developed from Research

The data obtained from the study reveals that out of the 200 individuals who participated, more than half, precisely 107 (53%), reported being married, while 88 (44%) stated that they were still single. Additionally, a small minority of 5 (3%) had a different marital status, which may include divorced, separated, or widowed.

### 4.1.1.5 Highest Education Completed

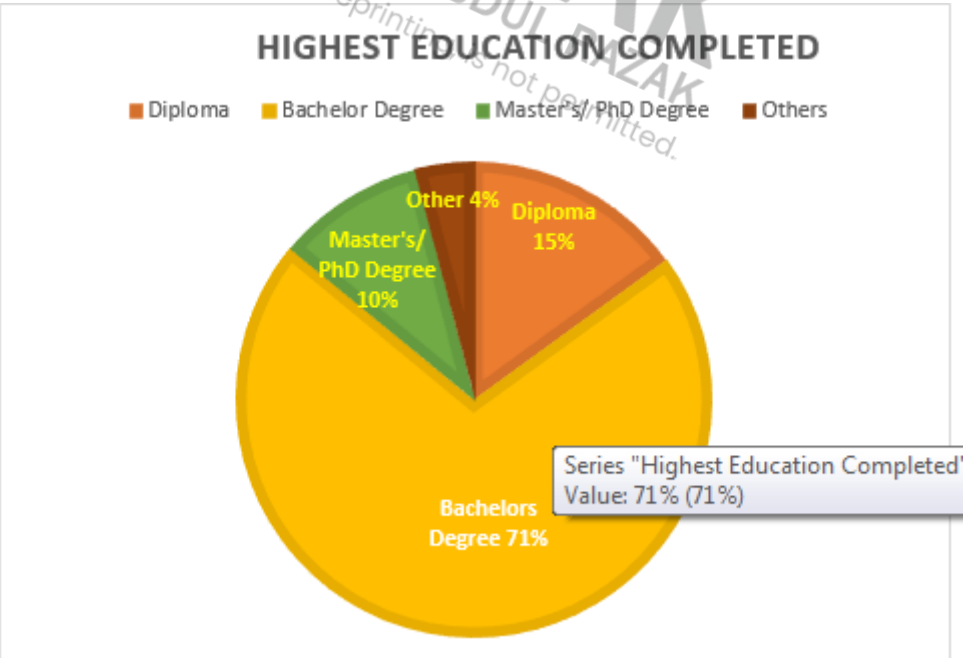
Table 4.1.1.5.1: Descriptive analysis of respondents' Highest Education Completed

| Highest Education Completed | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| Diploma | 30 | 15.00 | 30 | 15.00 |
| Bachelor Degree | 142 | 71.00 | 172 | 86.00 |
| Master's/ PhD Degree | 20 | 10.00 | 192 | 96.00 |
| Others | 8 | 4.00 | 200 | 100.00 |

Source: Generated from SAS Enterprise Guide 5.1



Figure 4.1.1.5.1: Descriptive analysis of Highest Education Completed




Source: Developed for Research Purpose

The report provides a comprehensive analysis of the highest level of education attained by the respondents. The data is categorized into four groups: Diploma Level, Bachelor's Degree Level, Master's/PhD Degree Level, and others. The findings reveal that the majority of respondents, which corresponds to a significant 71% or 142 individuals, have achieved a Bachelor's degree. On the other hand, 15% or 30 respondents have graduated with a Diploma, while 10% or 20 respondents have completed their Master's/PhD degree. The remaining eight respondents fall into the "other" category, representing the smallest fraction of 4%. Hence, the data clearly indicates that a Bachelor's degree is the highest educational level achieved by most respondents.

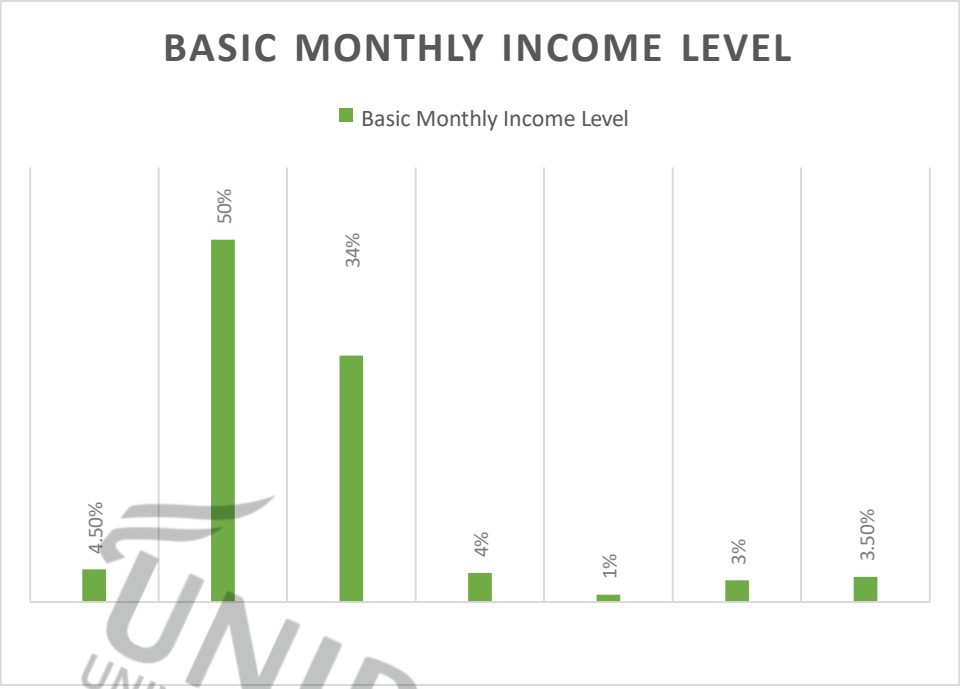
#### 4.1.1.6 Basic Monthly Income Level

Table 4.1.1.6.1: Descriptive analysis of respondents' Basic Monthly Income Level

| Basic Monthly Income Level | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| Below RM2000 | 9 | 4.50 | 9 | 4.50 |
| RM2001 – RM3000 | 100 | 50.00 | 109 | 54.50 |
| RM3001 – RM4000 | 68 | 34.00 | 177 | 88.50 |
| RM4001 – RM5000 | 8 | 4.00 | 185 | 92.50 |
| RM5001 – RM6000 | 2 | 1.00 | 187 | 93.50 |
| RM6001 – RM7000 | 6 | 3.00 | 193 | 96.50 |
| Above RM7000 | 7 | 3.50 | 200 | 100.00 |

Source: Generated from SAS

Figure 4.1.1.6.1: Descriptive analysis of respondents' Basic Monthly Income




Source: Developed for Research Purpose



From the survey results, a clear picture of the income distribution among the respondents emerges. The data indicates that the highest income bracket, which is characterized by RM2001, accounts for exactly 50% of the total number of respondents, which is 100. It is noteworthy that this group constitutes the largest segment of the sample population. On the other hand, the subsequent bracket, extending from RM3001 to RM4000, represents 34% of the total, comprising 68 respondents. This group is also significant and represents a considerable proportion of the surveyed population. The data further indicates that those earning less than RM2000 constitute a small percentage of the sample population. Specifically, this group comprises only 4.50% or 9 respondents.

Similarly, the income bracket of RM4001 to RM5000 represents only 4% or 8 respondents. In contrast, the number of respondents with a salary above RM7000 is relatively low, accounting for only 3.50% or 7 individuals.

The income range of RM5001 to RM6000 represents a slightly lower percentage of the total, comprising 3% or 6 respondents. Lastly, there is a group of respondents who earn between RM6001 and RM7000. This group is relatively small, accounting for only 1% or 2 respondents of the total. Overall, the survey data provides a clear and descriptive view of the income distribution among the respondents.

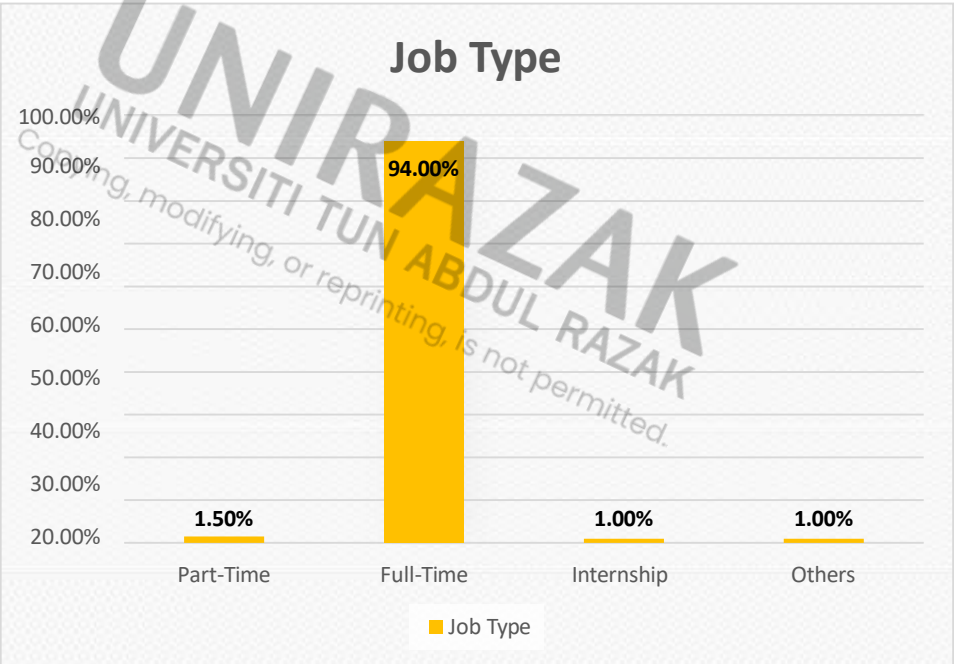
### 4.1.1.7 Job Type

Table 4.1.1.7.1: Descriptive analysis of respondents' Job Type

| Job Type | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| Part-Time | 3 | 1.50 | 3 | 1.50 |
| Full Time | 188 | 94.00 | 191 | 95.50 |
| Internship | 2 | 1.00 | 198 | 99.00 |
| Others | 2 | 1.00 | 200 | 100.00 |

Source: Generated from SAS

Figure 4.1.1.7.1: Descriptive analysis of respondents' Job Type






Source: Developed from Research

The table presented above illustrates the employment status of the respondents. According to the data, among the 200 participants, 94% (188) are employed full-time while only 1.50% (3) are part-time workers. The remaining 1% (2 each) are categorized as interns and other job types. The data clearly suggests that the majority of the participants are employed full-time, indicating a strong job market for full-time positions.

### 4.1.1.8 Total Working Experience

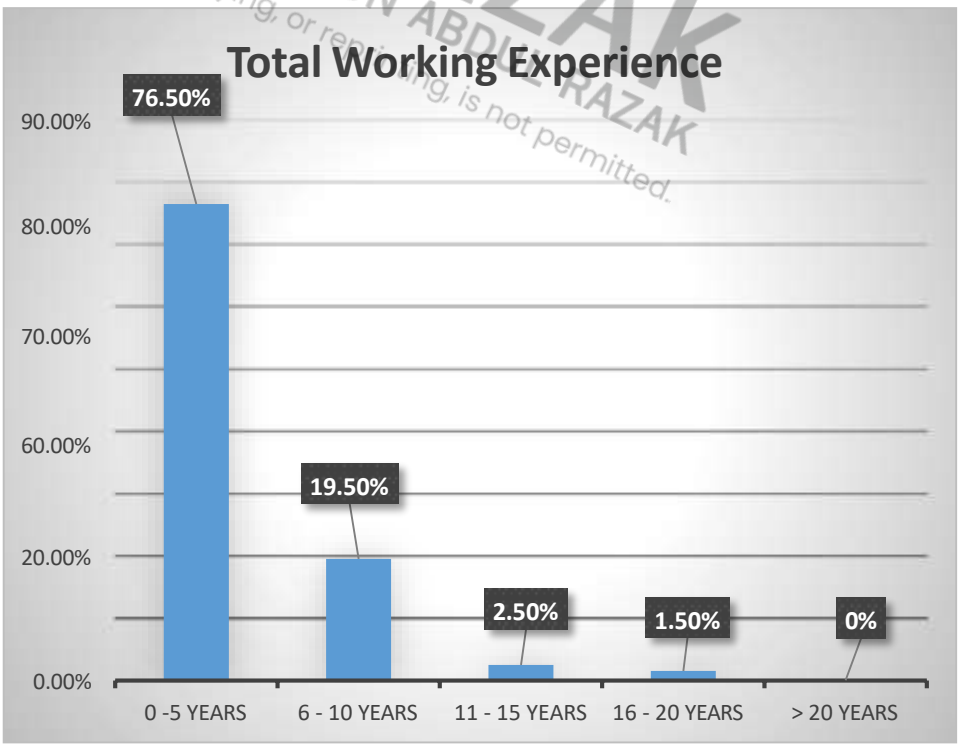
Table 4.1.1.8.1: Descriptive analysis of respondents' Total Working Experience

| Total Working Experience (Years) | Frequency | Percentage (%) | Cumulative Frequency | Cumulative Percent (%) |
|---|---|---|---|---|
| 0 - 5 | 153 | 76.50 | 153 | 76.50 |
| 6 – 10 | 39 | 19.50 | 192 | 96.00 |
| 11 – 15 | 5 | 2.50 | 197 | 98.50 |
| 16 – 20 | 3 | 1.50 | 200 | 100.00 |
| >20 | 0 | 0 | 0 | 0 |

Source: Generated from SAS



Figure 4.1.1.8.1: Descriptive analysis of Respondents' Total Working Experience




Source: Developed from Research

Based on the findings of the survey, it can be concluded that the majority of the respondents (76.50% or 153 individuals) had work experience within the range of 0 to 5 years. The second-largest group of participants (19.50% or 39 individuals) had work experience of 6 to 10 years. On the other hand, only a small number of respondents, 2.50% (5 individuals), had work experience ranging from 11 to 15 years. Furthermore, only 1.50% (3 individuals) of the participants had work experience between 16 to 20 years. Interestingly, none of the employees or staff who participated in the survey reported having more than 20 years of work experience.

### 4.1.2 Central Tendencies Measurement of Constructs

In this research, we analyzed the central tendencies to determine the average score for constructs on an interval scale. The respondents provided their responses using a 5-point Likert scale, and we used the obtained data to calculate the mean and standard deviation. To analyze the 25 questions in this study, we utilized SAS software to derive the mean, standard deviation, and variance. The resultant output from SAS provides us with a clear insight into the results of our analysis.



Table 4.1.2.1: Descriptive Statistic for Innovation

| Statement | Mean | Standard Deviation | Rank |
|---|---|---|---|
| Customers perceive our new products and services as highly distinctive. | 2.754 | 1.43 | 1 |
| Our company has introduced a range of innovative products and services over the last five years. | 2.680 | 1.21 | 5 |

| | | | |
|---|---|---|---|
| Our company is quickly introducing new products and services to the market. | 2.605 | 1.22 | 4 |
| Our upcoming products offer completely distinct features compared to our current offerings. | 2.580 | 1.32 | 2 |
| Our company develops new products using different components than the current ones. | 2.735 | 1.28 | 3 |

The table presented below provides valuable insights into the perceptions of the targeted respondents regarding innovation. Based on the data, it is evident that the statement "Our new products and services are often perceived as very unique by customers" has the highest mean score of 2.754, which indicates that a significant proportion of the respondents strongly believe that the new products and services offered by the company are unique. In contrast, the statement "Our new products with functionalities that are totally different from the current ones" has the lowest mean score of 2.580, indicating that the majority of respondents are indecisive about this statement, and their responses are relatively neutral.



The standard deviation of 1.43 for the statement "Our new products and services are often perceived as very unique by customers" implies that the response towards this statement has a higher dispersion rate compared to others. Thus, customers have varying opinions regarding this statement, which makes it the top-ranked statement in terms of dispersion rate. On the other hand, the statement "Our company has introduced more innovative products during the past five years" has the lowest standard deviation of 1.21. This indicates that the majority of respondents are giving a similar rating to this statement, which makes it the lowest-ranked statement in terms of dispersion rate.

Table 4.1.2.2: Descriptive Statistic for Organisational expertise

| Statement | Mean | Standard Deviation | Rank |
|---|---|---|---|
| Our organization's objective is to develop employees' competencies in innovation. | 2.695 | 1.39 | 1 |
| The training program aims to enhance our ability to generate new ideas. | 2.690 | 1.20 | 4 |
| My company developed new management strategies to meet evolving customer needs. | 2.650 | 1.18 | 5 |
| I believe that my company's research and development capabilities are sufficient to meet the demands of creating new products and services. | 2.631 | 1.26 | 3 |
| At my firm, we use various strategies and actively seek unique and innovative solutions for our clients. | 2.814 | 1.30 | 2 |

The table presents the results of a survey conducted to gauge customers' responses towards different statements about a company. The survey revealed that the statement "My firm utilises different strategies and seeks unusual, novel solutions for our customers" received the highest mean score of 2.814. This means that the majority of customers had a positive response towards the company's unique approach to providing solutions. However, the statement " I believe that my company's research and development capabilities are sufficient to meet the demands of creating new products and services." received the lowest mean score of 2.631. This suggests that customers were less positive towards this statement and felt that the company's research and development department needs improvement.

Interestingly, the statement " Our organization's objective is to develop employees' competencies in innovation." generated the highest standard deviation score of 1.39. This implies that customers had a wider range of responses to this statement, indicating that they were unsure or lacked clarity about the company's objectives. Therefore, the company may need to provide more information about its innovative plans and objectives to its customers. On the other hand, the statement " My company developed new management strategies to meet evolving customer needs." generated the lowest standard deviation score of 1.18. This means that customers had a more consistent response to this statement and were satisfied with the company's management approach. This consistency also indicates that the company has been successful in meeting the changing needs of its customers.

Table 4.1.2.3: Descriptive Statistic for Knowledge Management

| Statement | Mean | Standard Deviation | Rank |
|---|---|---|---|
| Companies benefit greatly from the skills that their employees possess, which allow them to contribute to the development of new products and opportunities. | 2.732 | 1.44 | 1 |
| In the organization, relevant information flows freely. | 2.645 | 1.11 | 5 |
| To ensure the delivery of high-quality products or services, it is imperative to have skilled employees who possess the necessary expertise. | 2.564 | 1.18 | 4 |
| Our company is able to provide exceptional value to customers thanks to the skills of our employees. | 2.635 | 1.285 | 2 |
| Employees share information with each other to solve problems.. | 2.695 | 1.24 | 3 |



The table provided a comprehensive summary of feedback from individuals specifically targeted for their knowledge management perspectives. It included various statements, among which the statement "Companies benefit greatly from the skills that their employees possess, which allow them to contribute to the development of new products and opportunities," received the highest mean score of 2.732. This suggests that the respondents generally agreed with this statement. Conversely, the statement "To ensure the delivery of high-quality products or services, it is imperative to have skilled employees who possess the necessary expertise" received the lowest mean score of 2.564, indicating a more neutral response.

Furthermore, the statement "Companies benefit greatly from the skills that their employees possess, which allow them to contribute to the development of new products and opportunities" also had the highest standard deviation of 1.44. This implies that there is a higher dispersion rate in the responses towards this statement, and customers may be uncertain about it. Therefore, we rank this statement as the top one. In contrast, the statement "In the organization, relevant information flows freely" had the lowest standard deviation of 1.11. This indicates that the responses towards this statement have a lower dispersion rate, and customers tend to give the same rating. Hence, we rank this statement as the lowest one.

Table 4.1.2.4: Descriptive Statistic for Organisational Engagement

| Statement | Mean | Standard Deviation | Rank |
|---|---|---|---|
| My supervisors provide useful suggestions for new product ideas that benefit my work team. | 2.681 | 1.40 | 1 |
| I am able to receive additional assistance from management in regards to the development of new products. | 2.624 | 1.16 | 5 |
| My company aims to enhance competitiveness through wise product development decisions. | 2.630 | 1.17 | 4 |
| My company provides ample resources and information to conduct research for generating new products. | 2.635 | 1.25 | 3 |

| | | | |
|---|---|---|---|
| Effective guidance for new product development is provided by supportive staff in my workplace. | 2.650 | 1.26 | 2 |

Upon examining the data presented in the table, it becomes evident that the statement "My supervisors provide useful suggestions for new product ideas that benefit my work team" was rated the highest with a mean score of 2.681. This indicates that the majority of the respondents strongly agreed with this statement, highlighting the pivotal role that supervisors play in contributing to the development of new product concepts. In contrast, the statement "I am able to receive additional assistance from management in regards to the development of new products" received the lowest mean score of 2.624. This implies that the respondents were mostly neutral about this statement, suggesting that the management team needs to improve its support towards the development of new products.



In conclusion, it is crucial to note that the supervisors' contributions are vital to the development of new product concepts. However, the management team needs to enhance its support towards the development of new products to meet the customers' needs and expectations.

Table 4.1.2.5: Descriptive Statistic for Organisational Culture

| Statement | Mean | Standard Deviation | Rank |
|---|---|---|---|
| For a company to become more innovative, it is crucial to have employees who can come up with creative ideas. | 2.575 | 1.38 | 1 |
| My leader has established formal processes and activities to foster innovation. | 2.640 | 1.15 | 5 |
| Empowerment leads to a sense of ownership and responsibility, resulting in greater organizational effectiveness. | 2.620 | 1.20 | 4 |
| Group learning allows individuals to share, acquire, and combine knowledge through collaborative experiences. | 2.624 | 1.27 | 3 |
| My company strives to develop strategies to better understand and meet the needs of our customers. | 2.731 | 1.27 | 2 |



The above table presents valuable insights on how the respondents perceive the organizational culture. Each statement's mean score and standard deviation were analyzed to understand the level of agreement and disagreement among the respondents. Of note is the statement "My company strives to develop strategies to better understand and meet the needs of our customers," which had the highest mean score of 2.731. This indicates that most respondents strongly agreed with the statement, reflecting the organization's customer-centric approach and prioritization of customer satisfaction.

Conversely, the statement "Group learning allows individuals to share, acquire, and combine knowledge through collaborative experiences" had the lowest mean score of 2.624, indicating a more neutral response. This suggests the need for the organization to foster a culture of innovation and encourage employees to share their creative ideas. Another statement with a high standard deviation of 1.38 was "For a company to become more innovative, it is crucial to have employees who can come up with creative ideas." This indicates a higher dispersion rate compared to other statements, highlighting the need for the organization to address this statement and consider potential improvements. However, the statement "My leader has established formal processes and activities to foster innovation" had the lowest standard deviation of 1.15, indicating a lower dispersion rate among respondents. This suggests the organization's success in promoting innovativeness, with employees having a clear understanding of the processes and activities in place.

## 4.2 Scale Measurement

### 4.2.1 Internal Reliability Test

Table 4.2.1.1 Cronbach's Alpha Reliability Test

| | Coefficient Alpha Value | Number of Items |
|---|---|---|
| **Dependent Variable:** | | |
| Innovation | 0.890 | 5 |
| **Independent Variables:** | | |
| Organisational Expertise | 0.838 | 5 |
| Knowledge Management | 0.808 | 5 |
| Employee Engagement | 0.807 | 5 |
| Organisational Culture | 0.802 | 5 |

Source: Developed for the Research Purpose.



The study employed the use of SAS software to perform an in-depth analysis of the independent variables that were considered crucial in evaluating organizational capabilities. The independent variables included knowledge management, employee engagement, and organizational culture. Two hundred respondents were selected to participate in the study by completing a series of survey questionnaires. The resulting data was then used to assess the reliability of the variables, which were all found to be highly reliable. Organizational capabilities scored the highest Cronbach's alpha of 0.838, indicating excellent reliability, followed by knowledge management with a Cronbach's alpha of 0.808, employee engagement with a score of Cronbach's alpha of 0.807, and organizational culture with a Cronbach's alpha of 0.802. Furthermore, the dependent variable of innovation also showed high reliability, scoring a Cronbach's alpha of 0.890. Based on these results, it can be concluded that the survey questionnaires used in this research were reliable and consistent in producing accurate results.

## 4.3 Inferential Analysis

In order to analyze the characteristics and features of a population, this study employed inferential analysis using the collected sample data. This method also allows us to identify the connection between independent variables and dependent variables. Section 4.3.1

### 4.3.1 Pearson Correlation Analysis

To assess the connection between variables, the Pearson Correlation Coefficient, which utilises the covariance method, is utilized. This examination enables us to determine the direction, strength, and significance of the bivariate relationship among all the variables included, such as organisational expertise, knowledge management, employee engagement, and organisational culture. The correlation is measured on an interval or ratio level, and the Pearson Correlation number indicates the correlation coefficient. A correlation of +1 denotes a perfect relationship between the two variables.



#### 4.3.1.1 Organisational Expertise and Innovation

Hypothesis 2

H0: There is no positive correlation between organisational expertise and the creation of innovation.

H2: There is a positive correlation between organisational expertise and the creation of innovation.

Table 4.3.1.1.1: Correlation between Organisational Expertise and Innovation

| | | Innovation |
|---|---|---|
| Organisational Expertise | Pearson Correlation | .932 |
| | Significant | .000 |
| | N | 200 |

The data presented in the above Table provides detailed information on the relationship between innovation and organizational expertise. The analysis reveals a strong positive correlation between these variables, with a correlation coefficient score of 0.932, which is considered high, falling within the range of coefficients from ± 0.71 to ± 0.90. This indicates that there is a significant and positive relationship between organizational expertise and innovation. The findings clearly demonstrate that when organizational expertise is high, the level of innovation also tends to be high. This means that organizations with a high level of expertise in their respective domains tend to be more innovative than those with a lower level of expertise. This correlation is further supported by the p-value of 0.000, which is less than the alpha value of 0.6, providing strong statistical evidence to support the significant relationship between these variables.

Based on these findings, we can reject the null hypothesis (H0) and accept the alternate hypothesis (H1), which suggests that there is a significant and positive relationship between innovation and organizational expertise. Overall, the results indicate that organizations with high levels of expertise in their respective domains are more likely to be innovative, which can lead to increased success and growth.

#### 4.3.1.2 Employee Engagement and Innovation

Hypothesis 3

H0: Employee engagement is not positively associated with innovation.

H3: Employee engagement is positively associated with innovation.

Table 4.3.1.2.1: Correlation between Employee engagement and Innovation

| | | Innovation |
|---|---|---|
| Employee Engagement | Pearson Correlation | .925 |
| | Significant | .000 |
| | N | 200 |



Relationship Analysis:

Based on the data, it has been revealed that there is a strong positive correlation between employee engagement and innovation. This suggests that higher employee engagement results in a higher level of innovation. Moreover, the organisational expertise variable has a correlation score of 0.925 with the innovation variable, indicating a strong relationship. This relationship falls within the range of coefficients from ±0.71 to ±0.90. Furthermore, this relationship is significant with a p-value of 0.000, which is less than the alpha value of 0.6. Therefore, the null hypothesis (H0) is rejected, and the alternate hypothesis (H2) is accepted.

#### 4.3.1.3 Knowledge management and Innovation

Hypothesis 4

H0: is not positively correlated with innovation.

H4: Knowledge management is positively correlated with innovation.

Table 4.3.1.3.1: Correlation between Knowledge management and Innovation

| | | Innovation |
|---|---|---|
| Knowledge Managment | Pearson Correlation | .935 |
| | Significant | .000 |
| | N | 200 |

The table above shows a strong positive correlation between knowledge management and innovation. The correlation score between knowledge management and innovation is 0.935, indicating that high knowledge management leads to high innovation. This correlation coefficient falls within the range of ± 0.71 to ± 0.90, which suggests a solid association between the two variables. The relationship between knowledge management and innovation is significant as the p-value of 0.000 is less than the alpha value of 0.6. Therefore, the null hypothesis (H0) is rejected, and the alternate hypothesis (H3) is accepted.

#### 4.3.1.4 Organisational Cultures and Innovation

Hypothesis 5

H0: Organisational culture has no positive relationship with innovation.

H5: Organisational culture has a positive relationship with innovation.

Table 4.3.1.4.1: Correlation between Organisational Cultures and Innovation

| | | Innovation |
|---|---|---|
| Organisational Cultures | Pearson Correlation | .937 |
| | Significant | .000 |
| | N | 200 |

Based on the data presented above, it is evident that there is a strong correlation between organisational cultures and innovation. The correlation coefficient value of 0.937 between these two variables indicates that high levels of organisational cultures correspond with high levels of innovation. This relationship is particularly robust since the correlation coefficient value of 0.937 falls within the range of coefficients from ± 0.71 to ± 0.90. Additionally, the connection between organisational cultures and innovation is statistically significant, as the p-value of 0.000 is lower than the alpha value of 0.6. This means that we can reject the null hypothesis (H0) and accept the alternate hypothesis (H4).



### 4.3.2 Multiple Linear Regression Analysis

When there are more than one independent variable is used to describe the variance regarding the dependent variable and it is called the Multiple Linear Regression.

Hypothesis 1

H0: The four independent variables that consists of: Organisational expertise, Knowledge Management, Employee engagement and Organisational Culture are not significant,

clarifying the variance in Innovation.

H1: The four independent variables that consists of Organisational expertise, Knowledge Management, Employee engagement and Organisational Culture are significant in clarifying the variance in Innovation.

Table 4.3.2.1: Table of Model Summary of Organisational Expertise, Knowledge Management, Employee Engagement and Organisational Culture

| Model | R Square | Adjusted R Square |
|---|---|---|
| 1 | 0.9516 | 0.9506 |

Source: Developed from research.

a. Independent variable: Organisational Expertise, Knowledge Management, Employee engagement and Organisational Culture
b. Dependent Variable: Innovation

The statistical measure known as R-squared is commonly employed to quantify the extent to which independent variables, including Organisational expertise, Knowledge Management, Employee engagement, and Organisational Culture, can account for the variability observed in the dependent variable, Innovation. Based on this research, we have found that the independent variables elucidate approximately 95.16% of the observed variations in Innovation. However, the remaining 4.84% of unexplained variability suggests that there could be other important variables that were not considered in this study, which may play a significant role in clarifying the observed variations in Innovation.



Table 4.3.2.2: Multiple Linear Regression

| Model | Parameter Estimated | t | Significance |
|---|---|---|---|
| (Constant) | -0.38682 | -7.38 | < 0.0001 |
| Organisational expertise | 0.34873 | 8.15 | < 0.0001 |
| Knowledge Management | 0.46492 | 8.32 | < 0.0001 |

| | | | |
|---|---|---|---|
| Employee Engagement | 0.18875 | 3.13 | 0.0002 |
| Organisational Culture | 0.24712 | 3.97 | 0.0021 |

Source: Developed for the research.

Organizational expertise and employee engagement significantly impact innovation, as indicated by their low p-values (0.0002 and 0.0001, respectively) compared to the alpha value of 0.05. To obtain parameter estimates for the output, we require a linear regression equation. The linear regression equation for this model is presented below:

$$Y = a + b1\ (X1) + b2\ (X2) + b3\ (X3) + b4\ (X4)$$

X1 = Independent variable 1

X2 = Independent variable 2

X3 = Independent variable 3

X4 = Independent variable 4

Innovation = -0.38682 + [ 0.34873 ( Organisational expertise ) ] + [ 0.46493 ( Knowledge Management ) ] + [ 0.18875 ( Employee engagement) ] + [ 0.24712 ( Organisational Culture ) ]

## 4.4 Conclusion

The current chapter provides a detailed overview of the statistical analysis conducted in this study. Specifically, we have employed central tendencies as a means of measuring the ordinal-scaled responses to the 25 questions, including their mean score and standard deviation. In addition, we have conducted rigorous reliability tests to ensure the consistency and accuracy of the variable. Lastly, we have utilised the Pearson and Multiple Regression Analysis to identify the relationship and significance of the variables, thus providing a comprehensive understanding of the data and its implications.

# CHAPTER 5: DISCUSSION AND CONCLUSION

## 5.0 Introduction

This chapter provides a detailed summary of the research findings, including both descriptive and inferential analyses of the study results. The research findings are thoroughly discussed, with a focus on their implications, and the potential limitations of the study are also carefully analyzed. Finally, the research offers valuable insights for future studies in this field, and recommendations and conclusions are drawn from these findings.



## 5.1 Summary of Statistical Analysis

### 5.1.1 Summary of Descriptive Analysis

The survey results provide a vivid and detailed snapshot of the target population. The gender distribution of the respondents indicates that the majority are female, accounting for 53% of the total, while the remaining 47% are male. This gender disparity is due to the fact that the target population is predominantly composed of female employees. Regarding age, the survey reveals that the largest group of respondents falls within the 31 to 40 years old range, comprising 34.50% of the respondents. The second-largest age group is the 21 to 30 years old range, consisting of 21% of the respondents. It is worth noting that only a small percentage of respondents fall between the ages of 18 to 20, accounting for 4% of the total number of respondents.

The ethnicity distribution of the respondents shows that the majority are of Chinese

descent, representing 67% of the total, followed by Malay (16%), Indian (12%), and other ethnicities (5%). This is likely because most of the respondents work for Chinese firms. In terms of education level, the majority of respondents hold a bachelor's degree, accounting for 71% of the total, while 15% have a Diploma. Only a small percentage of respondents have a Master's or PhD degree (10%), while 4% hold other qualifications. It is noteworthy that all of the target respondents are executive-level employees, so having a high level of education is critical. The survey also reveals that only 20 respondents have a Master's Degree, indicating a need for further education among the target population. The survey also gathered data on the marital status of the respondents, showing that the majority are married, accounting for 53.5% of the total, while the remaining 44% are single, and a small percentage fall under the "others" category (2.5%). Regarding salary, most respondents earn between RM2001 to RM3000, accounting for 50% of the total. Those earning below RM2000 make up 4.5% of respondents while the lowest percentage is for those earning RM6000 and above.



The majority of respondents are full-time employees, accounting for 94% of the total, while 1.5% are part-timers and 1% are interns/other. Finally, the survey gathered information on the respondents' experience in the manufacturing industry. The results indicate that most of the respondents have worked in the industry for less than ten years, with the highest percentage being in the zero to five years and six to ten years experience ranges. None of the respondents have worked in the industry for more than 20 years. Overall, the survey results provide a comprehensive and detailed view of our target population, which will help us tailor our services to better meet their needs.

## 5.1.2 Summary of Inferential Statistics

### 5.1.2.1 Reliability Test

The study performed a reliability test on 200 participants. The results showed that the questionnaire used in the research was dependable since all the variables scored above 0.7. The study examined four independent variables, namely organisational expertise, knowledge management, employee engagement, and organisational culture. Each variable had an alpha value ranging from 0.801 to 0.837, indicating good to excellent reliability. The dependent variable, innovation, had an alpha value of 0.890, indicating high reliability. These findings suggest that the questionnaire used in the study was effective in measuring the variables, and the study's outcomes are trustworthy.



### 5.1.2.2 Pearson Correlation Analyses

The Pearson Correlation Coefficient is a statistical tool that helps us understand the relationship between different factors. Recent studies have revealed that innovation is significantly impacted by several factors such as organizational expertise, knowledge management, employee engagement, and organizational culture. The data shows that organizational expertise has the strongest correlation coefficient value, scoring 0.93676, indicating that it is the most critical factor for innovation. Next, knowledge management scored 0.93525, suggesting that it plays a significant role in fostering innovation. Organizational culture scored 0.92533, indicating that it is also a crucial factor but may not be as influential as the other two factors. Surprisingly, the weakest correlation coefficient value is associated with organizational culture, scoring 0.93180. This suggests that it might not have as significant an impact on innovation as the other factors.

### 5.1.2.3 Multiple Regression Analyses

The findings of the Multiple Regression Analysis indicate that the mean score of organisational culture has the most significant impact on innovation, with a p-value of 0.0020. This means that the culture within an organisation plays a crucial role in encouraging innovation. The mean score of organisational culture is a close second, with a p-value of 0.0001, suggesting that it also has a significant influence on innovation. On the other hand, knowledge management and organisational expertise have the lowest p-value of less than 0.0001, indicating that they also contribute significantly to innovation within an organisation. Overall, the analysis highlights the importance of the four organisational factors in promoting innovation, as they all have a p-value of less than 0.05.

## 5.2 Major Findings

Table 5.2.1: Correlation Value between Independent Variables and Job Satisfaction

| Hypotheses | Results | Conclusion |
|---|---|---|
| $H_2$: There is a positive correlation between organizational expertise and innovations. | P = <.0001<br>R sq= 0.8776 | $H_2$ is s accepted |
| $H_3$: There is a positive effect between knowledge management and innovation | P = <.0001<br>R sq= 0.8748 | $H_3$ is s accepted |
| $H_4$: There is a positive effect between employee engagement and innovation | P = 0.0020<br>R sq= 0.8563 | $H_4$ is accepted |
| $H_5$: There is a positive effect between organisational culture and innovation | P = 0.0001<br>R sq = 0.8683 | $H_5$ is accepted |



Source: Developed from the research

The correlation between independent variables and job satisfaction is presented in the table above. The study tested several hypotheses to determine the positive correlation between different factors and innovation. The first hypothesis, H2, proposed a positive correlation between organizational expertise and innovation. The results showed a strong relationship between the two factors, with a p-value of less than .0001 and an R squared value of 0.8776. Therefore, H2 is accepted. The second hypothesis, H3, tested the positive effect of knowledge management on innovation. The results showed that the p-value was less than .0001 and the R squared value was 0.8748. Therefore, H3 is accepted. The third

hypothesis, H4, tested the positive effect of employee engagement on innovation. The results showed that the p-value was 0.0020 and the R squared value was 0.8563. Therefore, H4 is accepted. The fourth hypothesis, H5, tested the positive effect of organizational culture on innovation. The results showed that the p-value was 0.0001 and the R squared value was 0.8683. Therefore, H5 is accepted.

All the information presented in the table is based on the findings from the conducted research.

## 5.3 Implication of the Study

### 5.3.1 Managerial Implications

Innovation has become an integral part of modern business practices, embedded deeply within the organisational structures, processes, and products of firms. Without embracing innovation, firms stand to lose their competitive edge and, subsequently, their customers, market share, and profits. Scholars such as Drucker (1985), Hitt, Ireland, Camp, & Sexton (2001), Kuratko, Ireland, Covin, & Hornsby (2005), Rashwan & Ghaly, (2022), Ishak, & Thiruchelvam (2023), have argued that innovation provides firms with a strategic orientation to solve problems and achieve a sustained competitive advantage. Innovation is a multifaceted concept that is not only applicable to products and processes but also to marketing and firm culture. The OECD Oslo Manual (2005) identifies four types of innovation: innovation, process innovation, marketing innovation, and organisational innovation. Achieving innovation requires a strong commitment from top to bottom of the organisation, as highlighted by Akova et al. (1998) and Wang et al. (2023), who emphasised the importance of fostering synergy both within and outside the firm with customers and suppliers.



Based on the results of a comprehensive research study, organisational expertise, employee engagement, knowledge management, and organisational culture were identified as critical factors that positively affect innovation in manufacturing firms. The study found that if these four factors are well-designed, executed, and supervised, they can significantly enhance firm performance, teamwork, and other important outcomes. The implications of these findings are significant, as they provide guidance on how firms can increase their innovation capabilities by designing adaptive organisational cultures that are proactive and flexible in problem-solving and decision-making.

The research underscores the importance of company managers paying attention to all aspects of their organisations, not just product and service innovation. Innovation is a dynamic and collaborative process that requires the active participation of all employees. Thus, firms should articulate their innovation programs and related information to all employees and encourage them to share their ideas and feedback freely. Support from upper management is also critical to fast-track innovation progress, and setting clear innovation goals, such as product X modifications in the next year, provides direction and strategic focus. Recognising and rewarding new ideas and thoughts can also encourage employees to participate actively in innovation programs. Communication barriers, such as status differences, gender differences, cultural differences, and prejudices, should be addressed to encourage team members to share new ideas and collaborate effectively.

Overall, this research provides firms with a deeper understanding of the context of innovation and how innovation programs should be developed and executed to align with the interests of employees, fostering their innovativeness and competitiveness. Successful innovation can help firms prioritize their market, production, and technological approaches for long-term success.

## 5.4 Limitations of the Study

Achieving accuracy and precision in results requires a significant amount of effort in gathering information, supporting documents, and conducting surveys. Despite the existence of numerous theoretical studies and published articles on the topic, only a handful of studies have closely examined the impact of organizational expertise, knowledge management, employee engagement, and organizational culture on innovation in manufacturing firms. It is important to note that the questionnaire design may not cover all the actual measurements required for different respondents. The job type and working experience of the respondents are used to categorize them, but the targeted group of respondents has different statuses and levels. Therefore, the questionnaire only covers the dimensions needed to measure organizational factors and innovation. As a result, respondents may have varied perceptions of the factors influencing innovation. It is important to recognize that this study is limited to what we aimed to measure.



The data collection is limited to selected locations. Although Malaysia has 14 states and over 631,552 companies, we only sampled Johor, Perak, Pulau Pinang, and Kuala Lumpur. The sampling may encounter issues because it may not be large enough to represent all 14 states. Therefore, we used geographical and cluster sampling techniques to save costs, reduce time, and ensure data feasibility. Furthermore, it is worth noting that the research is based on quantitative measurement, which uses numerical and analytical approaches to address research objectives through empirical findings. However, some data require a qualitative approach to measure accurately. To collect respondents' responses, we tested their participation using observation, listening, and interpreting methods. Some factors cannot be recorded through a single method, and the questionnaire

may not give them a chance to voice their opinions. Therefore, in the future, we suggest using a combination of quantitative and qualitative methods to collect sample data.

Additionally, the number of female respondents is higher than male respondents, and the majority of respondents are Chinese, with fewer Malays, Indians, and individuals of other ethnicities. Finally, it is important to note that some respondents are reluctant to participate because they perceive the questionnaire to be a sensitive subject that discloses their firm's innovativeness and their personal profile. Even though we have clearly articulated why we are interested in their firm, some firms are still unwilling to cooperate due to their heavy workload.

## 5.5 Recommendations for Future Research

The primary objective of this study is to delve into the various factors that can impact innovation in manufacturing companies. As innovation plays a critical role in a firm's service, technology, and management, it is imperative for organisations to comprehend the nature of innovation and how it can be integrated into their decision-making, structure, and overall innovativeness.

Despite the significance of innovation, there are several elements beyond organisational expertise, employee engagement, knowledge management, and organisational culture that can impact it. Consequently, further research is necessary to explore how innovation can be affected in the current business environment.



While there has been some progress in this area, there is still considerable room for improvement and more research. In this regard, there are several variables that need to be evaluated in the context of innovation and other related fields, such as agriculture, packaging, and more. Factors that can influence innovation include market orientation, information technology, knowledge integration mechanisms, and external factors such as the economy, infrastructure, and current trends.

To ensure the accuracy of the study's findings, future researchers are encouraged to expand the distribution of questionnaires and increase the number of respondents to represent the population better. Furthermore, researchers should select respondents from other industries, such as textile, telecom, and food, to gain a more comprehensive understanding of the nature of innovation. It is important to note that

a country's innovation cannot be studied or concluded based on the results of a single industry. Thus, conducting more research on the innovativeness of other sectors is imperative to advance the era of technological innovation and progress.

## 5.6 Conclusion

The research had a significant objective – to explore and examine the various factors that impact innovation in manufacturing firms. I focused on four critical variables namely, employee engagement, knowledge management, organizational culture, and organizational expertise. Through the use of analysis software, we were able to determine the direct positive or negative effects of each variable on innovation. My study discovered that organizational expertise had the highest alpha value, followed by knowledge management, employee engagement, and lastly, organizational culture, which had the lowest effect on innovation.



To provide a more comprehensive summary and analysis of our findings, I have presented detailed statistical analysis, major findings, the implications of the study, limitations of the research, and recommendations for future research. I have also interpreted and discussed the relationship between the independent variables and dependent variables to justify and prove the results obtained in Chapter Four. I also presented the limitations and constraints I encountered while conducting the research and provided recommendations for future areas of investigation to further enhance the understanding of the factors that impact innovation in manufacturing firms.

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## APPENDIX 1.0 PERMISSION LETTER

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

This letter certifies that Mr Yap Kim Fai I.C. 770401-14-5501, Matric No. M221101045 is currently pursuing an MBA at Universiti Tun Abdul Razak (UNIRAZAK), Malaysia. He has been a registered student since November 2022 semester.

We would be most grateful if you could allow him and his nominated assistants to conduct a survey, collect, process and analyse data pertaining to his research area. The data obtained will be strictly used for academic purposes, and respondents' anonymity will be ensured. His working thesis title is 'Enhancing Innovation in the Manufacturing Industry: Antecedent Factors'

We seek your kind cooperation to assist Mr. Yap Kim Fai in his quest for knowledge. All the support rendered to him is highly appreciated. If you have enquiries with regard to the above, please do not hesitate to contact us at +60122024577 or roland@unirazak.edu.my

Thank you. Yours sincerely,

(Prof Dr Roland Xavier as supervisor)

## APPENDIX 2.0: QUESTIONNAIRE

### Enhancing Innovation in the Manufacturing Industry: Antecedent Factors

Survey Questionnaire

Dear respondent,

**Instructions**:

This questionnaire consists of **TWO (2)** sections. Section A and B. Respondents are required to answer **ALL** of the questions. The contents of this questionnaire will be kept strictly **PRIVATE AND CONFIDENTIAL.** Please use either a blue or black pen to tick and circle at the appropriate boxes provided.

We would like to invite you to participate in our survey that aims to investigate the relationship between organizational culture, expertise, knowledge management, employee engagement, and innovation. It would be highly appreciated if you could answer all the questions in the questionnaire. Please be assured that all the data collected will be used strictly for research purposes. Thank you for your valuable time.

**Section A: Demographic Profile**

Please provide the following information about yourself by placing a "√" on one of the blank spaces to assist us in analysing the responses.

1. Gender:
   - Female
   - Male

2. Age:
   - 18-20
   - 21-30
   - 31-40
   - 41-50
   - 51 and above

3. Race
   - Malay
   - Chinese
   - Indian
   - Others: _____(Please Specify)

4. Marital status:
   - Single
   - Married
   - Others: _____(Please Specify)

5. Highest education completed:
   (Please specify the fields of study.) E.g., Bachelor of Business Administration

   - Diploma _____
   - Bachelor Degree _____
   - Master's / PhD Degree _____
   - Others _____

6. Basic monthly income level:
   - Below RM 2000
   - RM 2001 – RM 3000
   - RM 3001 – RM 4000
   - RM 4001 – RM 5000
   - RM 5001 – RM 6000
   - RM 6001 – RM 7000
   - Above RM 7000



7. Job Type:
   - Part-Time
   - Full Time
   - Internship
   - Temporary
   - Others: _____(Please Specify)

8. Total Working Experience in Manufacturing Firm:
   - 0 – 5
   - 6 – 10
   - 11 – 15
   - 15 – 20
   - More than 20 years

**Section B: Perception of innovation**

Below are the dimensions for evaluating innovation. Please use the Likert scale (1-5) to indicate your level of agreement with each statement.

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**Definition: The creation and subsequent introduction of a good or service that is either a new or an improved version of previous goods.**

| **Dimension: Innovation** | SD | D | N | A | SA |
|---|---|---|---|---|---|
| 1. Our new products and services are often perceived as very unique by customers. | 1 | 2 | 3 | 4 | 5 |
| 2. Our company has introduced more innovative Products/services during the past five years. | 1 | 2 | 3 | 4 | 5 |
| 3. Our company is rapidly bringing new products or services into the market. | 1 | 2 | 3 | 4 | 5 |
| 4. Our new products with functionalities that totally different from the current one. | 1 | 2 | 3 | 4 | 5 |
| 5. Our company develop new products with components that are different from the current one. | 1 | 2 | 3 | 4 | 5 |

**Definition: A company's ability to manage resources in gaining an advantage over competitors and meeting customer demand.**

| **Dimension: Organisational Expertise** | SD | D | N | A | SA |
|---|---|---|---|---|---|
| 1. The objective of our organisation is to help develops employees' competencies towards innovation. | 1 | 2 | 3 | 4 | 5 |
| 2. Training program is conducted to improve our ability to enhance the generation of new ideas. | 1 | 2 | 3 | 4 | 5 |
| 3. My firm developed new management approaches to fulfil the changing needs of our customers. | 1 | 2 | 3 | 4 | 5 |
| 4. My firm's R&D is adequate to handle the development needs of new products. | 1 | 2 | 3 | 4 | 5 |
| 5. My firm utilises different strategy and seek unusual, novel solutions for our customers. | 1 | 2 | 3 | 4 | 5 |



**Definition: The process of capturing, developing, sharing, and efficiently using organisational knowledge.**

| **Dimension: Knowledge Management** | SD | D | N | A | SA |
|---|---|---|---|---|---|
| 1. Employees have skills that contribute to the developmentof new products and opportunities. | 1 | 2 | 3 | 4 | 5 |
| 2. There is the free flow of relevant information in the organisation. | 1 | 2 | 3 | 4 | 5 |
| 3. Employees have skills that are needed to maintain high-quality products/services | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| 4. Employees have skills that enable our company to provide exceptional customer value. | 1 | 2 | 3 | 4 | 5 |
| 5. Employees exchange information among each other for solving problems purposes | 1 | 2 | 3 | 4 | 5 |

**Definition: Degree to which employees believe that their organisation values their contribution and cares about their well-being.**

| **Dimension: Employee Engagement** | SD | D | N | A | SA |
|---|---|---|---|---|---|
| 1. My supervisor contributes ideas regarding new product concepts that are helpful for my workgroup. | 1 | 2 | 3 | 4 | 5 |
| 2. The management is able to assist me further on new product development. | 1 | 2 | 3 | 4 | 5 |
| 3. My company makes wise decisions on new product development in order to be more competitive in the marketplace. | 1 | 2 | 3 | 4 | 5 |
| 4. My company provides sufficient resources and information to undergo research for new product generation. | 1 | 2 | 3 | 4 | 5 |
| 5. Supportive staff in my workplace has the skills and knowledge to provide effective guidance to the employees in pursuing their research on new product developments. | 1 | 2 | 3 | 4 | 5 |

**Definition: The values and behaviours that contribute to the unique social and psychological environment of an organisation.**

| **Dimension: Organisational Culture** | SD | D | N | A | SA |
|---|---|---|---|---|---|
| 1. Employees with creative ideas are able to improve the firm's innovativeness. | 1 | 2 | 3 | 4 | 5 |
| 2. My leader established a formal processes and activities to promote innovativeness. | 1 | 2 | 3 | 4 | 5 |
| 3. Empowerment enables me to have a sense of ownership and responsibility toward the organisation, which results in greater organisational effectiveness. | 1 | 2 | 3 | 4 | 5 |
| 4. Group learning enables me to share, acquire, and combine knowledge through experience with one another. | 1 | 2 | 3 | 4 | 5 |
| 5. My firm tends to learn ways to understand and react to their customer's needs. | 1 | 2 | 3 | 4 | 5 |



**~ THANK YOU FOR PARTICIPATING IN OUR QUESTIONNAIRE. ~**

**APPROVAL PAGE**

**TITLE OF PROJECT:** **ENHANCING INNOVATION IN THE MANUFACTURING INDUSTRY: ANTECEDENT FACTORS**

**NAME OF AUTHOR:** **YAP KIM FAI**

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The undersigned is pleased to certify that the above candidate has fulfilled the condition of the project paper prepared in the partial fulfilment for the award of the degree of Master of Business Administration.

**SUPERVISOR**

Signature **:** _____

Name **:**

Date **:**



**ENDORSED BY:**

_____

Dean

Graduate School of Business

Date