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**THE EFFECTS OF SUPPLY CHAIN MANAGEMENT
PRACTICES ON SMES MANUFACTURING PERFORMANCE IN
MALAYSIA**



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MASTER OF SCIENCE (SUPPLY CHAIN MANAGEMENT)

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**THE EFFECTS OF SUPPLY CHAIN MANAGEMENT
PRACTICES ON SMES MANUFACTURING PERFORMANCE IN
MALAYSIA**

By



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Thesis Submitted to

Othman Yeop Abdullah Graduate School of Business

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In Partial Fulfilment of the Requirement for the Master of Science

(Supply Chain Management)



Kolej Perniagaan
(College of Business)
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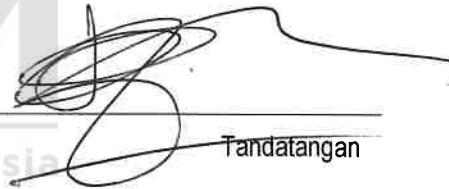
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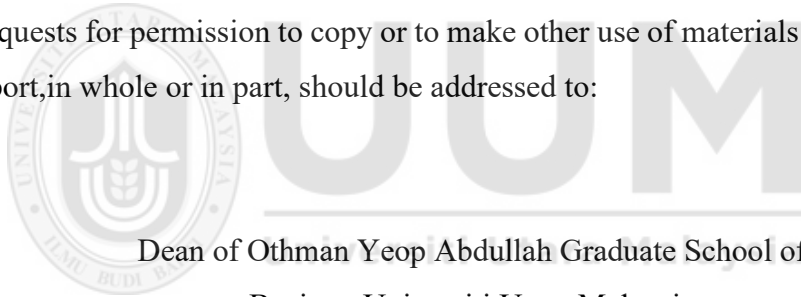
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LIST OF SYMBOLS AND ABBREVIATIONS

SCM	Supply Chain Management
SCMP	Supply Chain Management Practices
SCS	Supply Chain Strategy
SCI	Supply Chain Integration
SCIM	Supply Chain Information Management
SMEs	Small and Medium Enterprises
FMM	Federal Malaysia Manufacturing
KPI	Key Performance Indicators
RBV	Resource Based View
TCE	Transaction Cost Economics
RBT	Resource Based Theory
SMART PLS	Structural Equation Modelling Partial Least Squares

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ABSTRAK

Ekonomi Malaysia bergantung kepada perusahaan kecil dan sederhana (PKS). Pengurusan rantai bekalan adalah penting untuk meningkatkan prestasi industri dan daya saing pasaran syarikat-syarikat ini. Kajian ini memberi tumpuan kepada kesan amalan pengurusan rantai bekalan pada prestasi pengeluaran PKS di Malaysia. Kajian ini juga bertujuan untuk mendedahkan amalan pengurusan rantai bekalan yang memberi kesan signifikan kepada prestasi pengeluaran dan menawarkan nasihat praktikal kepada PKS untuk meningkatkan prestasi melalui teknik Pengurusan Rantai Bekalan yang berkesan. Penyelidik mengumpulkan data kuantitatif daripada PKS di Malaysia. Penyelidikan ini menggunakan soalan kajian untuk mengumpul data mengenai strategi rantai bekalan syarikat-syarikat kecil, integrasi rantai bekalan, pengurusan maklumat rantai bekalan dan indikator prestasi pengeluaran. Penyelidik menggunakan SPSS dan SmartPLS untuk menilai data serta memahami bagaimana amalan pengurusan rantai bekalan mempengaruhi prestasi pengeluaran. Kajian ini mendapati bahawa strategi pengurusan rantai bekalan mempengaruhi prestasi pengeluaran SME Malaysia. Penyelidik juga menganalisis dan menafsirkan data untuk mengenal pasti indikator prestasi dalam membantu PKS meningkatkan kecekapan operasi dan daya saing pasaran. Sebagai kesimpulan, kajian ini menumpukan berkaitan dengan pengurusan rantai bekalan dan prestasi PKS di Malaysia. Dengan menekankan kesan amalan rantai bekalan terhadap prestasi pengeluaran, kajian ini memberi nasihat kepada PKS mengenai cara untuk mengoptimumkan operasi dan kemampuan dalam persekitaran perniagaan yang kompetitif di Malaysia.

Kata kunci: *prestasi kilang, strategi rantai pembekalan, integrasi rantai bekalan, pengurusan maklumat rantai bekalan*

ABSTRACT

Malaysia's manufacturing economy relies on SMEs. Supply chain management is crucial for improving these SMEs' industrial performance and market competitiveness. This study focuses on the effects of supply chain management practices on Malaysian SMEs' manufacturing performance. The study seeks to uncover supply chain management practices that significantly impact manufacturing performance and offer practical advice for SMEs to improve performance through effective supply chain management techniques. The researcher collected quantitative data from Malaysia's manufacturing SMEs. The research uses survey questionnaires to collect data on these SMEs' supply chain strategy (SCS), supply chain integration (SCI), supply chain information management (SCIM), and manufacturing performance indicators. The researcher used SPSS and SmartPLS to evaluate the data to understand how supply chain management practices affect manufacturing performance. The study found that supply chain management strategies affect Malaysian SMEs' manufacturing performance. The researcher also analyses and interprets data to identify performance indicators, helping SMEs enhance operational efficiency and market competitiveness. In conclusion, this study advances Malaysian supply chain management and SME performance studies. By highlighting supply chain practices' impact on manufacturing performance, the study advised SMEs to optimize operations and grow sustainably in Malaysia's competitive business environment.

Keywords: *manufacturing performance, supply chain strategy, supply chain integration, supply chain information management*

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter delves into the study's background, problem statement, research objective, research questions, scope, and limitations of the research. Additionally, this study discusses research significance. Finally, the researcher defined key terms and organised the study's conduct.

1.2 Background of Study

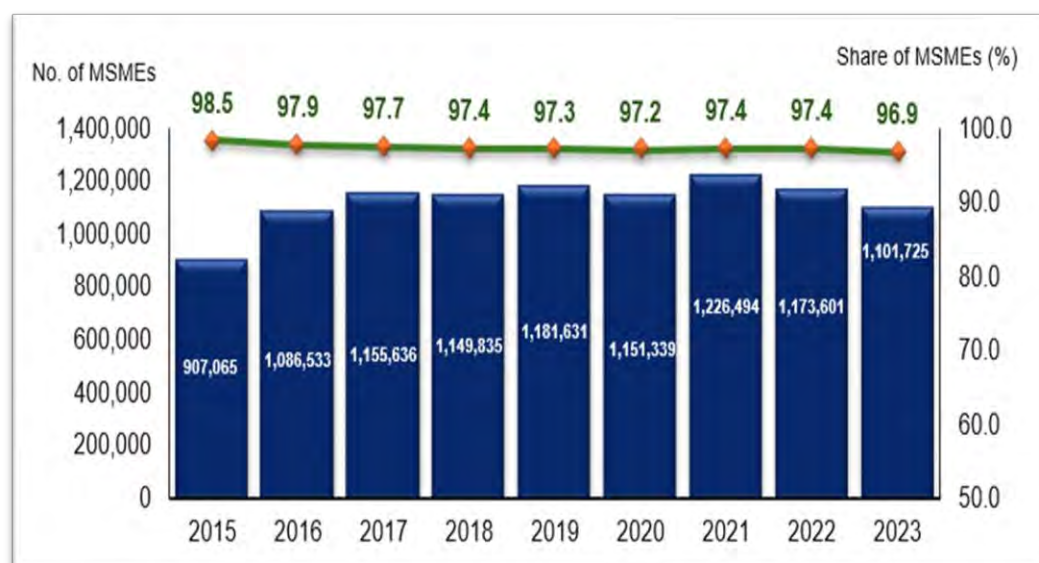
Global competitiveness has ushered in a new era for manufacturing firms. These businesses initially implemented lean production concepts to boost productivity in response to growing competition (Chikán et al., 2022). They aimed to enhance local operations and manufacturing. Industrial firms restrict productivity enhancements. Dealing with supplier performance issues, unclear client requirements, and the volatile business environment. Businesses can enhance their competitiveness by adopting an integrated supply chain strategy (SCS) to tackle these challenges (Barnum, 2024). Competition among company chains is now more important than competition within individual firms. The trend is more prominent in underdeveloped countries. Modern organizations work together with suppliers, consumers, and sometimes even competitors to adapt to these changes (Barnum, 2024b). They aim to establish a collaborative supply chain strategy (SCS) that excels and takes the lead in their respective industries by sharing expertise and information. In a highly competitive environment, it is increasingly challenging to obtain a competitive advantage.

As stated by Dubey et al. (2024), manufacturing organizations also must integrate supply chains and cultivate collaborative connections to effectively adjust to

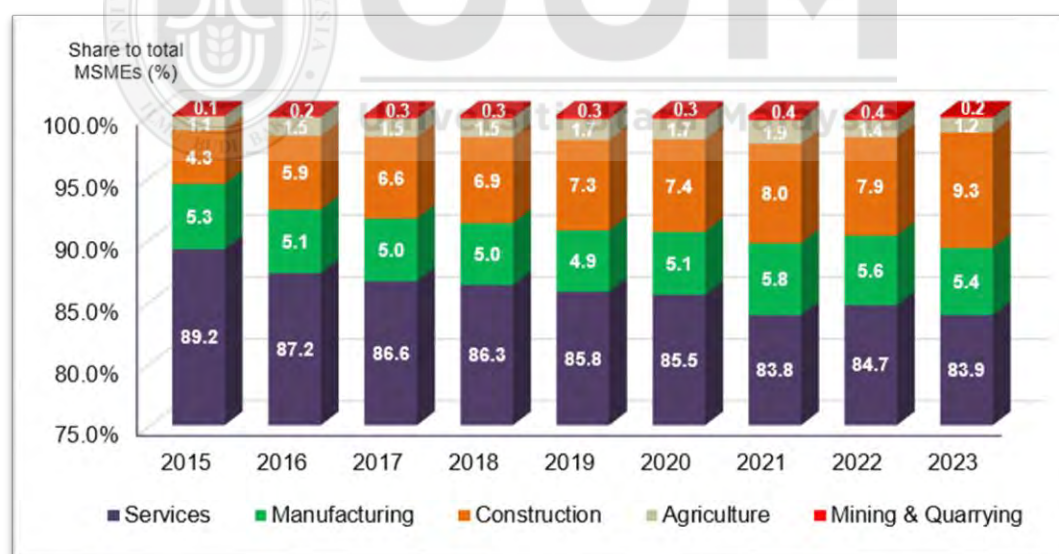
market changes. Their methodology allows them to effectively handle global competition and emerge as industry leaders. Supply chain management (SCM) practices significantly impact manufacturing performance, particularly in small and medium-sized enterprises (SMEs) in Malaysia, among the constantly evolving global economic landscape (Hossain et al., 2023). This research investigates the intricate relationship between supply chain management (SCM) strategies and manufacturing efficiency in small and medium-sized enterprises (SMEs) in Malaysia. The significance of these practices is crucial, emphasizing the need for effective supply chain management (SCM) strategies to improve productivity and competitiveness in the dynamic global market, despite facing barriers and criticisms (Nasyiah et al., 2024). In this research, the researcher explored how supply chain management (SCM) practices affect the manufacturing performance of small and medium-sized enterprises (SMEs) in Malaysia. It underlines the key reasons why applying and improving these tactics is critical to achieving sustainable growth and success (Jordão & Novas, 2022). Furthermore, the researcher intends to highlight the significance of this link, despite the current research gap in this field. This research also shows that addressing this crucial relationship is vital for improving operational efficiency and boosting competitiveness in the local market (Cheah & Tan, 2023). This study aims to examine the influence of supply chain management (SCM) approaches on manufacturing performance to provide valuable insights for strategic decision-making and sustainable growth for Malaysian small and medium-sized enterprises (SMEs).

Based on the latest data published by the Department of Statistics, Malaysia (DOSM), MSMEs accounted for 96.9% (1,101,725 firms) of overall establishments in Malaysia in 2023. There has been an increment of more than 190,000 firms as compared

to a total of 907,065 MSMEs in 2015, thus registering an average growth rate of 2.5% per annum during the period.



Note. From Profile of MSMEs in 2015-2023. Department of Statistics, Malaysia (DOSM). Copyright 2024 by Department of Statistics Malaysia (DOSM).



Note. From Profile of MSMEs in 2015-2023. Department of Statistics, Malaysia (DOSM). Copyright 2024 by Department of Statistics Malaysia (DOSM).

In terms of breakdown by key economic sectors based on the above graph, the services sector has consistently accounted for more than 80% of all MSMEs throughout the period. For the latest 2023 MSME profile, the services sector constituted 83.9%, amounting to 924,170 firms. The construction sector remained to be the second largest

contributor at 9.3% (102,657 firms). Meanwhile, about 5.4% of MSMEs (59,316 firms) were involved in the manufacturing sector, followed by 1.2% (13,099 firms) in the agriculture sector, with the remaining 0.2% (2,483 firms) in the mining & quarrying sector.

By business size, majority of the MSMEs were microenterprises, forming 69.7% (767,421 firms) of total MSMEs in Malaysia. Meanwhile, small-sized firms accounted for 28.5% (314,465 firms) and medium-sized firms constituted the balance 1.8% (19,839 firm).



Note. From Profile of MSMEs in 2015-2023. Department of Statistics, Malaysia (DOSM). Copyright 2024 by Department of Statistics Malaysia (DOSM).

This study aims to build upon previous studies regarding the impact of supply chain management (SCM) strategies on the manufacturing performance of Malaysian small and medium-sized enterprises (SMEs) (Jose & Shanmugam, 2020). In addition, supply chain management (SCM) is crucial for enhancing production efficiency and effectiveness in small and medium-sized enterprises (SMEs) with limited resources (Chang et al., 2024). This study investigates the impact of supply chain management (SCM) strategies on the performance of manufacturing small and medium-sized

enterprises (SMEs). This study addresses a gap in the existing literature by offering specialized insights for Malaysian small and medium-sized enterprises (SMEs). These insights are beneficial for professionals and policymakers seeking to enhance supply chain management (SCM) operations to improve manufacturing performance in the area. According to Partanen et al. (2020) found that supply chain management (SCM) approaches have a significant impact on manufacturing performance, especially in Malaysian small and medium-sized enterprises (SMEs). In this study, the researcher examines the impact of supply chain management practices (SCMP) on the performance of manufacturing companies and their ability to enhance operational efficiency and success for small and medium-sized enterprises (SMEs) in Malaysia. Moreover, the researcher focused on the Small and medium-sized enterprises (SMEs) supply chain management (SCM) strategies in Malaysia to provide insights into the country's manufacturing dynamics and their impact on manufacturing performance. This study also supported by Partanen et al. (2020) conducted an empirical study and data analysis to investigate the impact of strategic supply chain management (SCM) methods on enhancing the competitiveness and sustainability of Malaysian manufacturing small and medium-sized enterprises (SMEs). In addition, Lee et al. (2022) found that supply chain management (SCM) approaches impact manufacturing performance in Malaysian small and medium-sized enterprises (SMEs). The researcher found that supply chain management (SCM) solutions enhance manufacturing business performance, particularly for Malaysian small and medium-sized enterprises (SMEs). This includes the acquisition of raw materials, manufacturing, inventory control, and distribution (Cabo & Possani, 2024). The researcher also found that effective supply chain management (SCM) in Malaysia enhances manufacturing performance by impacting small and medium-sized enterprises' (SMEs) productivity, cost-effectiveness,

and responsiveness. The study can assist small and medium-sized enterprises (SMEs) in making strategic decisions and improving their operations by analyzing supply chain management (SCM) techniques and manufacturing performance.

In previous studies, scholars have done research on how supply chain management (SCM) approaches impact the performance of small and medium-sized enterprises (SMEs). Effective supply chain management (SCM) enhances the performance and competitiveness of small and medium-sized enterprises (SMEs) in the current dynamic business environment (Koh et al., 2007; Syhachack et al., 2024). Small and medium-sized enterprises (SMEs) can enhance operational efficiency, reduce expenses, and improve customer satisfaction through the implementation of efficient supply chain management (SCM) approaches. Furthermore, previous scholars also suggested that small and medium-sized enterprises (SMEs) can enhance their operations and achieve a competitive advantage by implementing supply chain management (SCM) tactics such as supplier relationship management, inventory management, and logistics optimization (Koh et al., 2007; Purnama., 2024). In this study, the researcher highlighted that Small and medium-sized enterprises (SMEs) that focus on seeking to enhance their performance and sustainability should use robust supply chain management (SCM) strategies. In addition, competent supply chain management (SCM) also impacts the performance of small and medium-sized enterprises (SMEs). Moreover, small and medium-sized enterprises (SMEs) that have effective supply chain management (SCM) strategies enhance operational efficiency, reduce costs, and increase customer satisfaction (Koh et al., 2007; Purnama., 2024). Small and medium-sized enterprises (SMEs) can enhance market competitiveness and financial performance by improving inventory management, procurement, and distribution (Alam et al., 2023). Small and medium-sized enterprises (SMEs) can

enhance their performance and sustainability by efficiently managing their supply chain to respond promptly to market demands, reduce lead times, and minimize disruptions (Miswanto et al., 2024). Small and medium-sized enterprises (SMEs) need to prioritize effective supply chain management (SCM) to thrive in the current fast-paced business landscape (Nasereddin, 2024). Supply chain management (SCM) techniques impact the performance of small and medium-sized enterprises (SMEs). Moreover, Teoh et al. (2023) suggest that effective supply chain management (SCM) can enhance operational efficiency, reduce costs, and improve customer satisfaction for small and medium-sized enterprises (SMEs). Optimizing small and medium-sized enterprise (SME) processes can improve competitiveness by implementing effective supply chain management (SCM) procedures such as inventory management, procurement strategies, and simplified logistics (Zheng & Chen, 2024). Efficient supply chain management (SCM) enables small and medium-sized enterprises (SMEs) to promptly adapt to market needs, reduce disruptions, and foster robust partnerships with suppliers and customers (Canwat, 2024). Small and medium-sized enterprises (SMEs) need to develop robust supply chain management (SCM) strategies to enhance performance and thrive in the current fast-changing business environment. Small and medium-sized enterprises' (SMEs) performance is contingent upon supply chain management (SCM). Small and medium-sized enterprises (SMEs) can enhance operational efficiency, reduce expenses, improve product quality, and achieve a competitive advantage through effective supply chain management (SCM) (Saunila et al., 2024). Effective supply chain management (SCM) also assists small and medium-sized enterprises (SMEs) in improving operations, collaborating closely with suppliers and distributors, optimizing inventory levels, and promptly addressing market demands (Khan et al., 2024). This enhances customer satisfaction, sales, and small and medium-sized enterprises' (SMEs)

productivity. By establishing strong supplier connections and collaborating effectively in the supply chain, small and medium-sized enterprises (SMEs) may minimize risks, ensure punctual deliveries, and adapt to evolving market conditions (Al-Shboul., 2023). Supply chain management (SCM) approaches significantly impact the performance and competitiveness of small and medium-sized enterprises (SMEs).

Supply chain management (SCM) strategies significantly impact the success of manufacturing organizations, especially small and medium-sized enterprises (SMEs). Previously scholars highlighted that efficient supply chain management (SCM) strategies can greatly improve manufacturing performance by streamlining operations, increasing efficiency, and cutting costs throughout the supply chain (Hong et al., 2019; Le & Ikram., 2022). Small and medium-sized enterprises (SMEs) can improve productivity and performance by employing strong supply chain management practices (SCMP) to streamline operations, promote supplier cooperation, and assure timely delivery (Purwaningsih et al., 2024). Furthermore, supply chain management practices (SCMP) helped small and medium-sized enterprises (SMEs) react quickly to market needs, reduce risks, and promote innovation, ultimately leading to a competitive advantage in the sector (Kerekes & Felföldi, 2020). The researcher explores more about the efficient supply chain management practices (SCMP) that are crucial for small and medium-sized enterprises (SMEs) to improve their production performance and achieve sustainable growth in the current dynamic business landscape. In this study also, the researcher investigated that supply chain management practices (SCMP) are essential for improving manufacturing performance, especially for small and medium-sized enterprises (SMEs).

Implementing efficient supply chain management (SCM) strategies can greatly influence the operational effectiveness and overall performance of manufacturing

companies (Mani et al., 2020; Jaboob et al., 2024). Small and medium-sized enterprises (SMEs) can improve their production processes, lower costs, and improve product quality by implementing strong supply chain management (SCM) strategies such as effective inventory management, efficient procurement processes, and cooperative supplier relationships. Integrating technology and data analytics in supply chain management (SCM) can improve visibility and transparency, allowing small and medium-sized enterprises (SMEs) to make well-informed decisions and quickly adapt to market fluctuations (Nazir et al., 2024). Furthermore, supply chain management practices (SCMP) are vital for small and medium-sized enterprises (SMEs) to achieve operational excellence and competitiveness in the manufacturing sector. A study by Sabry et al. (2024) explored the relationship between SCMP and perceived organizational performance in the oil and gas industries revealing several key insights such as performance enhancement, complex supply chain, and strategic decision-making and findings suggest that companies in the oil and gas sector should adopt effective SCMP to enhance performance and gain a competitive advantage. Overall, in this study, the researcher investigates the importance of supply chain practices (SCMP) in driving success for manufacturing performance, especially among SMEs in Malaysia.

Based on a previous study, Kamarudin et al. (2024) found that utilizing supply chain integration (SCI) methods improves the manufacturing performance of small and medium-sized enterprises (SMEs) in Malaysia. This finding is consistent with previous research on the use of supply chain integration (SCI) to improve operational efficiency and customer satisfaction (Kamaruddin et al., 2020; Kamarudin et al., 2024). In this study research also found that supply chain collaboration improves manufacturing operations. The researcher investigates how Malaysian small and medium-sized enterprises (SMEs) can improve their performance through collaboration with their

supply chain partners in this research. This study adds to the current research on supply chain management practices (SCMP) and manufacturing performance in small and medium-sized enterprises (SMEs) in Malaysia.

Recent studies by Sinaga et al. (2021), Hanumsari et al. (2021), and others emphasize the critical role of supply chain management (SCM) in enhancing the competitiveness and sustainability of small and medium-sized enterprises (SME). Below are the key points for the argument, research problems, gaps, and findings from their research:

1. **Competitive Advantage:** Sinaga et al. found that adopting SCM methods enables SMEs to achieve lower costs, improved quality, and faster delivery, particularly benefiting the processed food industry in Jakarta.
2. **Sustainability through Green SCM:** Hanumsari et al. (2021) highlighted the importance of integrating sustainable practices within SCM, which not only supports environmental goals but also enhances operational efficiency and long-term viability.
3. **Challenges in Implementation:** SMEs face significant challenges in adopting SCM principles, including regulatory compliance and resource constraints. Research by Kerekes & Felföldi (2020) and Prabhu and Srivastava (2022) emphasize the need for strong leadership and supply chain agility to navigate these obstacles.
4. **Collaboration and Innovation:** The studies stress the importance of collaboration and innovative approaches in SCM. Imtiaz et al. (2023) noted that leveraging technology can improve partner collaboration and overall performance in SMEs.

5. **Proactive Strategies:** SMEs are encouraged to adopt proactive solutions, such as utilizing technology, developing internal talent, and fostering integrated networks, to address challenges related to information exchange, trust, and cost management.

Overall, these findings, help the researcher to explore more the essential role of SCM in driving success for SMEs, highlighting the need for effective practices and innovative strategies to enhance performance and sustainability in manufacturing industries.

In Malaysia, supply chain management practices (SCMP) have a substantial impact on the manufacturing performance of small and medium-sized enterprises (SMEs). Lee et al. (2021) conducted research that highlights the importance of efficient supply chain management practices (SCMP) in improving manufacturing performance in small and medium-sized enterprises (SMEs). By streamlining supply chain processes, small and medium-sized businesses (SMEs) in Malaysia can increase overall efficiency while lowering costs and improving product quality (Abdallah et al., 2024). In this study, the researcher also highlighted the importance of adapted supply chain management practices (SCMP) for Malaysian SMEs, the importance of the need for operational efficiency, sustainable growth, and competitiveness in the ever-changing business landscape.

Furthermore, Lee et al. (2022) highlight that efficient supply chain management (SCM) strategies greatly improve manufacturing performance. Small and medium-sized enterprises (SMEs) in Malaysia can enhance their efficiency by concentrating on inventory management, supplier relationships, and production planning to streamline operations and lower costs (Panigrahi et al., 2024). By using strong supply chain

management practices (SCMP) manufacturing companies can improve their ability to meet market needs, reduce lead times, and boost product quality. In the Malaysian manufacturing sector, small and medium-sized enterprises (SMEs) can gain a competitive edge by implementing novel approaches and incorporating new technologies (Ibikunle et al., 2023). An efficiently managed supply chain management practices (SCMP) plays a crucial role in enhancing operational excellence and boosting the performance of small and medium-sized enterprises (SMEs) in the manufacturing industry in Malaysia (Lee et al., 2022).

According to previous scholars' research, Wong et al. (2020) examined the impact of supply chain management (SCM) approaches on manufacturing performance in Malaysian small and medium-sized enterprises (SMEs). The study demonstrated that implementing strategic supply chain management (SCM) can enhance manufacturing performance and provide Malaysian small and medium-sized enterprises (SMEs) with a competitive advantage. The research findings indicate that the adoption of strategic supply chain management practices (SCMP) can augment manufacturing performance and confer a competitive edge to small and medium-sized enterprises (SMEs) in Malaysia. The study underscores the importance of supply chain management practices (SCMP) in augmenting manufacturing performance and emphasizes the need for SMEs in Malaysia to adopt and implement effective supply chain strategies to foster long-term growth and success in the ever-changing business landscape (Talib et al., 2023).

A recent study by Abdelaziz et al. (2023) emphasises the pivotal role of supply chain management practices (SCMP) in enhancing manufacturing performance and providing Malaysian SMEs with a competitive advantage. By prioritising the optimisation of inventory management, fostering strong supplier relationships, and enhancing production planning, SMEs can streamline their operations, lower costs, and

improve product quality, leading to sustainable growth and profitability in a challenging business environment. In Malaysia's evolving economic environment, small and medium-sized enterprises (SMEs) that proactively adopt supply chain management practices (SCMP) are more adept at adapting to market fluctuations, fulfilling consumer demands, and maintaining sustainable long-term expansion. Moreover, in Malaysia, small and medium-sized enterprises (SMEs) industrial activities rely on supply chain management (SCM). Furthermore, Muhamed et al. (2023) stated that effective supply chain management (SCM) can enhance the performance of manufacturing businesses. Malaysian SMEs can achieve cost savings, improved quality, and increased efficiency by implementing lean production, optimizing inventory management, and improving supplier relationship management (Panigrahi et al., 2024b). Improved synchronization among production phases and meticulously organized supply chain management practices (SCMP) can accelerate processes and improve customer satisfaction. Small and medium-sized enterprises (SMEs) in Malaysia need to implement strong supply chain management practices (SCMP) strategies to maintain continuous growth and competitiveness in the manufacturing sector.

In conclusion, the integrated supply chain practices (SCMP) are necessary. This study investigates supply chain management practices (SCMP) and manufacturing performance in Malaysian SMEs, highlighting the importance of adopting efficient approaches to enhance productivity and competitiveness in the rapidly evolving global market. The researcher also investigated the effectiveness of supply chain practices (SCMP) to improve SMEs' manufacturing performance and competitiveness by optimizing operations, increasing efficiency, and cutting costs. Supply chain practices (SCMP) such as supply chain strategy (SCS), supply chain integration (SCI), and supply chain information (SCIM) can help SME manufacturers quickly adapt to market

demands, reduce risks, and foster innovation. Regulatory compliance and limited resources hinder SCMP for SMEs, but innovative solutions can enhance growth through ongoing improvement. Overall, effective supply chain management practices (SCMP) can significantly impact the manufacturing performance of Malaysian SMEs, enabling them to respond to market fluctuations, meet consumer needs, and achieve sustainable growth.

1.3 Problem Statement

In the continuously changing global manufacturing scene, supply chain efficiency and resilience have become crucial to nations' competitiveness (Holgado & Niess, 2023). International manufacturing powerhouse Malaysia is no exception. Supply chain planning is crucial to the country's manufacturing industry, which drives its economy (Mahmood et al., 2024). However, this crucial component faces obstacles. Logistical inefficiencies, manual processes, and worldwide interruptions are major obstacles (Odimarha et al., 2024). However, these issues with Malaysia's supply chain strategy (SCS) are possibilities for improvement, not insurmountable obstacles (Khan & Zaman, 2024). This research was argued that Malaysia's supply chain strategy (SCS), despite problems and criticism, is crucial to manufacturing performance (Zailani et al., 2023). Therefore, it is imperative to carefully address and rectify any identified issues or weaknesses in this plan. This technique may help Malaysia strengthen its manufacturing sector and gain a global leadership position (Hossain et al., 2023b).

Given the importance of a strong supply network for industrial efficiency, Malaysia must address supply chain strategy (SCS) shortcomings (Zailani et al., 2023). Inefficiencies persist despite legislative changes and interim logistical fixes by the Malaysian government, restricting sector performance (Istimaroh, 2023). An agile supply chain that can quickly respond to disruptions is essential. Besides that, Istimaroh

(2023) also highlights that Malaysia's industrial industry needs agile supply chain methods to succeed. Advanced technologies like artificial intelligence for predictive analytics and blockchain for transparent tracking can improve responsiveness and operational continuity amid disruptions (Enyejo et al., 2024). Integrating these technologies would optimize inventory management and logistics, as well as provide real-time risk data for faster mitigation. As a result, the researcher needs to reconsider Malaysia's supply chain framework in order to include flexible methods (Lim et al., 2022). Because of this, Malaysian manufacturers are becoming more resilient to global disruptions like pandemics and geopolitical tensions. They are also becoming more competitive by guaranteeing the efficiency and quality of their production (Istimaroh, 2023).

In addition, supply chain disruptions affect performance in Malaysia's industrial industry, highlighting a key area for improvement. Global supply chains are complex, so even little disruptions can have a major impact on industry (Guntuka et al., 2023). Malaysia can be vulnerable to such disruptions due to its importance to the global electronics and automotive component industries (Karim & Said, 2024). Raw material delivery delays, worldwide demand changes, and logistical inefficiencies raise operational expenses, lower customer satisfaction, and perhaps reduce income (Fernández-Arribas et al., 2024). Although just-in-time inventory reduces overhead costs, it exacerbates supply chain disruptions, leaving producers with little room for error. Malaysia's industrial performance has never been more dependent on a strong supply chain strategy (SCS) that can react to global market dynamics and minimize risks through diversity and technological integration (Lee & Qi, 2021).

The supply chain integration (SCI) landscape of Malaysian small and medium-sized enterprises (SMEs) shows that gaps and obstacles affect manufacturing

performance (Mer & Viridi, 2024). Digital infrastructure and technology adoption are lacking, which impedes real-time data sharing and supply chain communication (Shah et al., 2024). This weakness causes delays, inventory mismanagement, and reduced market responsiveness. Power inequalities between large corporations and small and medium-sized enterprises (SMEs) weaken supply chain interactions (Belyavskiy, 2023). As smaller companies, small and medium-sized enterprises (SMEs) may receive worse conditions and face more pressure, which can affect their operational efficiency and profitability (Thekkootte, 2023). In Malaysia, cultural differences in corporate relationship-building can often be difficult. Small and medium-sized enterprises (SMEs) may take longer to build trust and understanding, which are essential for supply chain integration (SCI), especially with overseas partners or new market entrants (Strupinski & Witek-Hajduk, 2024). This highlights the need for deliberate initiatives to improve digital capabilities, establish equitable business partnerships, and create a supportive ecosystem for small and medium-sized enterprises (SMEs) to prosper in Malaysia's competitive manufacturing industry.

Addressing supply chain information management (SCIM) concerns in Malaysian small and medium-sized enterprises (SMEs) shows that inadequacies in this area severely impair industrial performance (Suzuki et al., 2022). Lack of supply chain integration (SCI) of advanced information systems causes manufacturing inefficiencies and delays (Wei et al., 2022). Many Malaysian small and medium-sized enterprises (SMEs) use manual or semi-automated systems to handle inventory, procurement, and production scheduling, resulting in poor decision-making and no real-time data (Yeo & Ong, 2024). Lack of standardized information exchange standards between manufacturers, distributors, and suppliers exacerbates miscommunications and errors (Attaran et al., 2023). Reluctance to invest in complex information technology solutions,

typically owing to expense or a lack of knowledge of the benefits, compounds this (Abraham et al., 2023). These supply chain information management (SCIM) gaps inhibit Malaysian small and medium-sized enterprises (SMEs) from optimizing production performance, restricting their domestic and international competitiveness. To overcome these challenges, a concerted effort is required to adopt contemporary information management systems, standardize data sharing, and encourage technological investment to increase operational agility and efficiency (Abhulimen & Ejike, 2024).

Moreover, supply chain efficiency and resilience are crucial for nations' competitiveness in the global manufacturing scene. Malaysia's supply chain strategy (SCS) encounters challenges from global disruptions, manual procedures, and logistical inefficiencies (Khan et al., 2022). However, by implementing agile supply chain techniques and cutting-edge technologies like blockchain and artificial intelligence, these problems can be resolved (Eyo-Udo, 2024b). As a result, Malaysian manufacturers were becoming more competitive and resilient to disruptions on a global scale by increasing their responsiveness and operational continuity during disruptions (Ishak et al., 2023). Global supply chain disruptions may have a major effect on Malaysia's industrial performance, increasing operating costs, decreasing customer satisfaction, and possibly lowering revenue (Zahari et al., 2023). A strong supply chain strategy (SCS) that can react to global market dynamics and minimize risks through diversity and technological integration is essential for Malaysia's industrial performance. Furthermore, the supply chain integration (SCI) environment of small and medium-sized businesses (SMEs) in Malaysia also reveals gaps and barriers like cultural differences, power imbalances, and a lack of digital infrastructure (Ling et al., 2024). Improving performance in small and medium-sized enterprises (SMEs) also

requires addressing supply chain information management (SCIM) issues (Gong, 2024). To increase operational efficiency and agility, modern information management systems, data-sharing standards, and technological investment are required (Simpson et al., 2024).

In conclusion, supply chain efficiency and resilience play a crucial role in a nation's competitiveness in the global manufacturing industry, especially for Malaysia. The country's supply chain planning is critical for its economy, but it faces challenges such as logistical inefficiencies and worldwide interruptions. These challenges present opportunities for improvement rather than insurmountable barriers and addressing them is crucial for Malaysia's manufacturing sector to thrive. Implementing agile supply chain methods and advanced technologies like artificial intelligence and blockchain can enhance responsiveness and operational continuity amidst disruptions. By adapting to global market dynamics and integrating technology, Malaysian manufacturers can improve their global competitiveness and resilience. Additionally, improving supply chain integration (SCI) and information management (SCIM) in small and medium-sized enterprises (SMEs) is necessary for enhancing their operational efficiency and competitiveness. Embracing modern information management systems and encouraging technological investment are key steps towards increasing agility and performance in Malaysia's competitive manufacturing industry. Based on these gaps and research problems, the researcher determined that supply chain strategy (SCS), supply chain integration (SCI), supply chain information management (SCIM), and manufacturing performance (MP) are crucial components in this study.

1.4 Research Objectives

The primary objectives of this research are to address the knowledge gap regarding the relationship between supply chain management practices (SCMP) and

manufacturing performance in small and medium-sized enterprises (SMEs) in Malaysia. By achieving the following objectives, the researcher can contribute to the existing literature and offer insights that can help Malaysian small and medium-sized enterprises (SMEs) enhance their supply chain management practices (SCMP) and improve their overall manufacturing efficiency and performance.

- i. To investigate the extent of supply chain management practices (SCMP) among Malaysian small and medium-sized enterprises (SMEs) manufacturing performance.
- ii. To investigate the relationship between supply chain strategy (SCS) and manufacturing performance.
- iii. To investigate the relationship between supply chain integration (SCI) and manufacturing performance.
- iv. To investigate the relationship between supply chain information management (SCIM) and manufacturing performance.

1.5 Research Questions

To fill the existing knowledge gap, this research question aims to investigate the relationship between supply chain management practices (SCMP) and manufacturing performance in small and medium-sized enterprises (SMEs) in Malaysia. By fulfilling the stated objectives, the researcher can contribute to the current literature and provide insights to help Malaysian small and medium-sized enterprises (SMEs) improve their supply chain management practices (SCMP), manufacturing efficiency, and performance.

- a. What is the extent of supply chain management practices (SCMP) in Malaysia SMEs?

- b. What is the relationship between supply chain strategy (SCS) on manufacturing performance (MP)?
- c. What is the relationship between supply chain integration (SCI) on manufacturing performance (MP)?
- d. What is the relationship between supply chain information management (SCIM) on manufacturing performance?

1.6 Scope of Research

The study aimed to examine small and medium-sized enterprises (SMEs) in Malaysia that operate in the manufacturing sector and are situated in various regions of the country. The study conducted by Sorooshian et al. (2020) and Qi et al. (2024) offers valuable insights into the performance evaluation strategies employed by small enterprises in Malaysia. These strategies illuminate the factors that influence the success or failure of these businesses. In addition, Cheong et al. (2020) and Onjewu et al. (2024) was provide a comprehensive examination of the impact of COVID-19 on the implementation of e-commerce by small and medium-sized enterprises (SMEs) in Malaysia. The analysis is presented within the framework of Malaysia. This study is crucial for gaining a more comprehensive comprehension of the obstacles currently encountered by small and medium-sized enterprises (SMEs). In addition, Hasin et al. (2021) and Hasin et al. (2022) examine the crucial elements contributing to the prosperity of small and medium-sized enterprises (SMEs) during an economic downturn and the impact of COVID-19 on small and medium-sized enterprises (SMEs) in Malaysia, respectively. In light of the current economic climate, these studies shed light on the difficulties encountered by small and medium-sized enterprises (SMEs). The study was largely focus on small and medium-sized enterprises (SMEs) in

Malaysia which was under Federal Malaysia Manufacturing (FMM). It was evaluating industrial industries situated in different states of Malaysia.

This research was focus on the intricate landscape of small and medium-sized enterprises (SMEs) under Federal Malaysia Manufacturing (FMM) operating across several industrial sectors. The expedition was both ambitious and intriguing. This research was aimed to explore previously unexplored areas in order to create an extensive repository of information. The study was specifically examining the domains of electronics, textiles, food processing, automotive, and several other industries. The aim was been to have an in-depth understanding of the significant impact that supply chain management (SCM) approaches have on manufacturing performance through an in-depth investigation of their complexities. This captivating investigation is nearing its conclusion, and as it does, the stage is set for a profound exploration of the correlation between business tactics and achieving the goal of industrial success.

The researchers, Oyelakin and Abdullahi (2022), used a quantitative methodology that included the use of a structured questionnaire to choose respondents for the sample. The respondents were chosen using stratified proportional sampling. Because it offers insights into the quantitative method and the use of structured questionnaires for the purpose of sampling small and medium-sized enterprises (SMEs), this reference is pertinent because it aligns with the quantitative research strategy. Purposive sampling was used by Teoh et al. (2023) in order to acquire pertinent information from specialized specialists, such as the top management of small and medium-sized enterprises (SMEs). This reference is relevant because it discusses the technique of purposive sampling, which is a strategy that may be helpful in choosing a sample of small and medium-sized enterprises (SMEs) that is representative of the whole. In order to guarantee that the results are accurate, a sample that is representative

of small and medium-sized enterprises (SMEs) in Malaysia was be chosen for the purpose of data collection and analysis. The size of the sample was be defined by the resources that are available and the statistical power that is sought, while the selection criteria was take into consideration the variety of the industry, the size of the industry, and the willingness to participate.

Next, according to Narasimhan and Carter (1998) and Soosay (2024) was examine the impact of supply chain integration (SCI) on manufacturing performance in their research. They provide significant observations on the relationship between supply chain management (SCM) techniques and indices of manufacturing performance, such as cost efficiency, delivery performance, and quality. Consistent with the research emphasis on supply chain management practices (SCMP) and manufacturing performance indicators, this source is pertinent. In addition, Frohlich and Westbrook (2001) investigate the relationship between supply chain strategy (SCS) and performance, providing insights into how supply chain management (SCM) methods affect industrial performance. Their discoveries provide pertinent insights into the correlation between supply chain management practices (SCMP), supply chain strategy (SCS), and manufacturing performance, which corresponds to the study's emphasis on supply chain management practices (SCMP) and manufacturing performance indicators. Furthermore, Ketchen et al. (2008) and Yu et al. (2024) was examining the impact of supply chain integration (SCI) on customer satisfaction in their study. They provide significant observations on the correlation between supply chain management (SCM) methods and customer happiness, a critical metric for evaluating industrial performance. This study is relevant because it corresponds to the research emphasis on supply chain management (SCM) methods and indicators of manufacturing success. In the previous study, Pagell and Wu (2009) and Pagell and Wu (2024) examine the constraints of

research in supply chain management (SCM). They consider crucial limitations, such as time and finances, that must be recognized in the proposed investigation. The source is important because it offers valuable insights into possible constraints in supply chain management (SCM) research, which is in line with the recognition of limits in the study. Moreover, Flynn et al. (2010) and Rashid et al. (2024) examine the influence of inventory management on the efficiency and effectiveness of manufacturing operations. They provide significant observations on the correlation between supply chain management (SCM) strategies in inventory control and manufacturing performance metrics, such as cost effectiveness and quality. This reference is pertinent since it examines the correlation between supply chain management (SCM) techniques in inventory management and manufacturing performance, which aligns with the study topic.

In this research, the researcher's investigation was deeply based on the objective of looking at the link between supply chain management (SCM) techniques and manufacturing performance indicators like quality, cost-effectiveness, delivery performance, and customer satisfaction. This is because supply chain management (SCM) practices are currently a problem in Malaysia's manufacturing industry. Furthermore, the research aims to investigate the correlations among supply chain management practices (SCMP) in supply chain strategy (SCS), supply chain integration (SCI), supply chain information management (SCIM), and the manufacturing performance of small and medium-sized enterprises (SMEs) in Malaysia. The research seeks to provide insights into the influence of supply chain management (SCM) techniques on the manufacturing performance of small and medium-sized enterprises (SMEs) in Malaysia by investigating these connections between the hypotheses. The duration of the study was be established according to the resources and limitations of

the research. This was providing an ample amount of time for gathering data, doing research, reviewing literature, and reaching conclusions. By identifying specific restrictions, such as limited time, financial limits, and the possibility of influencing samples, is crucial.

To establish a research approach that is concentrated and manageable, researchers may ensure that the study's scope is well defined. This would enable researchers to provide useful perspectives on the distinctive circumstances of supply chain management (SCM) techniques and manufacturing performance inside small and medium-sized enterprises (SMEs) in Malaysia under Federal Malaysia Manufacturing (FMM).

1.7 Limitation of Research

The primary constraint is a scarcity of time. The researcher is required to finish this study report within a timeframe of 3-4 months. The study's scope and magnitude may be constrained by temporal limitations, which are frequently encountered in research endeavours. The researcher may not have the ability to allocate sufficient time to collect a significant volume of data or conduct comprehensive observations or tests. The imposition of rigid time constraints can hinder the thorough examination of enduring consequences or advancements resulting from the research, potentially resulting in the missed opportunity to uncover significant findings that may unfold gradually.

1.8 Significance of Research

The study on "The Effects of supply chain management practices (SCMP) on Manufacturing Performance of SMEs in Malaysia" holds several significant implications:

1.8.1 Theoretical Contribution

Established within the dynamic context of small and medium enterprises (SMEs) in Malaysia, this innovative study seeks to surpass the limitations of current knowledge and transform our comprehension of the complex connection between supply chain management (SCM) techniques and manufacturing performance. It undertakes a notable endeavor to address the longstanding research deficit in this sector, revitalizing uncharted paths of investigation. By using the priceless knowledge gained from prior research, this study establishes a strong basis for the development of new concepts and models. The study was offering empirical data that has been acquired and analyzed with great care. This data was served as evidence of the thoroughness and integrity of the research. It was pushing the limits of knowledge and contribute to the advancement of small and medium enterprises (SMEs) in Malaysia, fostering a new age of development and innovation.

1.8.2 Practical Managerial

This revolutionary study was providing invaluable knowledge and guidance to the thriving community of small and medium enterprises (SMEs) in Malaysia. It was unveil crucial insights and hands-on recommendations that was revolutionize their supply chain management (SCM) processes. Equipped with this new knowledge, these adaptable and strong businesses was having the ability to undertake a transformative journey, skillfully combining strategic moves and practical initiatives to optimize their complex operations, significantly reducing expenses, enhancing the core of excellence, and ultimately raising customer satisfaction to unprecedented levels. Through a rigorous process of identifying elusive practices that possess the capacity to positively impact manufacturing performance, these innovative entrepreneurs were gain access to

an infinite domain of opportunities, which was facilitate their unparalleled success and unrivaled expansion.

1.8.3 Policy and Government Support

The study's innovative discoveries have the potential to transform the way policymakers and government agencies understand the complex connection between supply chain management practices (SCMP) and the manufacturing performance of small and medium enterprises (SMEs). This study illuminates the crucial role that efficient supply chain management (SCM) plays in propelling small and medium enterprises (SMEs) to unparalleled levels of achievement, based on a thorough examination of industry data. This research also emphasizes the crucial significance of this often-disregarded element, serving as a strong appeal to policymakers and government agencies to give priority to and include resilient supply chain methods in their strategic frameworks.

This study has significant consequences and serves as a catalyst for the creation and execution of support initiatives, policies, and programs that seek to empower small and medium enterprises (SMEs) by providing them with the required resources, training, and assistance to strengthen their supply chain skills. With these useful insights, policymakers can strategically plan and implement specific interventions to close the gap between theory and practice. This was enabling small and medium enterprises (SMEs) to effectively use their supply chains as a competitive advantage by equipping them with the necessary tools.

Furthermore, the outcomes of this research have a significant impact not just in academia but also among entrepreneurs and business executives. The increased attention on supply chain management highlights its crucial role, prompting small and

medium enterprises (SMEs) to reassess their current methods and adopt novel tactics that enhance their production efficiency. Hence, this study provides valuable insights to policymakers and government agencies, enabling the entire small and medium enterprise (SME) ecosystem to enhance their development potential by strategically coordinating their supply chains.

Essentially, this research has significant consequences that go beyond just facts and statistics, influencing the future of manufacturing for small and medium enterprises (SMEs). By identifying the crucial importance of supply chain management techniques, politicians and government agencies can lead a fundamental change, creating an atmosphere where small and medium enterprises (SMEs) can sustainably innovate and make a lasting impact on the global business stage.

1.8.4 Competitiveness and Economic Growth

With their better manufacturing performance, small and medium enterprise (SMEs) hold a unique possibility of reinforcing their competitiveness not only inside their home market but also on a worldwide scale. By optimizing their supply chain for efficiency and flexibility, these firms may achieve several advantages, including increased production, reduced costs, and improved customer satisfaction. The significant benefits of these advantages serve as the main catalyst for the development and expansion of Malaysia's manufacturing sector, eventually pushing the whole economy to reach unprecedented levels.

1.8.5 Future Research Directions

The current study, with its varied and thorough analysis, has the potential to provide a solid basis for future research in the complex and constantly changing fields of supply chain management (SCM), manufacturing performance, and small and

medium enterprises (SMEs). By examining the complexity of different disciplines, this study not only provides insight into the present situation but also motivates academics and researchers to investigate undiscovered factors, settings, and approaches. By conducting thorough studies, a more profound comprehension of the subject matter may be attained, enabling the discovery and dissemination of more subtle and sophisticated ideas to the world of academia and beyond.

This research's significance extends beyond academia when considering its broader implications. The findings and recommendations provided have practical implications that are significant for small and medium enterprises (SMEs), policymakers, and the broader economy of Malaysia. This study examines supply chain management (SCM) strategies and manufacturing efficiency in small and medium enterprises (SMEs). It attempts to offer direction on enhancing efficiency, productivity, and profitability in this research sector. This research study contributes significantly to economic development by focusing on the needs and challenges faced by small businesses. It strives to create a conducive environment for the growth of small businesses and their substantial impact on the overall economic environment.

Finally, this study paves the way for future research and holds significant prospects for real-world application and concrete impacts. This multidimensional strategy ensures its relevance and adaptability in a dynamic context by considering a wide range of aspects, situations, and approaches. This study explored how research can effectively drive positive change and foster innovation in supply chain management (SCM) and manufacturing performance in small and medium enterprises (SMEs) by linking theoretical concepts with practical applications and bridging the gap between academia and industry.

1.9 Definition of Key Terms

Manufacturing Performance (MP)

Manufacturing performance includes a range of metrics that assess how well a manufacturing process functions in terms of productivity, quality, flexibility, and cost management. It is characterized as the efficacy and efficiency of manufacturing operations, stressing the capacity to produce goods that satisfy customer demands while minimizing costs and lead times (Bianco et al., 2023).

Supply Chain Management (SCM)

Supply chain management is an essential component of contemporary enterprises, with a substantial impact on facilitating the seamless movement of goods and services from suppliers to customers. As stated by Hugos (2024), the author highlighted the need for efficient supply chain management in maximizing operations and improving customer satisfaction in his book "Essentials of Supply Chain Management. Additionally, Hugos (2024) highlights the necessity for firms to implement a strategic approach to overseeing their supply chains, with a specific focus on inventory management, logistics, and supplier relationships.

SCM Practices (SCMP)

Supply chain management practices (SCMP) highlight the importance of these practices in contemporary corporate operations (Olawale, Ajayi, Udeh, et al., 2024). Thus, the examination of SCMP serves as more than just an intellectual pursuit but rather as a pragmatic compass for effectively navigating the complexities and possibilities of the modern marketplace. It serves as a reminder that in the delicate interplay between supply and demand, each action taken is crucial to attaining success.

Supply Chain Strategy (SCS)

Supply Chain Strategy (SCS) is the plan and set of decisions that govern supply chain management and coordination to maximise efficiency and effectiveness in accomplishing the organisation's goals (Cadden, McIvor, Cao, and Treacy, 2022). This strategy includes procurement, production, distribution, and logistics to meet client demand and the company's competitive strategy. The key to SCS is its capacity to integrate and synchronise all supply chain segments to create value and competitive advantage. By prioritising supply chain integration, responsiveness, and agility, organisations can navigate global markets and adapt to changing business conditions.

Supply Chain Integration (SCI)

Hussein and Song (2024) define supply chain integration (SCI) as a strategic technique to collaborate and oversee supply chain stakeholders' operations. This includes manufacturers, suppliers, distributors, and customers, enabling a smooth flow of information, goods, and services from origin to consumer.

Supply Chain Information Management (SCIM)

Understanding supply chain information management (SCIM) is essential as supply chains become more complicated and global. SCIM coordinates the flow of information between supply chain stakeholders for product and service procurement, manufacturing, and delivery. According to Stranieri, Fadda, and Stella (2024), SCIM as the technology, systems, policies, processes, and skills needed to capture, process, and share information among supply chain entities. SCIM aims to improve supply chain visibility, coordination, and decision-making to boost efficiency, save costs, and improve customer satisfaction.

Small and Medium-sized Enterprise (SMES)

Small and medium-sized enterprises (SMEs) are defined as bigger businesses based on their employee count, yearly revenue, and financial assets (Engelmann, 2024). This classification is crucial since it establishes the economic and regulatory environment in which these enterprises function.

Federal Malaysia Manufacturing (FMM)

Understanding Federal Malaysia Manufacturing (FMM) is vital for stakeholders inside and outside Malaysia due to its complex industrial ecosystem. In their thorough 2024 FIIB Business Review research, Hossain et al. (2024) characterised the FMM as a key entity that represents Malaysia's manufacturing sector's interests and objectives. It advocates for manufacturing-friendly regulations and hosts a forum for its members to share ideas and best practices. The FMM promotes innovation, sustainability, and growth in Malaysia's manufacturing sector to boost its worldwide competitiveness. Due to its extensive initiatives and programs, the FMM has become an essential part of Malaysia's economic framework, facilitating government-manufacturing dialogue to protect manufacturers' interests (Hossain et al., 2024).

1.10 Organization of Thesis

Chapter 1 provides the study subject and specify the research problems or questions in the introduction parts. This chapter covers the introduction, the background of the study, problem statements, the research objective, the research question, the scope of research, the significance of the research, and the definition of key terms. Chapter 2, which is the literature review section, investigates current studies on supply chain strategy (SCS), supply chain integration (SCI), supply chain information management (SCIM), and manufacturing performance. This chapter covered

definitions and concepts of variables, relationships between variables, previous studies, hypotheses development, theoretical framework, underpinning theory, and chapter summary. Chapter 3 explains the research methodology. This chapter covered the research framework, summary of research questionnaire design, research measurement, data collection, data analysis techniques, and chapter summary. Chapter 4 explains the data analysis and results. This chapter covered preliminary analysis, response rate of the survey, common method variance, structural model, and hypothesis testing. Chapter 5 explains the discussion and conclusion. This chapter covers summary and discussion of findings, the contribution of this study, theoretical and practical contributions



CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discussed the definition and concept variables, previous studies on variables, hypotheses development, theoretical framework, underpinning theory, and chapter summary. Effective supply chain management practices (SCMP) are crucial for the success of small and medium enterprises (SMEs) in the manufacturing sector, especially in a competitive and globalized environment like Malaysia. This literature review explores the impact of various supply chain management practices (SCMP) on the performance of Malaysian manufacturing small and medium enterprises (SMEs).

2.2 Manufacturing Performance Concept (Dependent Variables)

Effectiveness and efficiency in manufacturing processes are essential (Kolasani, 2024). Defining variables like production output, quality, efficiency, cycle time, and cost is crucial to measuring and investigating performance effectively (Kechaou et al., 2022). These variables contribute to the overall performance of a manufacturing process and can be measured and monitored. Clear operational definitions are necessary to guarantee accuracy and consistency in performance measurement procedures, which in turn aligns with the goals and strategies of the organization (Smith & Thomas, 2024). This allows organizations to gain valuable insights, identify areas for improvement, and make informed decisions to improve their manufacturing processes.

2.2.1 Overview and Definition of Manufacturing Performance

Manufacturing performance is a crucial foundation throughout industrial operations for enhancing efficiency, quality, and profitability (Tripathi et al., 2021b). This research provides a detailed explanation and description of manufacturing performance,

highlighting its importance in today's ever-changing industrial environment. Organizations may improve efficiency, product quality, and profitability by comprehending the complexities of manufacturing performance (Udeh, 2024b). This research attempts to highlight the crucial importance of understanding manufacturing performance in driving operational success as well as encouraging competitiveness in today's manufacturing industry.

Every company's manufacturing performance shows how efficiently and effectively it makes items. According to Kimwaki (2024), manufacturing performance is defined as a company's ability to meet quality, cost, delivery, and flexibility objectives from production. In addition, Dekkers (2024) also defines manufacturing performance as a production system's capacity to meet quality, cost, delivery, flexibility, and innovation goals. Manufacturing performance is crucial in evaluating the efficiency and effectiveness of production systems using key metrics and indicators. Furthermore, Priyadarshini and Gupta (2023) also study manufacturing performance as the manufacturing system's capability to meet its goals in terms of cost, quality, delivery, flexibility, and innovation. Cost efficiency is a key aspect of manufacturing performance that aims to reduce production costs without compromising product quality (Paul et al., 2024). Quality assurance is essential for ensuring that goods adhere to defined standards and client requirements. Delivery performance assesses the punctuality of delivering goods to clients, indicating the efficiency and dependability of the production system (Emon et al., 2024). Adaptability is crucial for responding to shifting market needs and product changes, while innovation fosters ongoing enhancement and competitiveness. Manufacturing performance is a complex notion that requires a well-rounded strategy to improve operational results and boost overall organizational success (Al-Swidi et al., 2024). Finally, manufacturing performance is

essential to industrial operations, boosting efficiency, quality, and profitability. This research highlights manufacturing performance's crucial significance in the contemporary industry by examining its many ramifications. Organizations can improve procedures, product quality, and financial success by studying manufacturing performance. This discourse shows how evaluating and improving manufacturing performance may lead to operational success and boost competitiveness and sustainability in the ever-changing industrial sector. Companies can overcome problems, optimize resources, and succeed in the changing manufacturing environment by embracing manufacturing performance (Hossain et al., 2023c).

Another argument for manufacturing performance refers to assessing aspects that impact the efficiency, productivity, and quality of manufacturing processes in an organization. Lee et al. (2021) state that it includes many key performance indicators (KPIs) such as production output, quality control, cost management, lead times, and overall operational efficiency. Manufacturing performance is a critical element of industrial operations, including a range of metrics and indicators that demonstrate the efficiency and effectiveness of a manufacturing process. According to Ravi, Bhatia, and Jain (2023), manufacturing performance is defined as the capability of a production system to create outputs meeting specified quality criteria while efficiently using resources like time, labor, and materials. This concept emphasises the necessity for ongoing development and optimization in industrial processes to balance quality and efficiency. Manufacturing performance, including productivity, quality, cost, and delivery, is measured using key performance indicators (KPIs) (Geng et al., 2024). Monitoring and analyzing these key performance indicators (KPIs) help companies improve processes, manufacturing performance, and efficiency. Companies may evaluate their performance, pinpoint areas for improvement, and make strategic choices

to boost their competitiveness in the market by tracking and analyzing these key performance indicators (KPIs) (Glišić et al., 2024). Optimizing manufacturing performance is essential for organizations aiming to streamline production processes, reduce waste, and provide top-notch goods to satisfy client needs efficiently. Furthermore, it acts as a crucial instrument for comparing, establishing objectives, and promoting ongoing improvement efforts in industrial processes (Tannady & Jiddan, 2024). In another study, manufacturing performance measures a company's manufacturing processes' productivity, quality, cost, and other important performance factors (Sindakis et al., 2023). This includes throughput, cycle time, defect rates, and equipment efficacy. Manufacturing performance evaluation helps companies optimize processes, boost efficiency, and discover development opportunities. Manufacturing performance monitoring helps organizations make choices, manage resources, and remain competitive. Understanding and analyzing manufacturing performance is crucial for continual development and sustainable growth (Rashid et al., 2024)

Finally, manufacturing performance is a critical aspect of industrial operations, enhancing efficiency, quality, and profitability. It is defined as a company's ability to meet quality, cost, delivery, and flexibility objectives from production (Pozzi et al., 2021). It is essential for evaluating the efficiency and effectiveness of production systems using key metrics and indicators. Manufacturing performance includes factors such as production output, quality control, cost management, lead times, and overall operational efficiency (Lee et al., 2023). Key performance indicators (KPIs), such as production output, quality control, cost management, lead times, and overall operational efficiency, are used to measure manufacturing performance. Monitoring and analyzing these key performance indicators (KPIs) help companies improve processes, enhance efficiency, and make strategic decisions to boost competitiveness.

Optimizing manufacturing performance is essential for organizations to streamline production processes, reduce waste, and provide top-notch goods (Khosroniya et al., 2024). It also acts as a tool for comparing, setting objectives, and promoting ongoing improvement efforts in industrial processes. Understanding and analyzing manufacturing performance is crucial for continual development and sustainable growth (Rashid et al., 2024b).

2.2.2 Factors of Manufacturing Performance

Small and medium enterprises (SMEs) are crucial in propelling economic growth and innovation in the ever-changing industrial sector (Basuo & Ebisinkemefa, 2024). In Malaysia, these businesses face numerous obstacles that hinder their manufacturing efficiency. This research explores the complex array of challenges encountered by small and medium enterprises (SMEs) in Malaysia, focusing on the external factors that impede their progress (Adnan et al., 2023). Small and medium enterprises (SMEs) face various complex issues that require detailed analysis for comprehension. It advocates for a defensive position to protect and promote the interests of these vital economic contributors in challenging circumstances (Barber et al., 2022). This study aims to provide insights into manufacturing performance difficulties faced by Malaysian small and medium enterprises (SMEs) to help develop strategies that enable and empower these firms to succeed in a competitive business climate.

Malaysia's manufacturing industry, especially small and medium enterprises (SMEs), encounters diverse problems that affect their performance. As stated by Tay et al. (2021), investigate how factors such as limited technology availability, insufficient infrastructure, and a lack of qualified workers impede manufacturing efficiency in Malaysian small and medium enterprises (SMEs). Inadequate technological adoption

by small and medium enterprises (SMEs) can result in inefficiencies and decreased competitiveness in the global market (Mishrif & Khan, 2023). Inadequate infrastructure, such as transportation systems and utilities, can hinder the efficient functioning of manufacturing operations. Additionally, a shortage of competent labor intensifies these issues, making it difficult for small and medium enterprises (SMEs) to locate suitable staff to fulfill their manufacturing needs (Žilka et al., 2024). It is essential to tackle these difficulties to improve manufacturing performance in small and medium enterprises (SMEs) in Malaysia, which would lead to growth and sustainability in the sector. Malaysian small and medium enterprises (SMEs) encounter numerous obstacles in achieving optimal manufacturing performance. According to Sopian (2022), a major problem is the limited availability of cutting-edge technology and necessary resources for executing effective production procedures. Small and medium enterprises (SMEs) frequently face challenges when trying to invest in contemporary machinery and systems that could improve their productivity and competitiveness in the market (Mer & Virdi, 2024b). This technological divide hinders their performance and limits their ability to adapt to changing market demands and trends. Furthermore, constraints such as limited financial resources, insufficient skilled personnel, and regulatory restrictions worsen the challenges faced by small and medium enterprises (SMEs) in Malaysia's manufacturing industry (Thekkoote, 2023b). Resolving these difficulties is essential for enhancing the overall performance and sustainability of small and medium enterprises (SMEs) in the manufacturing sector, ultimately leading to economic growth in the country (Surya et al., 2021).

Another factor was that supply chain management (SCM) methods play a crucial role in determining operational performance in the complex manufacturing industry (Hasan et al., 2022). This research explores the interdependent connection

between supply chain management practices (SCMP) and manufacturing performance, emphasizing how successful tactics in this area may be crucial for organizational success. This research argues that effective supply chain management (SCM) strategies are crucial in defining manufacturing performance by enhancing operational efficiency, reducing costs, and influencing overall organizational success (Feng et al., 2024). This study attempts to reveal the significant influence that strategic supply chain management (SCM) may have on the manufacturing sector through a thorough investigation of their interaction.

Supply chain management practices (SCMP) improve industrial performance. As stated by Bekele et al. (2024), supply chain management practices (SCMP) require coordinating sourcing, manufacturing, and distribution to guarantee the seamless flow of resources and information. Manufacturing firms may improve productivity, lead times, inventory holding costs, and operations by using effective supply chain management practices (SCMP). A well-managed supply chain helps organizations adapt quickly to market changes, satisfy consumer needs, and stay competitive. In today's changing business climate, enterprises must engage in comprehensive supply chain management practices (SCMP) processes to optimize performance and develop sustainably. In addition, manufacturing performance also depends on supply chain management practices (SCMP). As stated by Gebisa (2024), good supply chain management practices (SCMP) may boost industrial performance. Companies may increase productivity, cut costs, and satisfy customers by properly managing commodities, information, and funds throughout the supply chain (Khan et al., 2024b). Lean manufacturing, just-in-time inventory, and vendor-managed inventory may reduce waste, simplify processes, and assure timely product delivery (Kelka, 2024). Close engagement with suppliers, distributors, and other supply chain partners

improves coordination, flexibility, and market response. Thus, supply chain management practices (SCMP) are essential to manufacturing performance and competitiveness in today's changing business environment (Umar et al., 2024). Supply chain management (SCM) is critical to industrial success because improved operational efficiency, cost reduction, and performance in manufacturing require effective supply chain management practices (SCMP). Supply chain management practices (SCMP) coordinate procurement, production planning, inventory management, and distribution to guarantee a smooth flow of products and information (Cahyono et al., 2023). Manufacturers may reduce lead times, optimize inventory, and respond to market changes by using effective supply chain tactics. Effective supply chain management practices (SCMP) encourage supplier cooperation and help firms develop robust and agile supply networks that can react to business interruptions and uncertainties (Istimaroh, 2023). Thus, companies that prioritize and invest in strong supply chain management practices (SCMP) procedures are likely to improve production performance and acquire a market edge. Last but not least, supply chain management (SCM) methods are crucial in influencing industrial performance. Zhou and Li (2020) state that efficient supply chain management practices (SCMP) are crucial for increasing operational efficiency, cutting costs, and raising overall performance in industrial sectors. Companies may optimize their supply chain by effectively coordinating the movement of goods, services, and information to enhance efficiency, reduce congestion, and guarantee punctual delivery of items to consumers (Tajik et al., 2024). A well-organized supply chain management practices (SCMP) system helps companies adjust to market changes, reduce risks, and sustain competitive advantages in the global market. Supply chain management practices (SCMP) have a substantial

impact on industrial organizations' success by improving procedures, fostering cooperation with suppliers, and achieving consumer expectations (Siju et al., 2024).

Furthermore, supply chain management practices (SCMP) significantly impact the effectiveness of industrial processes. Zhou and Li (2020) stress the need for efficient supply chain management practices (SCMP) to improve industrial performance. Organizations may optimize their operations, save costs, enhance quality, and better meet market expectations by successfully coordinating the movement of items, information, and funds along the supply chain (Tahri, 2024). Aligning supply chain activities, such as procurement, production planning, inventory management, and distribution, helps firms achieve operational excellence and a competitive advantage in the market. Collaborative partnerships with suppliers, distributors, and other partners in the supply chain improve coordination and flexibility, resulting in better production performance. Adopting effective supply chain management practices (SCMP) strategies are crucial for enhancing efficiency, innovation, and sustainability in manufacturing operations, which significantly impacts the overall performance of the organization (Ngo et al., 2023). Supply chain management practices (SCMP) approaches are crucial in influencing industrial performance. As stated by Mirzaee Soleimanieh (2023), states that effective supply chain management practices (SCMP) involve coordinating and integrating several operations, starting from procuring raw materials to delivering the final product to clients. Companies may increase efficiency, save costs, and boost overall performance by optimizing these operations. Implementing lean supply chain methods may decrease waste and enhance responsiveness to client requests, resulting in enhanced production performance (Oluwaseyi, 2024). A well-managed supply chain facilitates improved inventory control, punctual delivery, and increased cooperation with suppliers, all crucial for

attaining manufacturing excellence. Investing in strong supply chain management (SCM) strategies is essential for firms aiming to improve their manufacturing performance and achieve a competitive advantage in the market (Hendijani & Saei, 2024). Supply chain management (SCM) strategies are crucial in influencing industrial performance. As stated by Akbari (2023), efficient supply chain management (SCM) plays a crucial role in impacting the entire performance of industrial operations. Companies may optimize their operations by effectively coordinating the movement of items, information, and resources across the manufacturing stages, resulting in streamlined procedures, shorter lead times, cost savings, and improved operational efficiency (Mpuon et al., 2023). Furthermore, a well-organized and optimized supply chain enables organizations to quickly adapt to market fluctuations, efficiently satisfy consumer needs, and sustain a competitive advantage in the sector (Ouanhlee, 2024). Investing in strong supply chain management (SCM) strategies is crucial for enterprises aiming to enhance their performance and attain sustainable development in the current dynamic business landscape (Akbari, 2023).

In conclusion, this research examines the challenges faced by Malaysian small and medium enterprises (SMEs) in the manufacturing industry, focusing on external factors that hinder their progress. The study aims to provide insights into the manufacturing performance difficulties faced by Malaysian small and medium enterprises (SMEs) and develop strategies to empower them to succeed in a competitive business climate. Factors such as limited technology availability, insufficient infrastructure, and a lack of qualified workers impede manufacturing efficiency (Al-Dweiri et al., 2024). Inadequate technological adoption can lead to inefficiencies and decreased global market competitiveness. Insufficient infrastructure, such as transportation systems and utilities, can also hinder efficient manufacturing operations

(Ojo et al., 2024). A shortage of competent workers exacerbates these issues, making it difficult for small and medium enterprises (SMEs) to find suitable staff (Biea et al., 2023). Addressing these challenges is crucial for enhancing the overall performance and sustainability of small and medium enterprises (SMEs) in the manufacturing sector, ultimately leading to economic growth in Malaysia (Hossain et al., 2023d). Moreover, supply chain management practices (SCMP) are crucial for improving industrial performance by coordinating sourcing, manufacturing, and distribution to ensure a smooth flow of resources and information (Omigie & Oguns-Obasohan, 2023). This approach can improve productivity, lead times, inventory holding costs, and operations, allowing companies to quickly adapt to market changes, satisfy consumer needs, and stay competitive. Effective supply chain management practices (SCMP) can also reduce waste, simplify processes, and ensure timely product delivery (Ngo et al., 2023b). Close engagement with suppliers, distributors, and other supply chain partners enhances coordination, flexibility, and market response. Not only that, but effective supply chain management practices (SCMP) are also essential for increasing operational efficiency, cost reduction, and overall performance in industrial sectors (Ghariani & Boujelbene, 2024). It coordinates procurement, production planning, inventory management, and distribution to ensure a smooth flow of products and information. By coordinating the movement of goods, services, and information, companies can enhance efficiency, reduce congestion, and ensure punctual delivery to consumers. A well-organized supply chain management practice (SCMP) helps companies adjust to market changes, reduce risks, and sustain competitive advantages in the global market (Rashid et al., 2024a). Adopting effective supply chain management (SCM) strategies is crucial for enhancing efficiency, innovation, and sustainability in manufacturing operations, significantly impacting the overall performance of the organization (El-Garaihy et al., 2022).

Investing in strong supply chain management (SCM) strategies is essential for enterprises aiming to enhance their performance and attain sustainable development in the current dynamic business landscape.

2.2.3 Issues in Manufacturing Performance

Small and medium enterprises (SMEs) in Malaysia's manufacturing industry are dealing with numerous key difficulties that require strategic solutions due to the constantly changing landscape (Manas et al., 2024). This research explores the complex array of obstacles that impede the effectiveness and competitiveness of small and medium enterprises (SMEs) in Malaysia. Although essential to the economy, many businesses face significant challenges that hinder their capacity to develop and thrive (Abdul-Azeez et al., 2024). This research also focuses on identifying the critical challenges impacting manufacturing performance in small and medium enterprises (SMEs) from a defensive perspective. It advocates for specific solutions to enhance their competitiveness in the global market (Adigwe et al., 2024). By addressing these difficulties and proposing creative solutions, we can strengthen Malaysia's small and medium enterprises (SME) sector and make it more resilient. Manufacturing processes often face various constraints and complications that hinder the achievement of optimal performance (Zehra et al., 2024). In addition, this study examines the intricate network of barriers that impede manufacturing performance, aiming to illuminate the industry's difficulties and propose feasible remedies (Usman et al., 2024). Thus, this research delves into the primary elements influencing manufacturing performance with a bold approach, aiming to identify difficulties and suggest solutions to enhance operational efficiency and productivity. The researcher's goal is to tackle these challenges and offer strategic suggestions to enhance efficiency and productivity in the manufacturing industry.

Manufacturing performance issues are complex and essential to resolve for operational effectiveness. Tseng et al. (2021) highlight the importance of different aspects that influence manufacturing performance, including production planning, quality management, supply chain coordination, and technology integration. The study emphasizes that incorporating new technologies such as automation and data analytics is crucial for increasing manufacturing performance through increased process accuracy, reduced lead times, and enhanced productivity levels (Adenekan et al., 2024). The researcher highlights the need for efficient supply chain coordination to reduce disruptions and delays, which are frequent challenges that might hinder manufacturing performance. Manufacturers can enhance their operations and aim for ongoing improvement in performance metrics by focusing on these crucial areas and utilizing technology improvements (Pansare et al., 2022). In addition, optimizing production processes to boost efficiency and productivity is a major manufacturing performance concern. Furthermore, Lee et al. (2021) highlight using sophisticated technical methods to overcome these issues and increase manufacturing performance. In today's competitive industry, producers must deliver high-quality items at lower prices and faster turnaround times. Automation, data analytics, and AI must be strategically integrated into production processes (Nzeako et al., 2024). Advanced engineering solutions help firms optimize operations, eliminate waste, and improve output quality. Many organizations struggle to incorporate such technology due to infrastructure and worker training costs. Complex machinery maintenance, data security, and the requirement for continual innovation hinder production performance. In this research, the focus is on manufacturing performance, which is a crucial element of an organization's operations, influencing its competitiveness, profitability, and customer satisfaction. According to Alliou and Mourdi (2023), stated the importance of tackling

obstacles that may impede manufacturing performance, including inefficient processes, the absence of automation, and quality control difficulties. Technological developments are essential for improving performance metrics in modern production. Organizations may enhance production processes, reduce downtime, and boost productivity by utilizing sophisticated technologies such as the Internet of Things (IoT), artificial intelligence (AI), and robotics (Anaba et al., 2024). Furthermore, labor training, supply chain management (SCM), and sustainability policies play a crucial role in enhancing industrial performance. Thus, a comprehensive strategy that combines technology, process refinement, and employee empowerment is crucial for addressing obstacles and attaining lasting enhancements in manufacturing performance (Haricha et al., 2023).

Various crucial factors can hinder operational efficiency and overall manufacturing performance to achieve success. As stated by Marques, Oliveira, and Barbosa (2024), highlights the importance of production delays, quality control issues, and supply chain interruptions in manufacturing operations. Production delays may arise from factors such as equipment malfunctions, insufficient personnel planning, or ineffective production scheduling. Quality control difficulties might arise from variations in raw materials, equipment failures, or human mistakes in the production process (Widiwati et al., 2024). Disruptions in the supply chain, such as those from natural catastrophes, political upheaval, or logistical problems, can significantly impact industrial performance. The complexity and interconnectedness of industrial operations highlight the need for proactive methods and strong systems to deal with and reduce possible problems (Odulaja et al., 2023). In conclusion, production is difficult, and performance is key to success. This research has analyzed manufacturing performance issues and proposed methods to boost operational efficiency and productivity. Addressing production planning, quality management, supply chain coordination, and

technology integration is crucial to optimizing manufacturing performance. Tseng et al. (2021) noted that automation and data analytics can improve process accuracy, lead times, and productivity. Supply chain coordination reduces disruptions and delays, improving production performance. Manufacturers must prioritize these areas and embrace technology to improve performance indicators moving forward. Manufacturing may transform and prosper in a competitive market by doing so (Agarwal et al., 2022).

In Malaysia, manufacturing performance challenges have been a central focus of discussion and research within small and medium enterprises (SMEs). As stated by Ling and Hamid (2020), they identified numerous significant obstacles encountered by small and medium enterprises (SMEs) in Malaysia's manufacturing industry. The obstacles include technology restrictions, insufficient infrastructure, skills shortages, and restricted access to financial choices. Technological limitations frequently faced by small and medium enterprises (SMEs) might impede their effectiveness and competitiveness in the market (Brandy, 2023). Moreover, the absence of up-to-date infrastructure can hinder their ability to operate effectively and expand. Additionally, the lack of skilled labor worsens the performance challenges experienced by small and medium enterprises (SMEs) in Malaysia's manufacturing industry (Abdulaziz et al., 2023). Moreover, limited access to financial resources presents a substantial obstacle to investment and expansion for these businesses (Oduro et al., 2024). It is essential to tackle these complex difficulties to improve the overall efficiency and longevity of small and medium enterprises (SMEs) in Malaysia's manufacturing sector. Small and medium enterprises (SMEs) in Malaysia have multiple obstacles while trying to improve their manufacturing performance. Furthermore, Tay et al. (2021) identified a significant problem in small and medium enterprises (SMEs) with the insufficient use

and incorporation of technology. The integration of advanced technologies into production operations poses a challenge for numerous small and medium-sized enterprises (SMEs) in Malaysia, thereby affecting their overall efficiency (Shah et al., 2024b). This technology disparity hinders production efficiency and affects the quality of products and services provided by these small and medium enterprises (SMEs). A lack of adequate training and skill development programs worsens the problem, as personnel may lack the necessary knowledge to efficiently operate and maintain current production technologies (Ranasinghe et al., 2024). It is critical to address these issues and encourage technical progress in Malaysian small and medium enterprises (SMEs) to improve manufacturing efficiency and ensure their viability in a highly competitive market. Manufacturing performance in small and medium enterprises (SMEs) in Malaysia has encountered several crucial difficulties. Nawanir et al. (2020) emphasize that a major obstacle for small and medium enterprises (SMEs) in Malaysia is the limited adoption of sophisticated technology, which can greatly affect their overall performance. Restricted access to resources and financial limitations exacerbates the issue, further hindering small and medium enterprises (SMEs) from investing in advanced technology that could enhance their manufacturing procedures. Furthermore, the research reveals that ineffective supply chain management practices (SCMP) also contribute to the underperformance of small and medium enterprises (SMEs) in the manufacturing industry (Malik et al., 2023). The findings highlight the complex issues encountered by small and medium enterprises (SMEs) in Malaysia, indicating the necessity for strategic interventions to overcome technology constraints, financial obstacles, and supply chain inefficiencies that impede industrial efficiency. Malaysian small and medium enterprises (SMEs) encounter numerous obstacles in achieving optimal manufacturing performance. According to Sopian (2022), a major problem is

the insufficient availability of cutting-edge technology and the necessary resources for implementing effective production procedures. Small and medium enterprises (SMEs) frequently face challenges when trying to invest in contemporary machinery and systems that could improve their productivity and competitiveness in the market. This technological divide hinders their performance and limits their ability to adapt to changing market demands and trends (Li et al., 2024). Furthermore, constraints such as limited financial resources, insufficient skilled personnel, and regulatory restrictions worsen the challenges faced by small and medium enterprises (SMEs) in Malaysia's manufacturing industry (Abdulaziz et al., 2023b). It is critical to address these issues to improve the overall performance and sustainability of small and medium enterprises (SMEs) in the manufacturing sector, ultimately aiding the nation's economic prosperity (Litvaj et al., 2023). In conclusion, small and medium enterprises (SMEs) in the manufacturing sector face complex and multidimensional difficulties that necessitate a holistic approach for effective resolution (Dwikat et al., 2023). Challenges include restricted technological access, insufficient infrastructure, and a lack of skilled workers, which greatly affect the productivity of small and medium enterprises (SMEs) in Malaysia. By acknowledging and comprehending these problems, stakeholders can devise methods to assist and empower small and medium enterprises (SMEs), allowing them to surmount obstacles and prosper in the competitive business climate (Hasliza et al., 2022). Policymakers, industry participants, and other important stakeholders must work together to establish a supportive environment that promotes innovation, expansion, and sustainability for small and medium enterprises (SMEs) in Malaysia. By doing so, these businesses can remain important catalysts for economic growth and innovation in Malaysia's manufacturing sector.

2.3 Supply Chain Strategy (Independent Variables)

In today's dynamic and competitive business environment, the importance of a clearly defined supply chain strategy (SCS) cannot be overstated. Businesses striving for success in their respective fields are increasingly grasping the pivotal role that an optimized supply chain plays in gaining a competitive edge (Non, 2023). From fostering strong supplier relationships to streamlining production processes, enhancing logistics, forecasting demand, and integrating cutting-edge technologies, every facet of the supply chain system significantly impacts manufacturing performance. This research initiative is geared towards delving into a holistic supply chain strategy (SCS) that not only enhances operational efficiency but also improves cost-effectiveness, responsiveness, quality assurance, and reliability. The researcher aims to explore the various components that constitute a successful supply chain strategy (SCS), ultimately offering valuable insights and guidance to manufacturing companies navigating the ever-evolving market landscape. By shedding light on the critical elements of an effective supply chain strategy (SCS), this study seeks to equip businesses with the knowledge and tools needed to thrive amidst the challenges and opportunities presented by today's business ecosystem (George, 2024).

2.3.1 Overview and Definition of Supply Chain Strategy

In manufacturing, the complex relationship between supply chain strategy (SCS) and performance is a crucial factor for success. This research provides a fundamental explanation and description of supply chain strategy (SCS) in connection to manufacturing performance. The researcher aims to highlight the crucial importance of developing a strong supply chain system (SCS) for improving manufacturing performance (Tripathi & Roy, 2023). This exploration's research shows that a carefully designed supply chain strategy acts as the fundamental framework that not only

coordinates operational operations but also enhances resource operations and promotes efficiency across the manufacturing cycle (Akam et al., 2023). The researcher delved into the complexities of supply chain strategy (SCS) in manufacturing; strategic planning in this area is essential for getting the best performance results. Furthermore, supply chain planning is crucial for boosting manufacturing performance through process optimization and efficiency enhancement. As stated by Dev, Shankar, and Qaiser (2020), supply chain strategy (SCS) is defined as the coordination of different operations in the manufacturing and distribution of goods. Organizations can enhance manufacturing performance by aligning sourcing, production, and distribution processes strategically to improve operational efficiency and cost-effectiveness (Nnaji et al., 2024). An explicit supply chain strategy (SCS) improves cooperation among stakeholders and helps organizations successfully adjust to changing market dynamics and customer expectations. Developing a strong supply chain strategy (SCS) is crucial for organizations aiming to improve their manufacturing performance and achieve a competitive advantage in the current dynamic business landscape (Garcia-Buendia et al., 2023).

Furthermore, supply chain planning is essential for improving industrial performance through the efficient management of resources, information, and finances among suppliers, manufacturers, distributors, and customers. Ashokbhai (2020) defines a supply chain strategy (SCS) as a series of coordinated decisions and activities that help a company gain a competitive edge by augmenting efficiency and effectiveness in production. Several methods currently exist to measure supply chain operations with overarching business goals, considering variables like cost, quality, speed, and flexibility. Organizations may improve lead times, decrease inventory levels, elevate product quality, and boost customer pleasure by effectively overseeing sourcing,

production, and distribution operations (Togun et al., 2024). A well-developed supply chain strategy (SCS) is crucial for enhancing production performance and achieving a competitive advantage in the market. By raising operations, decreasing costs, and increasing efficiency, supply chain strategy (SCS) improves manufacturing performance. Moreover, Messmann et al. (2020) defines a supply chain strategy (SCS) as decisions and actions that match supply chain practices with company goals. This includes information, financial, and physical goods flows. Companies can get a competitive edge by focusing on supplier selection, inventory management, production planning, and distribution (Dadaneh et al., 2023). Effective supply chain strategies synchronize activities across network functions to promote responsiveness, flexibility, and customer satisfaction. Thus, to improve manufacturing performance and succeed in today's competitive business environment, organizations must grasp supply chain strategy (SCS).

Next, the supply chain strategy (SCS) is crucial for improving manufacturing performance through process optimization, cost reduction, and increased efficiency in the supply chain network. In a recent article, Cui et al. (2022) state that a clear supply chain strategy (SCS) involves coordinating sourcing, production, and distribution to match organizational aims and objectives. Companies may efficiently control inventory levels, reduce lead times, and improve responsiveness to market demands by creating a strong supply chain strategy (SCS) (Garcia-Buendia et al., 2022). This strategic approach enhances operational performance and nurtures connections with suppliers and consumers, promoting collaboration and innovation throughout the supply chain ecosystem. A well-designed supply chain strategy (SCS) is essential for achieving manufacturing excellence and gaining a competitive edge in today's fast-paced business climate (Adama et al., 2024). The supply chain strategy (SCS) is crucial in influencing

operational efficiency and overall success in manufacturing performance. In addition, Wang et al. (2022), identify the importance of supply chain strategy(SCS) in optimizing manufacturing processes and improving performance results. Supply chain strategy (SCS) is the methodical approach organizations use to oversee the movement of products, services, information, and cash within the supply chain network (Tashtoush, 2022). Aligning supply chain strategy (SCS) with manufacturing objectives enables organizations to enhance coordination, cost efficiency, quality control, and responsiveness to market demands. By strategically aligning, organizations can improve manufacturing processes, shorten lead times, lower inventory costs, and increase customer satisfaction. A planned and efficiently executed supply chain strategy (SCS) is crucial for enhancing production performance and maintaining a competitive edge in the current dynamic business landscape (Santos et al., 2021).

In previous studies, supply chain strategy (SCS) has been crucial to industrial performance, especially for small and medium enterprises (SMEs). Small and medium enterprises (SMEs) confront distinct hurdles compared to larger firms, making supply chain planning important to their success. According to Partanen et al. (2020), supply chain strategy (SCS) comprises sourcing, procurement, production, and distribution planning and coordination. By strategically coordinating these functions, small and medium enterprises (SMEs) may optimize operations, cut costs, boost efficiency, and improve manufacturing performance. This strategy approach highlights supply chain network collaboration and coordination across internal and external operations with suppliers and customers (Solaimani & Van Der Veen, 2021). Thus, small and medium enterprises (SMEs) must carefully plan and implement supply chain strategies adapted to their demands and restrictions to achieve sustainable manufacturing performance and market advantage. By creating and implementing a solid supply chain strategy (SCS),

small and medium enterprises (SMEs) manufacturing performance improve. Supply chain strategy (SCS) in small and medium enterprises (SMEs) coordinates the flow of goods, services, and information from suppliers to customers. To maximize efficiency and responsiveness, small and medium enterprises (SMEs) also need a complete supply chain strategy (SCS) that includes procurement, production, distribution, and customer service (Menon & Shah, 2020). Small and medium enterprises (SMEs) may boost operational effectiveness, cost savings, and customer satisfaction by integrating supply chain activities with business goals. Small and medium enterprises (SMEs) may reduce risks, increase agility, and seize market opportunities with a well-defined supply chain strategy (SCS). To improve manufacturing performance and stay competitive in today's business environment, small and medium enterprises (SMEs) must carefully establish and implement supply chain strategies (Menon and Shah, 2020).

In recent years, supply chain strategy (SCS) is critical to industrial performance, especially in small and medium enterprises (SMEs). According to Lee et al. (2021), small and medium enterprises (SMEs) can perform much better if their supply chain strategy (SCS) is clearly defined and tailored to their needs and capabilities. This strategy involves sourcing, production, distribution, and customer service, which must be coordinated for the best outcomes (Fu et al., 2022). Small and medium enterprises (SMEs) may streamline operations, decrease costs, improve efficiency, and satisfy customers by carefully establishing and implementing a supply chain strategy (SCS) (Manzoor et al., 2021). Adopting new supply chain technologies and best practices can increase manufacturing performance, helping small and medium enterprises (SMEs) compete in the market and grow sustainably. Supply chain strategy (SCS) is a structured approach that integrates sourcing, production, distribution, and customer service to optimize manufacturing performance (Abdelaziz et al., 2023). Small and medium

enterprises (SMEs) can improve efficiency, cost, and customer happiness by aligning their supply chain strategy (SCS) with their business goals and operational capabilities (Manzoor et al., 2021). Small and medium enterprises (SMEs) need supply chain strategy (SCS) and manufacturing performance synchronization to compete and react to changing business circumstances. Small and medium enterprises (SMEs) may reduce risks, streamline operations, and seize growth and sustainability possibilities with customized supply chain strategies (De Moura & Saroli, 2020).

This research highlights the importance of supply chain strategy (SCS) in enhancing industrial performance through operational efficiency and cost-effectiveness (Gilanl & Etin, 2023). Improving manufacturing performance requires an effective supply chain strategy (SCS) to optimize operations and boost efficiency. Synchronising commodity production and delivery activities improves operational efficiency and cost (Azad et al., 2022). An explicit supply chain strategy (SCS) improves stakeholder engagement and helps organizations respond to changing market conditions and consumer needs. Improving manufacturing performance and gaining a competitive edge in today's ever-changing business environment requires an efficient supply chain strategy (SCS) (Shukor et al., 2020). Supply chain strategies that support organizational goals can improve lead times, inventory levels, product quality, and customer happiness. Effective supply chain approaches coordinate network functions to improve agility, adaptability, and customer satisfaction (Feizabadi et al., 2021). Small and medium companies (SMEs) have increasingly relied on supply chain strategy (SCS) for industrial performance. A supply chain strategy (SCS) must coordinate sourcing, production, distribution, and customer support for optimal results. Innovative supply chain technology and best practices may boost production efficiency, helping SMEs compete and grow sustainably (Fontoura & Coelho, 2022).

2.3.2 Supply Chain Strategy and Theory Associated with Supply Chain Strategy

In current corporate operations, the complex supply chain management (SCM) strategy significantly influences the success and efficiency of an organization. This research explores supply chain strategy (SCS) and the ideas that support its effectiveness. The main idea of this investigation is that a well-designed supply chain strategy (SCS) is essential for successful business operations. It involves a sophisticated system of ideas and practices that strive to improve the smooth movement of goods and services to efficiently meet consumer needs. The researcher attempts to explore the intricacies of supply chain strategy (SCS) and theory to highlight the key elements that contribute to operational excellence and competitive advantage in the current business environment.

A supply chain plan maximizes the efficiency of goods and services from production to consumption, guaranteeing the success of a corporation. As stated by Tewari and Dhobale (2024), supply chain strategy (SCS) as strategic decision relating to sourcing, production, distribution, and customer service. Forecasting demand is essential for supply chain planning. Accurately forecasting client demand allows organizations to optimize supply chains. Lean management reduces inefficiencies and enhances supply chain efficiency, resulting in cost savings and improved performance.

In today's fast-paced corporate world, a clear supply chain strategy (SCS) and sound theoretical principles are essential for achieving operational excellence and gaining a competitive edge (Tewari & Dhobale, 2024), Supply chain strategy (SCS) design and implementation are crucial for business success and competitiveness. Eriksson and Engström (2021) stress the importance of aligning supply chain planning with organizational objectives to enhance operational efficiency and effectiveness. Supply chain strategies aim to maximize the efficiency of product and service

movement by managing procurement, production, distribution, and engaging with suppliers and partners (Jia & Chen, 2024). Resource-Based View (RBV) and Transaction Cost Economics (TCE) theories help organizations optimize their resources and reduce supply chain transaction costs. Incorporating theoretical ideas into the development of supply chain strategy (SCS) helps enhance operations, manage risks, and gain sustainable competitive advantages in the current dynamic corporate landscape. Supply chain planning is crucial for achieving business success and efficiency. Cha (2022) states that organizations need a robust supply chain strategy (SCS) to oversee operations and meet client needs. Integrated supply chains that encompass sourcing, production, distribution, and logistics enhance competitiveness and market agility. Supply chain strategy (SCS) impacts product design, supplier selection, inventory management, customer service, and overall business strategy (Zarreh et al., 2024). Aligning supply chain strategy (SCS) with business goals enables organizations to address challenges, reduce costs, and enhance performance in the current competitive business landscape (Berglund & Riaz, 2024).

Effective supply chain planning is essential for overseeing the flow of goods and services from their point of origin to the end consumer. Pitkänen (2021) suggests that integrating supply chain strategy (SCS) with corporate goals might lead to smooth operations. The supply chain strategy (SCS) is prioritized. Theories can assist companies in enhancing supply chain procedures, engaging with suppliers and stakeholders, and gaining a competitive edge. Pitkänen (2021) suggests that supply chain planning should incorporate innovative technology and methodologies to enhance efficiency, reduce costs, and optimize performance. Supply chain strategies need to adapt to suit international market requirements (Lim et al., 2024). Various sectors rely on supply chain planning for their performance and efficiency. Supply chain

planning is crucial for achieving business success and efficiency. Mendes (2021) states that a carefully designed supply chain strategy (SCS) enhances efficiency, reduces expenses, enhances customer service, and gives organizations a competitive advantage. The supply chain strategy (SCS) focuses on integrating the firm with its suppliers and partners. Aligning procurement and distribution objectives and strategies enhances supply chain and company efficiency (Tripathi & Roy, 2024). Supply chain theory focuses on partner collaboration and information exchange to enhance forecasts, lead times, and responsiveness to market demand. Companies require a strong supply chain strategy (SCS) based on theory to adjust to market changes, mitigate risks, and achieve sustainable growth (Mendes, 2021). According to Phelps (2023), an effective supply chain strategy (SCS) involves coordinating sourcing, production, and distribution to provide a seamless flow of goods and services from suppliers to customers. Utilizing information technology is essential for enhancing collaboration and visibility in supply chain planning. Utilizing data analytics and advanced technology may enhance inventory management, reduce lead times, and streamline operations (Vaka, 2024). Effective supply chain strategies align organizational aims with consumer aspirations to fulfill market demands. This alignment enables organizations to adjust to shifting market conditions, mitigate risks, and capitalize on opportunities, leading to a competitive edge and enduring success in the ever-changing business landscape. Effective organizations utilize supply chain tactics to oversee resources, save expenses, and meet client needs. Malacina (2023) states that an effective supply chain strategy (SCS) encompasses sourcing, production, distribution, and interactions with suppliers and partners. If these components achieve their goals, they could provide organizations with a competitive advantage in the market. The supply chain theory highlights the importance of agility and flexibility in meeting market and consumer demands (Bai,

2024). Continuous assessment and enhancement of the supply chain process are necessary to maintain efficiency and responsiveness. Modern firms need to comprehend supply chain theory and establish a robust supply chain strategy (SCS) to achieve sustainable growth. An effective supply chain strategy (SCS) is crucial for managerial efficiency. Adu-Amankwa et al. (2023) examine the complex relationship between supply chain strategy (SCS) and conceptions. Align supply chain strategy (SCS) with company objectives to enhance performance and competitiveness. Companies can optimize resource utilization and minimize transaction costs by incorporating resource-based views and transaction cost economics into their supply chain strategy (SCS) development (Nagariyaa, et al., 2024). The study highlights the importance of supply chain agility and flexibility in responding promptly to market changes and consumer demands. Analysis shows that supply chain strategies based on theory are essential for operational efficiency and competitive advantage in the current intricate business landscape. Supply chain planning enhances performance and competitiveness in the current corporate landscape. Partanen et al. (2020) assert that organizations need a supply chain strategy (SCS) to oversee operations, save expenses, and meet customer expectations. Aligning the supply chain strategically with organizational goals is crucial for achieving operational excellence and maintaining competitiveness in the market. Utilizing supply chain techniques such as the resource-based approach and dynamic capabilities theory can assist organizations in adjusting to evolving market conditions and gaining competitive advantages (Li et al., 2024). Enhancing strategic partnerships and fostering innovation within the supply chain network leads to improved collaboration, efficiency, and overall performance (Copper, 2024). An effectively crafted supply chain strategy (SCS) grounded in pertinent theories enhances firm performance and sustainability in the dynamic business environment. Supply chain

planning is crucial for business success and efficiency. Shibin et al. (2020) describes supply chain strategy (SCS) as the decisions and actions taken to maximize the efficiency of goods, services, and information flow from production to consumption. This strategy encompasses essential sourcing, production, distribution, and logistical factors to create a cost-effective and customer-centric supply chain (Grover et al., 2024). Supply chain strategy (SCS) theory advocates for aligning suppliers, producers, and retailers to provide seamless coordination and collaboration. Companies can enhance performance, competitiveness, and market adaptability by utilizing theoretical frameworks in supply chain strategies (Tripathi & Roy, 2024). Supply chain planning is crucial for business efficiency and performance. Success in today's global and competitive marketplaces necessitates supply chain planning. According to Karani (2022), a robust supply chain strategy (SCS) encompasses procurement, manufacturing, distribution, and logistics to facilitate the movement of goods and services from suppliers to customers. Supply chain strategy (SCS) theory focuses on aligning operational activities with strategic objectives to achieve cost savings, enhance customer service, and increase market flexibility (Tripathi & Roy, 2024). Implementing a supply network strategy can enhance operations, mitigate risks, and improve performance. Supply chain theory advances, necessitating companies to adjust and innovate to address shifting market conditions and customer demands and enhance their supply chain strategy (SCS) to remain competitive. Statsenko, Jayasinghe, and Soosay (2024) emphasize that aligning supply chain strategy (SCS) with business strategy is crucial for gaining a competitive edge and achieving operational excellence. Aligning supply chain strategy (SCS) with business objectives enables organizations to enhance efficiency, save expenses, and meet consumer expectations. Supply chain strategy (SCS) emphasizes teams, information exchange, and the growth of supply chain

networks. Businesses can promptly adapt to market fluctuations and disturbances using this cooperative method (Shi, 2024). Organizations require a well-defined supply chain strategy (SCS) and theoretical framework to effectively operate in global marketplaces and achieve sustainable growth (Zainab et al., 2024).

A different study showed that implementing a supply chain strategy (SCS) enhances firm performance. Gonzalez-Loureiro et al. (2015) state that an effective supply chain strategy (SCS) assists organizations in matching their supply chain with their objectives. Implementing a cohesive supply chain strategy (SCS) can enhance operations, save expenses, boost consumer approval, and provide organizations with a competitive advantage (Singh, 2024). The Resource-Based View (RBV), Transaction Cost Economics (TCE), and dynamic capabilities theory enhance supply chain strategy (SCS) development and enable organizations to adapt to evolving market conditions. Effective supply chain strategies enable businesses to develop robust and adaptable supply chains capable of promptly addressing business disruptions and uncertainty (Mishra, 2024). Companies need to comprehend supply chain strategy (SCS) theory to compete and thrive in the current intricate economic landscape. Success in supply chain management (SCM) relies on both strategy and execution. Supply chain strategy (SCS) synchronizes business objectives with operational procedures to enhance trade from raw material suppliers to customers (Zaman et al., 2024). This strategy focuses on optimizing sourcing, production, distribution, and logistics to improve efficiency, reduce costs, and boost customer satisfaction. Businesses can modify their supply chain strategy (SCS) in response to market changes, disturbances, and customer demands by utilizing theoretical frameworks and practical applications (Chowdhury, 2024). Supply chain partners need to collaborate to synchronize activities and enhance value generation throughout the network. Companies need to comprehend supply chain

planning and associated theories to compete effectively in the current global business environment. Effective supply chain planning enhances performance and competitiveness in contemporary businesses (Esan et al., 2024). Kamboj and Rana (2023) state that the supply chain strategy (SCS) should be in line with the company's objectives for operational efficiency and customer contentment. A supply chain strategy (SCS) enhances sourcing, production, distribution, and customer service decisions to improve efficiency and responsiveness. Utilizing the Resource-Based View (RBV) and Transaction Cost Economics (TCE) can assist supply chains in generating value and mitigating risk (Casati et al., 2024). Utilizing supply chain management (SCM) technology and data analytics allows for immediate partner visibility and collaboration, enhancing adaptability in dynamic marketplaces (Ma & Chang, 2024). Businesses need a clearly outlined and executed supply chain strategy (SCS) to be competitive and adaptable in the current globalized and fast-moving business landscape.

Efficient product and service flow is achieved through smart supply chain management (SCM). A study by Aboelmaged et al. (2023) emphasizes the importance of having a well-defined supply chain strategy (SCS) that aligns with corporate objectives. Enhancing supply chain planning can improve efficiency, reduce costs, and enhance customer satisfaction (Karim et al., 2024). The writers state that the supply chain strategy (SCS) integrates procurement, production, warehousing, and distribution to guarantee the flow of products. Supply chain strategies must be flexible to accommodate market fluctuations and consumer demands. An effective supply chain strategy (SCS) is crucial for maintaining competitiveness in the evolving business environment (Saribanon et al., 2024). Supply chain planning significantly influences organizational performance in the current competitive environment. Bentaher (2023) states that a well-designed supply chain strategy (SCS) combines sourcing,

manufacturing, shipping, and distribution to achieve maximum efficiency and cost-effectiveness. Aligning supplier capabilities and customer needs with organizational goals is a supply chain strategy (SCS). Synchronization enhances efficiency, reduces lead time, and increases customer satisfaction. Supply chain theory encourages innovation, risk mitigation, and market responsiveness by fostering collaboration and sharing information (Dickens et al., 2024). Strategic supply chain management (SCM) enhances competitiveness, sustainability, and market responsiveness. Implementing a supply chain strategy (SCS) enhances company efficiency. An effective supply chain strategy (SCS) integrates sourcing, production, distribution, and customer service to facilitate the movement of goods and services from suppliers to customers (Groenewald & Kilag, 2024). Comprehensive supply chain management (SCM) is essential for cost reduction, quality improvement, and customer satisfaction to enhance firms' competitive advantage. Ultimately, the alignment of corporate goals and supply chain strategy (SCS) dictates the long-term profitability and sustainability of a company (Bag et al., 2024). Companies may enhance their supply chains and succeed by investing in development, innovation, and partnerships to react to market changes. Supply chain planning enhances operations and provides customer value in a dynamic business environment (Singh, 2024).

Business success relies on supply chain strategy (SCS) in the current globalized industry. Etemad (2020) asserts that firms need a supply chain strategy (SCS) to oversee operations, save expenses, and meet customer expectations. Developing a supply chain strategy (SCS) involves ensuring that organizational objectives are in harmony with supply chain objectives (Uddin et al., 2024). Aligning goals enhances operational efficiency and improves overall company performance. Supply chain strategy (SCS) aligns procurement, production, and distribution to facilitate the movement of goods

and services from suppliers to customers. This integration facilitates supply chain coordination and enables organizations to promptly adapt to market and customer fluctuations. In today's fast-paced company environment, a strong supply chain strategy (SCS) is essential for gaining a competitive edge and ensuring long-term growth (Susitha et al., 2024). The efficiency and effectiveness of a corporation are determined by its supply chain strategy (SCS). According to Kot (2023), states that a successful supply chain strategy (SCS) aligns sourcing, production, distribution, and logistics to provide a seamless flow of goods and services from suppliers to customers. Aligning supply chain strategy (SCS) with company goals can help companies save money, enhance customer happiness, and adapt to market changes. The notion of supply chain strategy (SCS) emphasizes partner engagement, risk management, sustainability, and technology to enhance operations and improve supply chain visibility (Sunmola & Apeji, 2024). Implementing a five-element supply chain strategy (SCS) may optimize operations, mitigate risks, and provide value for organizations and stakeholders.

In conclusion, this study investigates the impact of an effective supply chain strategy (SCS) on manufacturing performance. A supply chain strategy (SCS) encompasses decisions related to sourcing, production, distribution, and customer support. Accurate demand projections and lean management are essential for enhancing the efficiency of supply networks. Effective supply chain planning aligned with organizational objectives enhances operational efficiency. Organizations utilize Resource-Based View (RBV) and Transaction Cost Economics (TCE) theories to maximize resources and reduce transaction costs (Casati et al., 2024). Conceptual notions in supply chain strategy (SCS) assist firms in mitigating risks, achieving sustainable competitive advantages, and surmounting competitive business challenges. Efficient supply chain planning involves overseeing the movement of goods and

services from their source to the end user (Khan, 2024). The system connects the organization with suppliers and partners to enhance productivity, reduce expenses, and achieve a competitive advantage. Supply chain theory advocates for partner collaboration and information exchange to enhance forecasting accuracy, reduce lead times, and increase market responsiveness (Uddin, 2024). Enhancing collaboration and visibility is essential for supply chain planning and requires the use of information technology. Supply chain strategies assist firms in resource management, cost reduction, and customer satisfaction. Adapting to business and customer needs necessitates agility and adaptability. An effective supply chain strategy (SCS) is essential for achieving operational excellence and gaining a competitive edge in the current business landscape (Uddin, 2024). For firms to thrive, they need to understand supply chain theory and develop a robust supply chain strategy (SCS). Businesses require supply chain planning to effectively oversee operations, save costs, and meet consumer expectations (Chien et al., 2024). It optimizes the movement of goods, services, and information from production to consumption. Supply chain strategy (SCS) theory focuses on linking suppliers, producers, and retailers to provide seamless coordination and collaboration (Veile et al, 2024). Supply chain strategies enhance operations, mitigate risks, and enhance performance. An effective supply chain strategy (SCS) ensures that supply chains are in line with business objectives, enhancing efficiency, reducing costs, and meeting consumer demands (Tripathi & Roy, 2024). Resource-Based View, (RBV) transaction cost economics (TCE), and dynamic capacity theory enhance supply chain planning and market adaptation (Casati et al., 2024). Collaboration among supply chain partners is essential to enhancing the overall value of the network. For organizations to thrive in international trade, they need to understand supply chain planning and associated theories. Fast-paced industries necessitate a clearly defined and effectively

implemented supply chain strategy (SCS) to maintain competitiveness and sustainability. Businesses may enhance collaboration, efficiency, and performance by utilizing supply chain management (SCM) tools and data analytics. Efficient SCM guarantees seamless movement of products and services and a well-outlined strategy that aligns with corporate objectives. This system guarantees the smooth movement of products from sourcing through production, warehousing, and distribution (Zhang et al., 2024). Adaptability in a dynamic business landscape necessitates a versatile supply chain approach. Establish a streamlined supply chain for efficient and cost-effective sourcing, manufacturing, shipping, and distribution. Synchronization enhances effectiveness, reduces lead time, and boosts customer satisfaction (Taheri et al, 2024). Supply chain theory fosters innovation, risk reduction, and market responsiveness by encouraging collaboration and sharing information. Strategic supply chain management (SCM) enhances competitiveness, sustainability, and market responsiveness (Bekele et al., 2024). Investing in development, innovation, and partnerships to adjust to market changes enhances supply chains. An effective supply chain strategy (SCS) is essential for maintaining competitiveness and achieving sustained growth.

2.3.3 The Relationship Between Supply Chain Strategy and Manufacturing Performance and Proposed Hypothesis

Supply chain strategy (SCS) and manufacturing performance are crucial topics of research in the changing manufacturing industry (Zailani et al., 2024). Comprehending the impact of supply chain strategies on manufacturing performance is crucial for operational efficiency and competitiveness in Malaysia. This study was investigating the significant relationship between supply chain strategy (SCS) and the success of industrial manufacturing in Malaysia. This research highlights the importance of supply chain management (SCM) and its impact on industrial

performance in Malaysia. The relationship between supply chain strategy (SCS) and manufacturing performance is vital for operational success in manufacturing (Aljawazneh, 2024). This study also conducts in-depth analyses of Malaysia's significant industrial sector. The researcher aims to examine how supply chain management (SCM) approaches incorporated into the supply chain strategy (SCS) impact manufacturing performance using a critical and analytical method. The study sought to investigate the substantial impact of supply chain management practices (SCMP) on manufacturing performance in Malaysia. As stated by Zailani et al. (2024), manufacturing performance and supply chain strategy (SCS) are crucial to a company's success. Supply chain strategy (SCS) alignment with manufacturing processes improves operational efficiency and performance (Vafaei-Zadeh et al., 2020). To improve manufacturing performance, a well-defined supply chain strategy (SCS) streamlines production, optimizes inventory management and reduces lead times. Integration of supply chain strategy (SCS) with manufacturing processes helps companies respond to market changes, meet customer requests, and achieve a competitive edge (Saribanon et al., 2024). To achieve long-term success, organizations must integrate their supply chain strategy (SCS) with manufacturing performance. Supply chain strategy (SCS) drives manufacturing performance. Supply chain strategy (SCS) also can directly affect production efficiency and effectiveness (Lee et al., 2022). Well-structured and optimized supply chain strategies improve manufacturing stakeholder coordination, collaboration, and communication. Manufacturing objectives can be aligned with supply chain management (SCM) strategies to streamline production, decrease delays, and costs, and improve operational efficiency (Hugos, 2024). Effective supply chain strategies allow companies to respond quickly to market changes, customer demands, and interruptions, enhancing manufacturing flexibility and

responsiveness. Thus, a well-designed supply chain strategy (SCS) improves industrial performance. Supply chain strategy (SCS) was to drive manufacturing performance. Supply chain management (SCM) strategy can directly affect production efficiency and effectiveness, according to Lee et al. (2022). Well-structured and optimized supply chain strategies improve manufacturing stakeholder coordination, collaboration, and communication (Grover et al., 2024). Manufacturing objectives can be aligned with supply chain strategies to streamline production, decrease delays and costs, and improve operational efficiency (Kimwaki, 2024). Effective supply chain strategies allow companies to respond quickly to market changes, customer demands, and interruptions, enhancing manufacturing flexibility and responsiveness (Hugos, 2024). Thus, a well-designed supply chain strategy (SCS) improves industrial performance. The relationship between supply chain strategy (SCS) and manufacturing performance is a crucial element in the practice of operations management. Zailani et al. (2023) explores the importance of connecting supply chain strategy (SCS) with production objectives to improve overall performance. Companies can enhance their industry's competitiveness by efficiently integrating procurement, production, and distribution activities to streamline operations, lower costs, and enhance efficiency (Hugos, 2024). A clear supply chain strategy (SCS) helps companies adjust to market changes, reduce risks, and take advantage of new opportunities, leading to ongoing enhancements in production efficiency (Ngo et al., 2024). The interdependent connection between supply chain strategy (SCS) and manufacturing performance emphasizes the importance of organizations strategically integrating and optimizing their supply chain operations to attain sustainable success in the current dynamic business environment (Zaman et., 2024).

Recently, many scholars have studied how strategic supply chain management (SCM) and manufacturing excellence are vital to corporate success. Well-defined and executed supply chain strategies can boost manufacturing performance. According to Ofori and Doe (2022), strategic supply chains align production, inventory, and distribution networks to maximize operational efficiency. Considering sourcing, production planning, and logistics when building supply chain strategies may streamline manufacturing operations and boost efficiency. A strong supply chain strategy (SCS) helps companies respond to changing market needs, cut lead times, drop costs, and increase product quality, which boosts manufacturing performance (Al-Shboul, 2024). Good supply chain strategies are critical for operational excellence and a lasting competitive advantage in manufacturing. Any organization's success depends on the relationship that exists between manufacturing performance and supply chain strategy (SCS). Furthermore, Saeidi et al. (2023) state that a clear supply chain strategy (SCS) can greatly influence manufacturing performance through process optimization, cost reduction, quality improvement, and increased efficiency. A successful supply chain strategy (SCS) synchronizes the manufacturing process's aims and objectives with the overall organizational strategy to ensure efficient resource utilization and timely product delivery to customers. Integrating supply chain strategy (SCS) with production processes enables organizations to optimize operations, reduce waste, and enhance responsiveness to market fluctuations (Yu et al., 2024). This integration improves production performance and boosts the organization's overall success and competitiveness. Supply chain strategy (SCS) and manufacturing performance affect a company's operational efficiency. Moreover, Tan et al. (2023) also argue that strong supply chain practices affect manufacturing performance. A strong supply chain strategy (SCS) may optimize processes, increase efficiency, lower costs, and reduce

waste across the production cycle. A successful supply chain strategy (SCS) helps organizations adjust swiftly to market changes, meet consumer requests, and stay competitive (Saribanon et al., 2024). Aligning supply chain strategies with manufacturing goals and objectives improves operational excellence and business outcomes.

Hypotheses 1 (H1): There is a significant relationship between supply chain strategy (SCS) and manufacturing performance.

2.4 Supply Chain Integration (Independent Variable)

Integrating the supply chain strategy (SCS) is essential for achieving operational success and maintaining competitiveness in the dynamic business landscape of today (Ali et al., 2024). Supply chain integration (SCI) involves effectively coordinating and collaborating with different stakeholders to enhance efficiency, lower costs, and enhance overall performance (Esan et al., 2024). This study aims to address the need to implement efficient supply chain integration (SCI) in the current business environment. Studying the complexities and benefits of successful integration shows that companies must prioritize this aspect to sustain a competitive advantage in the market (Sondhi et al., 2024). Supply chain integration (SCI) is a crucial factor for success in manufacturing performance. This research specifically examines the complex relationship between supply chain integration (SCI) and overall performance within the Malaysian manufacturing industry. The study suggests that integrating supply chain management (SCM) tasks is crucial for improving the efficiency, cost-effectiveness, and competitive advantage of Malaysian manufacturing enterprises in the global market (Mashat et al., 2024). This research examined how supply chain integration (SCI) enhances performance in the Malaysian manufacturing industry, leading to growth and sustainability in a dynamic environment.

Contemporary businesses necessitate supply chain integration (SCI) for smooth coordination and collaboration. Fan et al. (2024) states that supply chain integration (SCI) involves coordinating procedures, information systems, and strategy among different departments and organizations. This relationship leads to enhanced communication, visibility, and market and customer responsiveness (Hu et al., 2023). Integrating supply chain activities enhances efficiency, reduces costs, and increases customer satisfaction. Supply chain integration (SCI) enhances risk management, inventory optimization, and supply chain performance. Organizations must utilize supply chain management (SCM) integration approaches to remain competitive in the current global economy (Fan et al., 2024). Supply chain integration (SCI) is crucial for the efficiency and effectiveness of organizational supply chains. According to Tiwari (2021), supply chain integration (SCI) is the smooth coordination and cooperation among suppliers, manufacturers, distributors, and retailers. By integrating these components, supply chain visibility, transparency, and synchronization are enhanced. This integration enables instantaneous decision-making and market reaction by streamlining product and information flow (Hu et al., 2023). Integration enhances supply chain partnerships by boosting communication, trust, and understanding. Aligning goals and strategies enables firms to innovate, save costs, mitigate risks, and enhance customer satisfaction. Integrating the supply chain strategy (SCS) is crucial for achieving operational excellence and gaining a competitive edge in today's business environment. Integrating the supply chain enhances organizational efficiency and competitiveness in the current dynamic business environment. Liao, Hu, and Chen (2022) assert that supply chain integration (SCI) necessitates collaboration among suppliers, manufacturers, distributors, and retailers. Implementing real-time data sharing and process synchronization can improve operational efficiency, reduce lead

times, optimize pricing strategies, and increase customer satisfaction. Integration enhances operational efficiency and enables businesses to adapt to fluctuations in market demand and disruptions in the supply chain (Lin & Fan, 2024). Enhanced visibility and transparency inside the supply chain network facilitate decision-making in a cohesive supply chain. Supply chain integration (SCI) is crucial for gaining a competitive edge and ensuring long-term growth in today's competitive business landscape.

Supply chain integration (SCI) is essential for operational success and competitiveness in the current changing business climate (Chatha et al., 2023). It requires coordinating and working together with stakeholders to enhance efficiency, reduce costs, and improve overall performance. This study investigates how supply chain integration (SCI) impacts the performance of the Malaysian manufacturing industry, emphasizing its role in enhancing efficiency, cost-effectiveness, and competitive edge. Supply chain integration (SCI) entails aligning processes, information systems, and strategies across many departments and organizations to improve communication, visibility, and market agility (Le et al., 2024). It improves risk management, inventory optimization, and supply chain effectiveness. Integrating components improves supply chain visibility, transparency, and synchronization, facilitating quick decision-making and market response (Martin & Ibrahim, 2024). This integration was improving supply chain partnerships by fostering innovation, reducing costs, managing risks, and increasing customer satisfaction.

2.4.1 Overview and Definition of Supply Chain Integration

Supply chain integration (SCI) is crucial for sustainable success in a competitive corporate climate focused on operational excellence (Le et al., 2024). This study thoroughly examines the complex concept of supply chain integration (SCI) and

emphasizes its crucial role in helping organizations succeed in today's intricate markets. Businesses are facing increasing pressure to improve efficiency and effectiveness (Shrivastava, 2023). Organizations view supply chain integration (SCI) as a critical strategy for survival and growth. This research was intended to explore the complexities of supply chain integration (SCI) and highlight its crucial significance as a fundamental factor for organizational sustainability and progress in the current dynamic environment. Supply chain integration (SCI) is also essential for corporate operations in Malaysia's ever-changing environment. The efficient coordination and collaboration of supply chain organizations have garnered attention for their significant influence on operational efficiency, cost reduction, and competitiveness (Zaman et al., 2023). Understanding supply chain integration (SCI) is critical in Malaysia due to the significance of economic growth and global market expansion. This research was offering a comprehensive analysis and clarification of supply chain integration (SCI) in Malaysia to address prevalent misunderstandings and obstacles. The researcher was also exploring supply chain integration (SCI) in Malaysia to illustrate its significance for economic development and global trade.

Contemporary organizations rely on supply chain integration (SCI), which entails smooth coordination and communication among supply chain participants (Ruzo-Sanmartín et al., 2022). Based on a previous study, supply chain integration (SCI) is defined as the coordination, collaboration, and sharing of information and resources among various entities in a supply chain to accomplish shared objectives (Mackelprang et al., 2014). To enhance efficiency, reduce expenses, and enhance performance, suppliers, manufacturers, distributors, and retailers need to synchronize processes, systems, and strategies. Supply chain integration (SCI) enables immediate visibility, quick market adaptation, streamlined operations, and enhanced customer satisfaction.

Organizations may enhance risk management, optimize decision-making, and achieve a competitive advantage in the current dynamic business environment through enhancing supply chain relationships and information exchange (Ricardianto et al., 2023). Integrating the supply chain enhances the efficiency of supply chain management (SCM). Supply chain integration (SCI) is also the efficient coordination and cooperation among businesses within a supply chain network to optimize operations, exchange information, and accomplish shared objectives (Kumar et al., 2022). Furthermore, an integrated supply chain is established by coordinating the objectives, operations, and procedures of suppliers, manufacturers, distributors, and retailers. Not only that, aligning roles and stakeholders can enhance supply chain visibility, responsiveness, and decision-making. Supply chain integration (SCI) enhances the efficiency of information, materials, and resource distribution within the network, resulting in better coordination, reduced lead times, lower costs, and increased customer satisfaction (Tan et al., 2022). Contemporary enterprises necessitate supply chain integration (SCI), which entails coordination and collaboration among organizations. Supply chain integration (SCI) is the process of linking and aligning supply chain operations, processes, and stakeholders to enhance efficiency, responsiveness, and performance. In addition, procurement, production, distribution, and logistics are closely coordinated to enable the continuous movement of goods and information in the supply chain network (Basaldúa & Di Palma, 2023). Integration also enhances visibility, communication, and collaboration, leading to decreased lead times and costs and increased customer satisfaction. Supply chain integration (SCI) enables partners to exchange data and insights, enhancing decision-making and increasing the agility and resilience of the supply chain (Jiang et al., 2023). So, supply chain integration (SCI) is essential for organizations aiming to stay competitive and adapt to

evolving market demands in the current fast-moving business environment (Sarfraz et al., 2023).

In Malaysia, supply chain management (SCM) integration is critical for improving the efficiency and competitiveness of businesses. Mubarik and Mubarak (2020) define supply chain integration (SCI) as the degree to which various entities in a supply chain work together and synchronize their actions to produce smooth operations and shared benefits. In Malaysia, with its numerous and interrelated industries, supply chain integration (SCI) is essential for optimizing operations, cutting costs, and enhancing overall performance (Fernando et al., 2023). This integration entails the exchange of information, resources, and strategies across different stakeholders like suppliers, manufacturers, distributors, and retailers to guarantee a coordinated flow of goods and services (Frimpong et al., 2024). Malaysian organizations can improve their ability to respond to market changes, meet consumer needs quickly, and achieve a competitive advantage in the global market by promoting integration throughout the supply chain. Supply chain integration (SCI) in Malaysia is crucial for improving the efficiency and competitiveness of enterprises in the region. A previous study by Shukor, Newaz, and Rahman (2021) described supply chain integration (SCI) as the smooth coordination and collaboration among different organizations in a supply chain network to expedite procedures and achieve shared objectives. In Malaysia, integration encompasses suppliers, manufacturers, distributors, and retailers working together to establish a cohesive and coordinated system that aims to decrease delays, lower expenses, and enhance overall efficiency (Le et al., 2024). Malaysian organizations can improve decision-making processes and responsiveness to market demands by integrating various components of the supply chain to promote visibility, communication, and information exchange. Supply chain integration (SCI)

in Malaysia also supports the use of sophisticated technology and innovative processes, helping organizations remain competitive in the global market and fulfill changing client demands. In Malaysia, supply chain integration (SCI) is a critical idea that significantly improves operational efficiency and competitiveness in the country's supply chain networks. Moreover, Abbasi et al. (2022) defines supply chain integration (SCI) as the strategic coordination of roles and processes inside the supply chain to ensure smooth information flow, collaboration, and synergy among stakeholders. Supply chain integration (SCI) in Malaysia entails combining suppliers, manufacturers, distributors, and retailers to streamline operations, decrease lead times, cut costs, and enhance overall performance. Integrating these processes is crucial for improving inventory management, production planning, and distribution strategies to efficiently meet customer requests and strengthen supply chain resilience and responsiveness (Pasupuleti et al., 2024). Malaysia may enhance its supply chain ecosystem by strengthening partnerships and exchanging information across partners, enabling it to better adapt to changing market conditions and promote long-term sustainable growth.

Furthermore, supply chain integration (SCI) in Malaysia is essential for improving operational efficiency and competitiveness in the business environment. As stated by Shaharudin et al. (2023), supply chain integration (SCI) is defined as aligning and coordinating different components of the supply chain to enable seamless collaboration and information exchange among organizations in the supply chain network. This integration encompasses the coordination of physical product flow as well as the alignment of information, processes, and strategies across suppliers, manufacturers, distributors, and customers (Pasupuleti et al., 2024). In Malaysia, organizations must prioritize supply chain integration (SCI) to enhance operational efficiency, lower expenses, enhance customer service, and achieve a competitive

advantage in the market. By efficiently integrating their supply chains, Malaysian businesses can improve their performance and achieve sustainable growth in Malaysia's dynamic business environment. This allows them to react quickly to market demands, optimize inventory levels, increase visibility throughout the supply chain, and build stronger relationships with partners (Weisz et al., 2024).

In a nutshell, supply chain integration (SCI) is crucial in today's competitive corporate landscape (Hu et al., 2022). It entails supply chain entities working together to share information and resources to accomplish objectives. This study investigates supply chain integration (SCI) in Malaysia and its impact on organizational sustainability and growth in a dynamic environment. Malaysian companies require supply chain integration (SCI) to enhance efficiency and competitiveness (Istimaroh, 2023). Suppliers, manufacturers, distributors, and retailers collaborate to synchronize goods and services by exchanging information, resources, and plans. Integration enhances transparency, communication, and teamwork, decreasing lead times and expenses and enhancing customer satisfaction (Lepistö et al., 2024). Supply chain integration (SCI) in Malaysia enables enterprises to utilize cutting-edge technology and new processes to compete globally and fulfill client requirements. Supply chain integration (SCI) entails the strategic coordination of roles and procedures to guarantee the seamless flow of information among stakeholders, fostering collaboration and synergy (Yasmin, 2024). Malaysian organizations can enhance performance and expand by effectively integrating their supply chains in a dynamic business setting. This enables them to quickly address market needs, optimize inventory levels, enhance supply chain visibility, and bolster alliances (Holloway, 2024).

2.4.2 Supply Chain Integration and Theory Associated

Supply chain integration (SCI) is a crucial component in modern business operations, playing a key role in enhancing efficiency, competitiveness, and overall performance (Salah et al., 2023). This research examines the theories related to supply chain integration (SCI) and its importance in modern corporate environments. The analysis asserts that supply chain integration (SCI) is not merely a trendy term but a crucial element for successful supply chain management (SCM) (Oubrahim et al., 2023). Despite encountering critiques and obstacles, integrating supply chains is essential for managing the intricacies of the global market and attaining sustainable growth. Understanding supply chain integration (SCI) might discover new opportunities for operational excellence and strategic benefit by comprehending the ideas that support this integration (Al Doghan & Abd Razak, 2024).

Supply chain integration (SCI) is a crucial topic in contemporary logistics and corporate operations. Richey et al. (2009) examine the importance of integrating different elements of the supply chain to improve overall performance and efficiency. They emphasize the significance of collaboration and coordination across various entities in the supply chain, including suppliers, manufacturers, distributors, and retailers. Organizations can achieve seamless supply chain integration (SCI), lower costs, enhanced customer satisfaction, and increased competitiveness in the market by aligning goals, exchanging information, and building strong partnerships (Holloway, 2024). The notion of supply chain integration (SCI) highlights the importance of taking a comprehensive strategy that includes internal processes, external linkages, and market dynamics. This was emphasizing the interconnectedness of supply systems and the influence of integration on the overall efficacy of supply chains (Zelbst et al., 2024).

Furthermore, supply chain integration (SCI) is vital in contemporary company operations, with multiple theories linked to its execution and supervision. Allen, Zhu, and Sarkis (2021) define supply chain integration (SCI) as the smooth coordination and collaboration among various organizations in the supply chain network to enhance operational efficiency and effectiveness. The resource-based perspective theory associated with supply chain integration (SCI) suggests that companies can gain a lasting competitive edge by combining and integrating their resources and skills with those of their supply chain collaborators (Sahu et al., 2024). This idea emphasizes the significance of coordinating plans, exchanging information, and fostering mutual trust among supply chain members to improve overall performance. The transaction cost economics theory highlights the importance of transaction costs in influencing the level of integration in supply chains (Patil et al., 2024). Organizations can boost operational performance and gain a competitive edge by reducing transaction costs through supply chain integration (SCI), which helps streamline operations, minimize uncertainty, and improve coordination. Understanding supply chain integration (SCI) theories is critical for organizations looking to improve their supply chain operations and achieve long-term success in today's dynamic business landscape (Lin & Fan, 2024).

Supply chain integration (SCI) is crucial for improving the efficiency and performance of supply chain processes. Richey and Chowdhury (2023) define supply chain integration (SCI) as the coordination and collaboration of different organizations in a supply chain network to ensure smooth information sharing, resource optimization, and strategic alignment. The theoretical foundation of supply chain integration (SCI) emphasizes the significance of cultivating robust relationships among suppliers, manufacturers, distributors, and retailers to optimize operations and reduce interruptions (Rufo-Sanmartín et al., 2023). Organizations may enhance visibility,

agility, and responsiveness in their supply chain activities by including important stakeholders and utilizing sophisticated technologies like data analytics and automation (Sharma & Joshi, 2023). According to supply chain integration (SCI) theories, ongoing communication, trust-building, and mutual benefits among partners are critical to enhancing sustained competitive advantage and value generation within the supply chain (Akhtar et al., 2023)

The analysis of "Supply Chain Integration (SCI) and Theory Associated with Supply Chain Integration (SCI)" highlights the crucial importance of supply chain integration (SCI) in today's corporate environment. Despite the obstacles and negative feedback, integrating supply chains is critical for improving efficiency and performance in supply chain activities (Oubrahim et al., 2023). Organizations can achieve seamless information sharing, resource optimization, and strategic alignment by understanding and applying supply chain integration (SCI) ideas. Effective collaboration and coordination among different organizations in a supply chain network are crucial for gaining competitive advantages and creating value (Zaman et al., 2024). Continuous communication, trust-building, and the use of sophisticated technology was enhancing the importance of supply chain integration (SCI) in achieving success and sustainability in the ever-changing global market (Jia et al., 2023).

2.4.3 The Relationship Between Supply Chain Integration and Manufacturing Performance and the Proposed Hypothesis

In manufacturing, the complex relationship between supply chain integration (SCI) and manufacturing performance is a crucial factor in determining operational success (Kamble, 2023). In Malaysia, the focus is on the connection between supply chain management (SCM) methods and manufacturing performance (Fernando, 2023). This research investigates the relationship between these aspects, highlighting the need

for a strong integration strategy to improve manufacturing performance in Malaysia. This research aimed to emphasize the significant impact of SCI on manufacturing performance in the Malaysian industrial sector, notwithstanding any initial reservations or doubt.

Supply chain integration (SCI) enhances production performance by promoting collaboration and coordination among supply chain partners. As stated by Islami (2023), discovered that a cohesive supply chain enhances manufacturing performance through improved information exchange, collaboration, and synchronized procedures. Aligning production, procurement, and distribution enhances coordination, lead times, pricing, and customer responsiveness. Aligning and collaborating across the supply chain improves efficiency, minimizes delays, and enhances overall performance. Supply chain integration (SCI) and manufacturing performance are essential for achieving operational excellence and gaining a competitive edge in the current dynamic business landscape (Islami, 2023). The researcher has examined how integrating supply chains impacts operational outcomes and industrial performance. Rashid et al. (2023) indicates that supply chain integration (SCI) enhances manufacturing performance by promoting supply chain collaboration and coordination. Efficient integration can expedite operations, decrease lead times, minimize costs, optimize resource utilization, and enhance performance indicators (Khatri, 2023). A well-integrated supply chain enhances operating efficiency, quality, delivery reliability, and customer happiness. The results underscore the strategic significance of supply chain integration (SCI) in improving manufacturing performance. Manufacturing efficiency is influenced by the level of supply chain integration (SCI). Mogaka (2023) states that effective supply chain integration (SCI) necessitates collaboration among suppliers, manufacturers, distributors, and retailers. Collaboration across these entities enhances communication,

information sharing, and process efficiency. This integration enhances the efficiency of materials and information flow, accelerates decision-making processes, and increases the agility of market responses (Jafari et al., 2023). Integrating the supply chain enhances production performance by improving cost efficiency, product quality, on-time delivery, and customer happiness. Robust supply chain connections and interrelationships can enhance operational effectiveness and market competitiveness (Salam & Bajaba, 2023).

Supply chain integration (SCI) improves industrial performance by streamlining operations and increasing efficiency. When suppliers, manufacturers, and distributors are fully linked, the supply chain works more smoothly (Choi et al., 2023). This connectivity allows real-time communication, improved coordination, and a more flexible reaction to demand fluctuations or supply chain interruptions. By collaborating and sharing information, supply chain actors can improve operational performance, cost-effectiveness, and customer satisfaction (Garcia-Torres et al., 2024). Supply chain integration (SCI) improves visibility and control throughout the entire production process, reducing lead times, inventory costs, and product quality. Supply chain integration (SCI) helps companies respond to market changes, meet consumer needs, and improve industrial performance (Ruzo-Sanmartín et al., 2023). Supply chain integration (SCI) and production performance are crucial to manufacturing success (Saragih et al., 2020). In Malaysia, supply chain management (SCM) strategies and manufacturing performance are central. This research explores the relationship between these factors, emphasizing the importance of a strong integration strategy in improving Malaysian manufacturing performance. This study argues that supply chain integration (SCI) improves manufacturing performance and is crucial to the Malaysian industrial landscape, notwithstanding any misgivings.

Supply chain integration (SCI) also improves production performance by simplifying supply chain coordination and collaboration (Saragih et al., 2020). Well-integrated supply chains allow seamless information flow, effective communication, and synchronized activities, improving operational efficiency and responsiveness (Asnordin et al., 2021). This integration enhances productivity, lead times, inventory levels, and manufacturing processes. Companies may improve flexibility, cost savings, and product quality by coordinating strategy, sharing resources, and building strong supplier and partner connections (Tarigan et al., 2021). Thus, supply chain integration (SCI) and manufacturing performance are crucial to competitiveness and sustained growth in today's dynamic business climate (Shukor et al., 2021). Supply chain integration (SCI) improves production performance by encouraging partner collaboration and coordination (Purwanto et al., 2024). Supply chain integration (SCI) requires flawless alignment of processes, information, and resources across the supply chain network, according to Lee et al. (2023). With this connectivity, manufacturers may streamline processes, cut lead times and inventory, and boost efficiency. Organizations may respond quickly to market changes and customer demands by exchanging real-time information and building strong supplier and distributor partnerships (Copper, 2024). Synchronized efforts improve production quality, customer satisfaction, and manufacturing performance. Thus, producers seeking operational excellence and competitive advantage in today's changing business climate need a well-integrated supply chain (Tikka, 2024). In conclusion, the study emphasizes the crucial connection between supply chain integration (SCI) and industrial success in Malaysia. An in-depth analysis of supply chain management (SCM) techniques reveals that a strong integration approach is not just beneficial but essential for improving manufacturing performance (Oubrahim & Sefiani, 2024). This research highlights how

supply chain integration (SCI), through collaboration and coordination, plays a crucial role in improving operational efficiency and adapting effectively to market changes. Integrating supply chain operations is essential for enterprises aiming for operational excellence and a competitive advantage in Malaysia's changing industrial environment.

Furthermore, researchers were examining the relationship between supply chain integration (SCI) and manufacturing performance in small and medium enterprises (SMEs) in Malaysia. Vafaei-Zadeh et al. (2020) study highlights the significance of supply chain integration (SCI) in enhancing Malaysian small and medium enterprises (SMEs) manufacturing performance. Integrating the supply chain network enhances efficiency and effectiveness through coordination and collaboration. Efficiently connected supply chains can accelerate operations, decrease lead times, enhance product quality, and enhance production performance, as stated in the research. Establishing strong relationships with suppliers, distributors, and stakeholders is crucial for Malaysian small and medium enterprises (SMEs) to efficiently utilize resources, mitigate risks, and capitalize on market possibilities, thus enhancing their manufacturing competitiveness. Malaysian small and medium enterprises (SMEs) must prioritize supply chain integration (SCI) to enhance production performance and achieve sustainable growth in the current dynamic business landscape. The operational efficiency and competitiveness of Malaysia's small and medium enterprises (SMEs) rely on the integration of supply chains and production performance. According to Kosasih et al. (2023), supply chain integration (SCI) enhances manufacturing performance for Malaysian small and medium enterprises (SMEs). Integrating supplies, manufacturers, and distributors helps optimize operations, reduce expenses, enhance communication, and increase efficiency for small and medium enterprises (SMEs) (Pratiwi, 2024). Integration assists small and medium enterprises (SMEs) in optimizing

material and information flow and adjusting to evolving market demands and customer preferences. Supply chain integration (SCI) can enhance manufacturing performance for small and medium enterprises (SMEs) in Malaysia's competitive business landscape, promoting their long-term success and sustainability. It is essential to study supply chain integration (SCI) and manufacturing performance in Malaysian small and medium enterprises (SMEs) (Zailani et al., 2024). Enhanced coordination and collaboration within supply chain entities enhance efficiency and effectiveness. The performance of Malaysian small and medium enterprises (SMEs) in manufacturing is contingent upon the integration of their supply chains. Enhanced supply chain integration (SCI) enhances production performance by reducing costs, ensuring quality control, and increasing customer satisfaction. This highlights the importance of using integrated supply chain techniques by Malaysian small and medium enterprises (SMEs) to enhance manufacturing efficiency and achieve a competitive edge in the market. Enhancing supply chain integration (SCI) can help Malaysian small and medium enterprises (SMEs) boost manufacturing growth by optimizing operations, minimizing disruptions, and satisfying customer demands (Panigrahi et al., 2024).

Finally, supply chain integration (SCI) is crucial for manufacturing success, particularly in Malaysia (Zailani et al., 2024). Supply chain partners enhance collaboration and coordination by sharing information and synchronizing processes. Integration enhances operational efficiency, lead times, pricing, resource utilization, and performance (Patil et al., 2024). Supply chain management (SCM) solutions enhance manufacturing performance in Malaysia (Pansare et al., 2024). Collaboration among suppliers, manufacturers, distributors, and retailers is essential to enhance communication, information sharing, and operational efficiency (Prananta & Hidayat, 2024). Integration improves visibility and control in the production process, reducing

lead times, inventory costs, and enhancing product quality. Integrating the supply chain streamlines coordination and collaboration, enhancing production performance (Martin & Ibrahim, 2024). Efficient supply chains enhance operational effectiveness and agility by enabling the smooth flow of information, communication, and coordination. This connection enhances productivity, reduces lead times, optimizes stocks, and streamlines production processes. Utilizing strategy, resource sharing, and fostering strong supplier and partner connections can enhance flexibility, save costs, and improve product quality (Uddin, 2024). Malaysian small and medium enterprises (SMEs) long-term success and sustainability depend on supply chain integration (SCI) and production performance. Optimizing small and medium enterprises (SMEs) operations, costs, communication, and efficiency can be achieved by integrating supply, manufacturers, and distributors. Malaysian small and medium enterprises (SMEs) need to adopt integrated supply chain strategies to enhance manufacturing efficiency and achieve a competitive advantage in the market (Ibikunle et al., 2024).

Hypotheses 2 (H2): There is significant between supply chain integration and manufacturing performance.

2.5 Supply Chain Information Management (Independent Variables)

Supply Chain Information Management (SCIM) is essential for operational success in the fast-changing global manufacturing market (Ali et al., 2021). Coordinating resources, information, and money from supplier to manufacturer to wholesaler to retailer to consumer is difficult. As the neurological system that maintains supply chain information flow, supply chain information management (SCIM) is crucial to this complicated ballet (Sheth & Uslay, 2023). This study examined how supply chain information management (SCIM) affects industrial performance, where efficiency, agility, and innovation meet. supply chain information management (SCIM)

streamlines operations and gives manufacturers a competitive edge. Effective supply chain information management (SCIM) implementation is not just an operational necessity but a revolutionary force that improves manufacturing performance and drives industries to unprecedented efficiency and productivity (Ali et al., 2021). This study shows how supply chain information management (SCIM) underpins the symbiotic relationship between information management and manufacturing excellence by carefully examining previous studies and real-world applications.

2.5.1 Overview and Definition Supply Chain Information Management

Recently, there has been an increasing perception among scholars that supply chain information management (SCIM) is a key to improving industrial performance. supply chain information management (SCIM) allows firms to make speedy decisions by collecting, analyzing, and disseminating real-time data across the supply chain (Wang et al., 2022). In today's fast-paced markets, delays can cost money and undermine competitiveness; therefore, improved decision-making is essential. supply chain information management (SCIM) also promotes a more agile and responsive supply chain that can adjust to rapid market demand changes or supply disruptions (Ali et al., 2021). Supply chain information management (SCIM) aligns all supply chain stakeholders through transparent and unified information flow, enabling seamless manufacturing operations (Rathobei et al., 2024). Operational efficiency, product quality, and customer happiness improve. According to Wang et al. (2022), strategic supply chain information management (SCIM) implementation drives production performance, highlighting the importance of digital integration in modern manufacturing.

2.5.2 Supply Chain Information Management and Theory Associated

Modern commerce relies on Supply Chain Information Management (SCIM) to bridge the gap between traditional supply chain operations and the digital revolution (Ali et al., 2021). Information technology integration into supply chain processes provides unprecedented visibility, agility, and efficiency, revolutionizing demand forecasting, inventory management, and logistics (Odimarha et al., 2024b). Supply chain information management (SCIM) holds that appropriately gathered and effectively used information can boost supply chain performance. Information flow is crucial to synchronizing supply chain activities from raw material acquisition to customer delivery, according to supply chain management (SCM) theory. The notion states that real-time data and analytics help organizations make better decisions, forecast market developments, and respond faster to client needs (Adewusi et al., 2024). Supply chain information management (SCIM) theories also promote the use of IoT, cloud computing, and blockchain to securely, and instantly exchange important supply chain data across worldwide networks (Singh et al., 2024). These improvements improve operational transparency and supply chain partner collaboration, optimizing supply chain performance.

According to these theoretical principles, supply chain information management (SCIM) improves operational performance and reduces environmental uncertainty. According to Wong et al. (2011); Hendijani and Saei (2024b), "managers pursue information integration for supply chain management (SCM) to achieve operational performance improvement regardless of environmental uncertainty." Businesses face turbulent markets and intricate supply networks, making this claim significant. Through integrated information systems, organizations may synchronize supply chain activities and improve visibility across all levels (Hendijani & Saei,

2024b). Modern company strategies depend on supply chain information management (SCIM), which ensures the seamless flow of information from raw material suppliers to consumers. The supply chain information management (SCIM) theory emphasises information's importance as a supply chain resource, alongside physical commodities and services. This idea states that supply chain information management improves decision-making, efficiency, cost, and market response. In this theoretical framework, information sharing promotes the transparent and timely sharing of relevant data among supply chain players. Through collaboration and trust, firms can reduce risks, predict demand variations, and optimise inventory levels, giving them a competitive edge (Singh et al., 2024). In essence, supply chain information management and its theory provide a comprehensive approach to managing the flow of information in a way that aligns with strategic business objectives. It also incorporates lean management and just-in-time (JIT) inventory (Milewski, 2022).

This study provided insights into the theoretical significance and practical consequences of supply chain information management (SCIM). It was also advocated for a new approach to supply chain management (SCM) that prioritizes the use of information in decision-making. By adopting this approach, organizations can effectively adapt to future risks with more flexibility and anticipation, ensuring long-term success in a globally interconnected environment where information plays a crucial role (Van Der Duin et al., 2024).

2.5.3 The Relationship Between Supply Chain Information Management and Manufacturing Performance and The Proposed Hypothesis

In the constantly globalising economy, supply chain management's (SCM) importance for manufacturing performance, especially in small and medium enterprises (SMEs), has become a hot topic (Türkeş et al., 2024). This study examined the complex

relationship between supply chain information management (SCIM) and Malaysian SMEs' manufacturing capacities (Sahoo, 2021). Small and medium enterprises (SMEs) are vital to Malaysia's economy, but they confront obstacles that can hurt their operational efficiency and competitiveness. Supply chain management (SCM) is key to improving industrial performance despite these constraints (Ruzo-Sanmartín et al., 2024). This study argued that good supply chain information management strategies improve Malaysian small and medium enterprises (SMEs)' manufacturing results, refuting any contrary claims. This work contributes to scholarly discourse and has practical relevance for small and medium enterprises (SMEs) trying to improve their supply chains for better manufacturing performance. This research was examining current methods to show how supply chain management practices (SCMP) might improve Malaysian small and medium enterprises (SMEs)' manufacturing standards.

Based on a previous study by Lee et al. (2022), effective supply chain information management (SCIM) strategies directly affect manufacturing performance in Malaysian small and medium enterprises (SMEs), disproving any opposing claims. These findings support past research indicating supply chain information management (SCIM) flow optimization improves operational efficiency and competitiveness (Lee et al., 2022). Using real-time data analytics and integrated communication technologies, small and medium enterprises (SMEs) can better meet market expectations and reduce operational disruption risks. These advanced procedures improve lead times and resource utilization, sustaining productivity even during machinery breakdowns or other inefficiencies. This comprehensive supply chain management (SCM) methodology lets small and medium enterprises (SMEs) use asset-light delivery methods to improve performance (Lee et al., 2022). These findings support the idea that

small and medium enterprises (SMEs) need sophisticated information management systems in their supply chains to stay competitive in a changing market.

Furthermore, the study found that supply chain information management (SCIM) affects manufacturing performance in Malaysian small and medium enterprises (SMEs). According to Fok-Yew and Hamid (2022), good supply chain practices improve manufacturing outcomes and highlight the wider implications for small and medium enterprises (SMEs) navigating a globalized market. By adopting modern supply chain management (SCM) tactics, these companies can improve operational efficiency, decision-making, and market response (Kuruppu et al., 2023). This study shows how important supply chain management (SCM) is in the current economy and encourages Malaysian small and medium enterprises (SMEs) to act. Strong information management systems in supply chains are essential for excellent production performance and a sustained competitive advantage (Li et al., 2023). This research gives small and medium enterprises (SMEs) optimism for development, resilience, and success at the intersection of technical advancement and globalization. Supply chain management (SCM) becomes a strategic need that propels small and medium enterprises (SMEs) to new industrial excellence in Malaysia and beyond.

Moreover, the intricate relationship between supply chain information management (SCIM) and manufacturing performance signifies a pivotal aspect of modern industrial operations (Rashid et al., 2024). Supply chain information management (SCIM) encompasses the effective collection, analysis, and dissemination of data across the supply chain, ensuring that decision-makers have access to real-time information to make informed choices. This comprehensive flow of information directly influences manufacturing performance by enhancing operational efficiency, reducing lead times, and facilitating a more agile response to market demands (Rashid

et al., 2024). In this context, a proposed hypothesis would assert that an optimized supply chain information management (SCIM) system significantly contributes to improved manufacturing performance.

Specifically, it posits that the integration of advanced information technologies within the supply chain leads to a reduction in inventory costs, an increase in production efficiency, and an overall enhancement in product quality. Furthermore, by leveraging supply chain information management (SCIM), manufacturers can better predict and respond to consumer needs, thereby improving customer satisfaction and fostering a competitive advantage in the marketplace (Agag et al., 2024). This hypothesis underscores the critical role of effective information management in achieving operational excellence and sustainability in manufacturing operations.

Hypotheses 3 (H3): There is a significant relationship between supply chain information management (SCIM) and manufacturing performance.

2.6 Hypotheses Development

The contemporary witnessed notable progress and methodological breakthroughs that fundamentally reshaped the way scholars approach the creation and testing of hypotheses. Previously, scholars Gannon, Taheri, and Azer (2022) argued that positivism centers around the notion of a solitary, authoritative "truth," which plays a crucial role in guiding the formulation and testing of hypotheses to explain occurrences. Although they have encountered doubt and criticism, particularly about their inflexibility, the referenced works throughout this period have served as foundations for innovation and investigation across several fields (Qian, 2024). These contributions have disrupted conventional ideas by incorporating interdisciplinary methodologies, sophisticated statistical techniques, and cutting-edge technology like machine learning

and big data analytics into research motivated by hypotheses (Zong & Guan, 2024). As a result, researchers currently have improved resources to address intricate inquiries with enhanced accuracy and thoroughness. The studies conducted during this critical period expanded our understanding by developing rigorous hypotheses and exploring new avenues for empirical investigation. These studies have also underlined the importance of adapting traditional frameworks to address modern challenges (Gannon et al., 2022). As a result, this phase of transformation highlights the changing character of scientific investigation and emphasises the importance of sustaining rigorous methodology in the midst of a constantly evolving research environment.

According to Paul's (2024) article in the International Journal of Consumer Studies, a hypothesis is not only a guess based on knowledge but rather a prediction statement that is based on current theory and initial data. It is crucial to take this step, as it sets the course of the research by formulating a precise and verifiable hypothesis that aims to elucidate a phenomenon or the connection between variables. Furthermore, the scholars also highlighted the significance of clarity, brevity, and achieve ability in hypothesis formulation. He argues that a meticulously constructed hypothesis not only predicts possible results but also defines the boundaries of the study. This guarantees that the study's structure and available resources can adequately address the research questions. In addition, the process of formulating a hypothesis requires a comprehensive examination of current literature, allowing researchers to expand on previous knowledge while identifying areas that their study intends to fill (Casula et al., 2020). In essence, hypotheses serve as a link between theory and empirical inquiry, guiding the latter toward the generation of novel insights and a significant addition to the body of knowledge (Zong & Guan, 2024).

In the face of global concerns and rapid technological advances, researchers across disciplines have changed how they formulate and test hypotheses. By adopting new methods and revising research boundaries, academics have overcome scepticism and critique and advanced knowledge and inquiry. This transformative age, which we thoroughly analyse in our paper, shows how hypotheses bridge theoretical frameworks with empirical investigation, catalysing remarkable advances and setting a new standard for future scientific endeavours. These early pioneering efforts and lessons was continue to inspire and guide research methodology, reminding us of the power of hypotheses to drive understanding and innovation in a changing world.

Table 2.1: Research Hypotheses Development

Hypotheses	Statement
<i>Hypothesis (H1)</i>	<i>There is significant relationship between supply chain strategy (SCS) and manufacturing performance.</i>
<i>Hypothesis (H2)</i>	<i>There is significant relationship between supply chain integration (SCI) and manufacturing performance.</i>
<i>Hypothesis (H3)</i>	<i>There is significant relationship between supply chain information management (SCIM) and manufacturing performance.</i>

2.7 Research Framework

Expanding on these well-established understandings, a conceptual framework serves a purpose beyond only providing structural stability. It is a flexible instrument that enhances the implementation of knowledge management and other intricate concepts in research. Obule-Abila (2020) argues that creating a conceptual framework for implementing knowledge management in municipal garbage issues is important not

only for environmental evaluations but also for simplifying complex studies. This demonstrates how the framework enables the identification and analysis of connections between various study factors, so enhancing both theoretical comprehension and practical applications. When dealing with complex problems like waste management, researchers can use this framework to successfully include different perspectives from many fields, making sure that their conclusions are well-grounded in the specific context and based on reliable methods.

The use of a conceptual framework in research has both empirical support through citation data and significant theoretical benefits (Lynch et al., 2020). Detractors frequently contend that these frameworks might hinder innovation or impose artificial limitations on the investigation process. Nevertheless, these criticisms fail to acknowledge the inherent adaptive flexibility seen in well-designed frameworks (Olorunfemi et al., 2024). A dynamic conceptual framework is a flexible framework that can adapt to discoveries and changes in research focus as the study develops, rather than being a fixed template. This flexibility enables researchers to promptly incorporate new data while upholding a logical framework for their investigation (Mousa et al., 2024). Moreover, utilizing a conceptual framework improves multidisciplinary research by providing a shared vocabulary and point of reference for integrating various theoretical viewpoints and approaches (Scholz et al., 2024b).

Ultimately, regardless of the dynamic nature of research methodology and the various difficulties encountered in academic and professional domains, the conceptual framework remains a crucial tool for researchers (Dwivedi et al., 2024). The function of this technique in facilitating the design, implementation, and analysis of studies is unmatched, serving as a reliable guide and stabilizing force in the complex world of academic investigation. By facilitating a concise expression of study goals, hypotheses,

and the connections between variables, it guarantees that studies are not only methodically robust but also firmly grounded in theoretical rigour. The study conducted by Akinsanya, Ekechi, and Okeke (2024) highlights the importance of the conceptual framework in connecting theoretical concepts with real-world observations, thus enhancing the quality and significance of research results. The applications and interpretations of the conceptual framework was continuing to change as academia and professional disciplines progressed. However, its fundamental significance in directing scholarly efforts toward meaningful and authentic contributions to knowledge remains unquestionable. Subsequent studies unquestionably persisted in examining the limitations of current frameworks, suggesting enhancements and novel ideas. Nevertheless, the fundamental nature of the conceptual framework, serving as a guiding principle of transparency and honesty in research, persisted, promoting the progress of knowledge in a progressively intricate and linked world (Samkin et al., 2024)

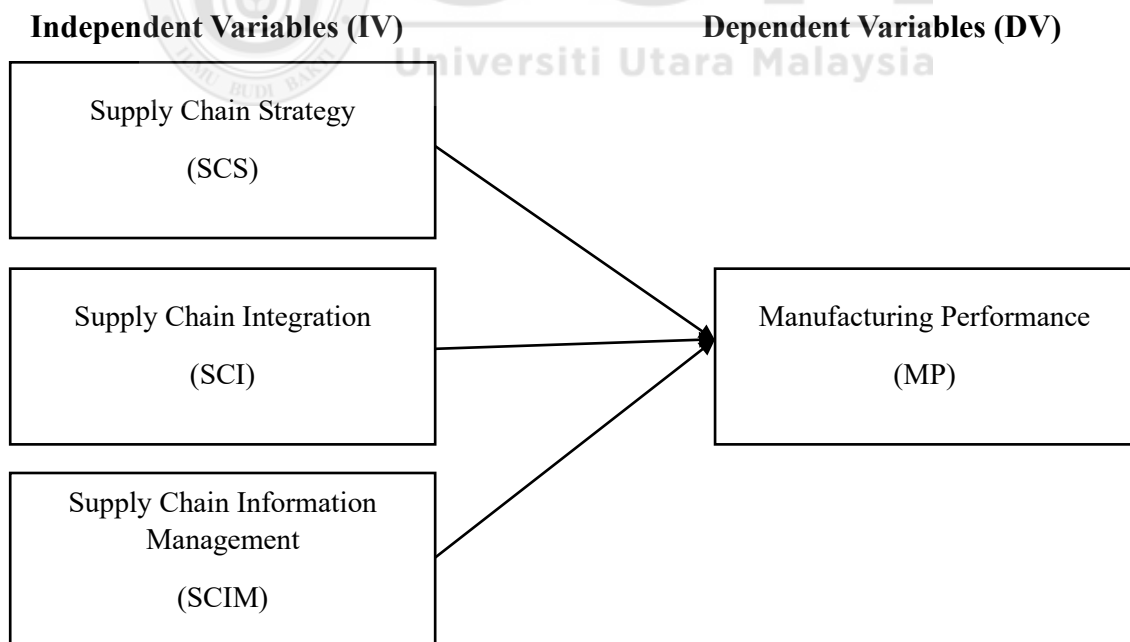


Figure 2.1: Framework

To navigate this complex terrain, the researcher has developed and adapted a conceptual framework as shown in *Figure 2.1*, acting as both the compass and the map

for this investigative journey. Despite potential criticism or skepticism regarding its applicability or robustness, this study was argued that the conceptual framework in question is not only valid but an essential tool for understanding the nuances of supply chain management (SCM) impact on manufacturing performance. The researcher was thoroughly demonstrating the usefulness of this framework by dissecting its components, examining its application, and evaluating the outcomes. This was given us useful information about how important supply chain management (SCM) practices are for the growth and competitiveness of small and medium enterprises (SMEs) businesses in the manufacturing sector. Furthermore, despite criticism or questioning, the conceptual framework for studying how supply chain management practices (SCMP) affect the manufacturing performance of small and medium enterprises (SMEs) remains important and valid. Critics may argue that an excessive reliance on pre-established frameworks could impede innovation or overlook distinctive, context-specific subtleties. However, investigation shows that the iterative refining approach effectively addresses these challenges (Prayitno et al., 2024). Not only that, but the scholar also carefully calculated supply chain management (SCM) performance indicators and supply chain management (SCM) maturity criteria to make sure they are useful and applicable in a range of small and medium enterprises (SMEs) operational situations (Prayitno et al., 2024). This technique not only emphasizes the strength and durability of the framework but also showcases its ability to adapt and change in response to new knowledge and trends in data. In addition, Abdullah (2022) highlighted the importance of considering moderating elements such as technical improvements and regulatory settings. This requires an adaptable model that can effectively incorporate these factors into the analysis.

The researcher integrated and adapted these independent variables which are supply chain strategy (SCS), supply chain integration (SCI), and supply chain information management (SCIM) into the study based on Figure 2.1. The researcher discovered 3 independent variables would affect the manufacturing performance of small and medium enterprises (SMEs). This study aims to analyze the relationships between supply chain strategy (SCS), supply chain integration (SCI), and supply chain information management (SCIM) with the manufacturing performance in small and medium enterprises (SMEs). Thus, manufacturing performance for small and medium enterprises (SMEs) is considered the result of these connected aspects, with the idea that better improvement in supply chain practices inside small and medium enterprises (SMEs) had arisen from improvement in the supply chain strategy (SCS), supply chain integration (SCI) and supply chain information management (SCIM). The framework's empirical validation through consensus among small and medium enterprises (SMEs) enhances its credibility and ensures its alignment with industry realities and emerging trends. Therefore, rather than being inflexible or outdated, this strategy is crucial for promoting strategic advancements and developing policies specifically designed to thoroughly improve the results of small and medium-sized enterprise (SME) production in Malaysia.

2.8 Underpinning Theory

A theory, which defines the connection between variables to describe a natural occurrence, is a collection of connected concepts, components, interpretations, and premises that give a systematic picture of phenomena (Taha, 2020). The fundamental component of organizational studies, theory serves as a major yardstick for assessing the caliber and significance of our work (Nwokeocha, 2024). This editorial article emphasizes conceptual work above empirical research to show how theorizing may

take many different shapes and how it manifests itself in various kinds of theory papers (Cornelissen et al., 2021).

In general, the term "underpinning theory" refers to the underlying or basic theories, notions, or concepts that serve as the framework for comprehending and elucidating a certain subject or area of study (Jiang et al., 2024). The theory serves as the cornerstone or foundation for further specialized knowledge and study. According to Kirchner-Krath et al. (2024), a study's underlying theory may be able to identify the variables that influence an organization's information system's creation, implementation, or both. To address present or new issues, gaining a greater understanding of the socio-technical processes of organizations and businesses, as well as how people engage with the structures, is the goal.

For this research, as the researcher mentioned that there are 3 independent variables which are supply chain strategy (SCS), supply chain integration (SCI) and supply chain information management (SCIM). There are 3 theories for 3 of them as a justification framework to support it.

2.8.1 Resource-Based View Theory

The Resource-Based View (RBV) Theory is a critical foundation for manufacturing performance that significantly impacts organizational success (Chatterjee et al., 2021). This study investigated the substantial impact of a Resource-Based View (RBV) on manufacturing performance, with a specific focus on the defensive strategy of supply chain processes (Sipos et al., 2023). Studying strategic resource management can reveal its critical role in influencing success in industrial operations. This research aims to conduct a thorough analysis of the resource-based view Resource-Based View (RBV) and its influence on manufacturing performance,

emphasizing the intricate interplay between resources, strategies, and results in the manufacturing sector. Resource-Based View (RBV) has a significant impact on Malaysia's competitive industrial performance environment (Koliby et al., 2022). The researcher extensively investigates the intricate correlation between the resource-based perspective Resource-Based View (RBV) and manufacturing efficiency in Malaysia. This study also aims to investigate the critical elements that enhance manufacturing performance in Malaysia, with a specific focus on the strategic significance of the resource-based view Resource-Based View (RBV) in enhancing operational efficiency and competitiveness in the manufacturing industries.

The Resource-Based View (RBV) is a prominent paradigm commonly used to analyze business performance, especially in the manufacturing industry. Koliby et al., (2022) state that a resource-based view Resource-Based View (RBV) highlights a firm's internal resources and capabilities as crucial factors for achieving competitive advantage and superior performance results. In manufacturing, this theory suggests that a company's unique resources, such as technology, experienced employees, distinctive processes, and effective supply chain management (SCM), can greatly influence its overall performance (Alghababsheh, 2024). Manufacturing enterprises can gain a sustained competitive edge by successfully using internal resources, leading to improved operational efficiency, product quality, and superior financial performance. Applying Resource-Based View (RBV) to analyze manufacturing performance emphasizes the significance of internal strengths and skills in enhancing competitive advantage and achieving success in the industry (Malhotra et al., 2024). Furthermore, Resource-Based View (RBV) is a significant theoretical framework in strategic management that highlights the crucial importance of the unique resources and capabilities of a corporation in maintaining long-term competitive advantage.

Furthermore, Shubin et al. (2020) state that the Resource-Based View (RBV) theory proposes that a company's success in manufacturing is determined by how well it strategically manages its distinct set of resources, which include physical assets like equipment and technology as well as intangible resources like expertise, reputation, and corporate culture. Organizations can build unique and valued competencies by properly utilizing resources, resulting in higher manufacturing performance (Koliby et al., 2024a). This perspective underscores the importance of aligning resources with strategic goals, continuously renewing and upgrading resources to maintain competitiveness, and developing dynamic capabilities to respond to changing market conditions. The Resource-Based View (RBV) offers a beneficial perspective for comprehending the intricate connection between firm-specific resources and manufacturing success (Madhala et al., 2024).

Resource-Based View (RBV) also provides a useful framework for understanding manufacturing performance by highlighting the strategic importance of a company's distinct resources and talents (Agrawal et al., 2024). Moreover, the Resource-Based View (RBV) theory, as stated by Eryarsoy et al. (2022), argues that a company derives its competitive advantage from internal resources rather than external market factors. Manufacturing organizations can improve their performance and gain long-term competitive advantages by properly using and coordinating their internal resources. This perspective underscores the significance of tangible and intangible resources such as technology, human capital, organizational culture, and innovation capabilities in driving manufacturing success. Resource-Based View (RBV) emphasizes the need for enterprises to constantly evolve, refresh, and utilize their resources to adjust to market changes and sustain their competitive edge in the industrial sector (Dhrubo et al., 2024). Lastly, the Resource-Based View (RBV) is crucial to

industrial performance. The research focused on the impact of supply chain defensiveness and Resource-Based View (RBV) on industrial performance. This research also showed how strategic resource management affects industrial performance. This research examined the Resource-Based View (RBV) and performance to reveal the complicated link between manufacturing resources, procedures, and outcomes. Resource-Based View (RBV) emphasizes a firm's tangible and intangible resources for competitive advantage and success. Processes, people, and technology can improve market performance, quality, innovation, and manufacturing efficiency (Cakir et al., 2023). Thus, technology and skilled workers can also improve a company's manufacturing capacity and help it compete. The resource-based approach describes how businesses can increase production performance and gain a competitive edge by utilizing their resources and expertise (Cakir et al., 2023).

Moreover, manufacturing companies in Malaysia can benefit greatly from an understanding and application of Resource-Based View (RBV) principles, which promote strategic resource management practices that improve performance and maintain competitive advantage (Samadhiya & Agrawal, 2023). The resource-based view (RBV) theory is a crucial framework for comprehending manufacturing performance, especially within Malaysia's industrial environment. Thus, Rehman et al. (2023) state that the Resource-Based View (RBV) theory highlights a firm's internal resources and capabilities as key factors influencing its competitive advantage and better performance. In Malaysia's industrial sector, this theory is especially pertinent because of the country's varied resource endowments and competitive challenges. Malaysian companies can improve their production efficiency by leveraging their distinctive advantages, including a trained workforce, technical infrastructure, and strategic alliances. Malaysian manufacturing enterprises can establish long-term

competitive advantages, improve operational efficiency, and foster innovation within the industry. Thus, for businesses hoping to thrive in Malaysia's cutthroat business environment, they must comprehend how the Resource-Based View (RBV) affects manufacturing performance in that nation (Samadhiya & Agrawal, 2023).

In conclusion, the Resource-Based View (RBV) emphasizes aligning resources with strategic goals, updating and improving resources, and developing dynamic abilities to respond to changing market situations. The study shows how supply chain defensiveness and Resource-Based View (RBV) affect industrial performance, demonstrating the complex relationship between manufacturing resources, procedures, and results. The Resource-Based View (RBV) shows how companies may use their unique assets to boost output and acquire a competitive edge. Malaysia's Resource-Based View (RBV) emphasises technology, skilled labour, and organisational processes in performance. Effectively employing internal resources can help Malaysian manufacturing companies stay competitive, innovate, and succeed. For organisations to maintain a competitive advantage, Resource-Based View (RBV) emphasises producing and protecting important, scarce, hard-to-imitate, and non-substitutable resources. Malaysian manufacturing companies can succeed in the ever-changing and competitive business climate by implementing Resource-Based View (RBV) principles. Resource-Based View (RBV) concepts can assist Malaysian manufacturing companies enhance performance and stay competitive through smart resource management.

In conclusion, the idea of the Resource-Based View (RBV) emphasizes the importance of developing dynamic skills to adjust to changing market conditions, continuously renewing and improving resources, and matching resources with strategic objectives (Agyapong et al., 2024). The study examines how supply chain defensiveness and Resource-Based View (RBV) influence industrial performance,

highlighting the intricate connection between manufacturing resources, processes, and results. The Resource-Based View (RBV) explains how organizations can use their unique resources and capabilities to improve production efficiency and gain a competitive advantage. In Malaysia, the philosophy known as the Resource-Based View, or RBV, emphasizes the importance of technology, skilled labor, and organizational procedures in influencing performance outcomes (Fayyaz et al., 2024). The Malaysian manufacturing businesses may sustain a competitive edge, promote innovation, and attain long-term success by effectively using internal resources. The Resource-Based View (RBV) places significant emphasis on the creation and preservation of valuable, uncommon, difficult-to-replicate, and non-substitutable resources to provide organizations with a sustained competitive advantage (Fayyaz et al., 2024). By applying Resource-Based View (RBV) principles, Malaysian manufacturing enterprises can strategically position themselves for sustained success in the ever-changing and competitive business environment. Through strategic resource management, manufacturing organizations in Malaysia can maintain a competitive edge and improve performance by implementing the concepts of the Resource-Based View (RBV) (Koliby et al., 2022b).

2.8.2 Transaction Cost Economics (TCE Theory)

A strong framework for examining the relationship between supply chain management (SCM) and the manufacturing performance of Malaysian small and medium-sized enterprises (SMEs) is provided by the Transaction Cost Economics (TCE) theory (Sundram et al., 2020). In addition, according to Transaction Cost Economics (TCE) theory, small and medium-sized businesses (SMEs) can benefit from enhanced supply chain practices and strategic partnerships by lowering transaction costs and increasing operational effectiveness (Sundram et al., 2020). Using supply

chain management (SCM) techniques that lower contract negotiation, monitoring, and enforcement costs can help Malaysian manufacturing SMEs become more competitive and perform better (Singh & Chan, 2022). This is especially important in a constantly globalizing industry, where responding quickly to demand and supply changes can determine success.

By working more closely with suppliers and distributors, small and medium enterprises (SMEs) can improve supply chain transparency and reliability, lower transaction costs, and enhance production performance. As stated by Ketokivi and Mahoney's (2020), empirical research supports Transaction Cost Economics (TCE) theory's relevance to supply chain management (SCM)'s impact on Malaysian small and medium enterprises (SMEs)' manufacturing performance. While numerous theoretical lenses provide insights into supply chain actions, Transaction Cost Economics (TCE) excels in analyzing processes, disaggregating metrics, and identifying inefficiencies ("Our purpose in this study is to review the intellectual and..."). Their findings show that strategic partnerships and contract management reduce transaction costs and boost operational efficiency. Transaction Cost Economics (TCE) principles enable Malaysian small and medium enterprises (SMEs) to manage market risks and achieve more stable and predictable performance outcomes.

2.8.3 System Theory

The intricate relationship between supply chain management (SCM) strategies and the manufacturing performance of Malaysian small and medium-sized enterprises (SMEs) requires an understanding of system theory (Hossain et al., 2023e). Previous scholars argued that system theory provides a holistic picture of organizations by investigating supply chain connections (Nawanir et al., 2020). This approach helps explain how logistics, procurement, and inventory management affect manufacturing

performance. According to the study, SMEs can identify supply chain leverage points that increase production effectiveness and efficiency by applying system theory (Hossain et al., 2023e). Empirical evidence supports the system theory's effectiveness in improving Malaysian small and medium enterprises (SMEs) manufacturing performance. According to this understanding, system theory in supply chain management (SCM) can improve manufacturing performance for Malaysian small and medium enterprises (SMEs), despite criticism that it is too abstract and generic (Gonçalves et al., 2024). Critics say system theory's high-level conceptualizations lack practicality (Lin et al., 2020). These complaints ignore its holistic framework's practicality, which encourages a thorough investigation of supply chain components. According to Kitchot, Siengthai, and Sukhotu (2021), system theory in supply chain management promotes synergistic interactions between production components, creating a more unified and efficient operational framework. Small and medium enterprises (SMEs) may transcend supply chain barriers with this comprehensive approach, making management more adaptable and flexible (Dankyira et al., 2024). System theory emphasizes interconnection, which helps small and medium enterprises (SMEs) synchronize procurement, inventory management, and logistics, decreasing inefficiencies and lead times. Seeing these functions as interrelated parts of a system improves coordination and resource utilization (Dubey et al., 2022). Despite its abstract character, system theory provides a pragmatic framework for improving manufacturing performance for Malaysian small and medium enterprises (SMEs) (Kitchot et al., 2021). The theoretical foundations of this strategy are essential for stimulating innovation and maintaining competitive advantage in complex supply chains.

2.9 Chapter Summary

The literature on supply chain strategy (SCS), supply chain integration (SCI), and supply chain information management (SCIM) of manufacturing performance small and medium enterprises (SMEs) in Malaysia for this section based on past articles. The hypotheses, theoretical framework and underpinning theory are also included. The next chapter was be discussed concerning the use of research methodology.



CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The objective of this chapter is to emphasise the underlying rationale for the methods and approaches used in carrying out this research. This chapter was cover the scope of research and the procedures used to conduct the study, including the study design, the selection of the survey sample, the development of the questionnaire, the pretesting of the questionnaire, the measurement of the variables, the survey implementation, and the procedures for analysing data.

3.2 Research Design (Exploratory/Descriptive/Hypothesis Testing)

The research design is an essential component of every research project since it delineates the comprehensive plan and approach for carrying out the study (Faisal, 2022). The blueprint serves as a roadmap for the researcher to gather, analyses, and interpret data on the research topic. Research design is a methodical and organized technique that helps researchers achieve their goals while ensuring the accuracy and dependability of their discoveries (Duque-Urbe et al., 2023). There exist diverse study designs, each possessing unique advantages and disadvantages. Common types of research designs include experimental, correlational, descriptive, and exploratory designs (Ali et al., 2023). Experimental design entails the deliberate manipulation of variables to establish cause-and-effect linkages, whereas correlational design investigates the association between two or more variables (Bui et al., 2024). Descriptive design seeks to provide a detailed account of a phenomenon or population, whereas exploratory design is employed to develop novel ideas and hypotheses (Ferreira et al., 2022). The process of formulating a research project entails several

crucial stages. Initially, it is imperative to unambiguously delineate the study problem or question. This aids in directing the study and ascertaining the suitable research methodology (Panpatil et al., 2023). The next stage entails conducting a thorough examination of the current body of literature in order to improve one's understanding of the subject matter and identify any knowledge deficiencies. This stage additionally aids in informing the research design and methods.

After defining the study question and reviewing the literature, the researcher must choose the most suitable research design. Researchers select based on the inherent characteristics of the research inquiry, the accessible resources, and the investigation's practicability. The chosen design dictated the specific data that was to be gathered, the approaches used to collect the data, and the techniques used to analyze the data.

Data collection is an essential component of study design, and it can be accomplished through a variety of approaches, including surveys, interviews, observations, and experiments (Aldrighetti et al., 2022). The data must be both accurate and valid to guarantee the accuracy of the conclusions. After the data has been gathered, it is further examined using statistical or qualitative techniques, depending on the chosen study methodology (Cherian & Arun, 2022).

The last stage in research design involves analyzing and presenting the results. This entails examining the facts and drawing conclusions based on the results. The results should be displayed lucidly and succinctly, utilizing suitable tables, graphs, and charts (Lin et al., 2024). The report should include a discussion of the research design, specifically emphasizing its advantages and disadvantages. To summaries, the study design plays a vital role in every research endeavor. The framework facilitates the execution of the study, guaranteeing a methodical and dependable approach to addressing the research topic (Ijaz et al., 2024). An appropriately structured research

project can offer useful insights and contribute to the progress of knowledge in a certain domain. The purpose of this chapter is to highlight the fundamental reasoning behind the methods and approaches employed in conducting this research. This chapter was discuss the research scopes and the methodologies employed to carry out the study, encompassing the study design, the selection of the survey sample, the creation of the questionnaire, the preliminary testing of the questionnaire, the measurement of the variables, the execution of the survey, and the procedures for data analysis.

3.3 Population, Sample, And Sampling Technique

3.3.1 Population

The study's objectives aim to specify the population to which the research findings can apply or from which they can be extrapolated (Tsai et al., 2023). The researcher refers to this particular grouping as a population. Researchers intend to apply study results to the entire set of units known as the population (Shukla, 2020). The population of interest refers to the specific group that the study wants to investigate or treat (Pyo et al., 2023). The population of interest refers to the specific demographic that the study aims to investigate or provide support to (Liu et al., 2020).

For this study, the population is the small and medium enterprises (SMEs) in Malaysia. The effective supply chain strategy (SCS) is essential for organizations to maintain competitiveness in the globalized market. Robust supply chain strategies are crucial for ensuring long-term growth and enhancing performance for Malaysian small and medium enterprises (SMEs) who are renowned for their dynamic business environment (Pertheban et al., 2023). This study investigates the intricate correlation between supply chain strategy approaches and manufacturing performance in small and medium enterprises (SMEs) in Malaysia. Small and medium enterprises (SMEs) are considered the backbone of the nation, yet they encounter specific obstacles and

skepticism when it comes to implementing advanced management tactics. Despite the challenges of implementing comprehensive supply chain strategy procedures, recent research indicates their transformative capabilities. This study proposes that the implementation of strategic supply chain management practices (SCMP) can enhance the manufacturing performance of small and medium enterprises (SMEs) in Malaysia, contrary to common assumptions. This research analyzes the various complex elements of supply chain strategy and their immediate impact on operational effectiveness, product excellence, and customer contentment. It showcases how supply chain strategy has revolutionized the manufacturing sector of Malaysian small and medium enterprises (SMEs) and established a benchmark for future research and implementation.

In addition, Malaysian small and medium enterprises (SMEs) have enhanced their manufacturing efficiency by using robust supply chain management practices (SCMP) (Muhammed et al., 2020). Implementing these practices has led to enhanced small and medium enterprises (SMEs) productivity, reduced costs, and increased customer satisfaction (Alshahrani & Husain, 2023). Just-in-Time (JIT) inventory systems, for example, minimize waste and optimize inventory levels, resulting in a more efficient and responsive manufacturing process (Prashar, 2024). Establishing strong supplier relationships improves input quality consistency, enhancing the overall quality and reliability of the product (Njoki & Wachiuri, 2024). The emphasis on quality and efficiency has provided Malaysian small and medium enterprises (SMEs) with a competitive advantage on a global scale and has encouraged continuous improvement and innovation (Islam et al., 2024). The use of strategic supply chain management methods has enhanced the financial performance of numerous small and medium enterprises (SMEs), leading to an augmentation in profit margins and market share (Dey

et al., 2023). This emphasizes the significance of supply chain management for the success and manufacturing sustainability of small and medium enterprises (SMEs) in Malaysia. It demonstrates that operational efficiency in this domain is vital for organizational performance.

Small and medium enterprises (SMEs) in Malaysia have had the most substantial economic influence (Sathasivam et al., 2024). The Malaysian Department of Statistics conducted the Economic Census in 2016, revealing that there are 907,065 small and medium enterprises (SMEs) in Malaysia, accounting for 98.5 percent of all firm establishments in the country (Abdul Rahman et al., 2023). This study specifically examines Malaysia. Table 3.1 shows the number of small and medium enterprises (SMEs) establishments by state.

Table 3.1: Total Number of SMEs in Malaysia (Profile of SMEs reference year 2015)

State	Total SMEs	Percent (%)
Selangor	179,271	19.8
WP Kuala Lumpur	133,703	14.7
Johor	98,190	10.8
Perak	75,140	8.3
Pulau Pinang	66,921	7.4
Sarawak	61,036	6.7
Sabah	55,702	6.2
Kedah	48,894	5.4
Kelantan	46,618	5.1
Pahang	37,573	4.1
Negeri Sembilan	32,721	3.6
Melaka	31,361	3.5
Terengganu	29,324	3.2
Perlis	6,808	0.8
WB Labuan	2,567	0.3
WB Putrajaya	1,236	0.1
Total SMEs	907,065	100.0

Note. From Economic Census, 2016. Department of Statistics, Malaysia. Copyright 2023 by Department of Statistics Malaysia.

3.3.2 Sample

Sampling is the act of choosing a subset of a large or specific population to conduct research with a specific objective (Sarstedt et al., 2024). Sample errors can be quantified using sampling. Consequently, it is beneficial to gather data on specific demographic characteristics (Jung & Han, 2024). Acquiring data or information from the entire population can be difficult when researching to assist specific groups, such as those residing in disaster-affected regions (Zhou et al., 2024). This situation may arise when the population size is too large to conduct a census-based study, which involves requesting the participation of every member of the population, or when it is not feasible to individually identify or reach out to each member of the population (Moghanibashi-Mansourieh, 2020). Sampling is used to collect data that is believed to be representative of a target group when it is not possible to involve the entire population in the research or identify each individual independently (Stratton, 2021).

The researcher utilized the Krejcie and Morgan Table to ascertain the number of samples. Due to the necessity of an accurate statistical sample in empirical research, there is a growing need for a reliable method to determine the appropriate sample size (Giner-Sorolla et al., 2024). Krejcie and Morgan (1970) devised a tabular method to determine the appropriate sample size for a specific population, aiming to facilitate the process and minimise discrepancies (Bukhari, 2021). Table 3.2 displays the Krejcie and Morgan Table.

Table 3.2: Krejcie and Morgan Table, 1970

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317

45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

- N is population size

- S is sample size

Note. From Sample Size Determination Using Krejcie and Morgan Table, by Bukhairi, 2021. ResearchGate. Copyright 2021 by Research Gate.

3.3.3 Sampling Technique/Design (Probability/Non-Probability Sampling)

Sampling is selecting a subset of individuals from a larger group, known as the population. Sampling strategies are crucial in experimental research, including clinical studies. Sampling techniques can be categorized into two main groups: probability sampling and non-probability sampling (Xi et al., 2022)

There are two distinct methods of sampling: probability sampling and non-probability sampling. The term "probability sampling technique" pertains to a scenario where each individual in the population has an equivalent probability of being chosen (Khan, 2020). It is widely known as the most effective method to ensure that each sample unit accurately represents the population it is meant to represent. The main goal of probability sampling is to obtain a sample that accurately reflects the characteristics

of the population it was drawn from (Zickar & Keith, 2023). The random sampling technique does not guarantee that every sample perfectly represents the population. Instead, it suggests that most random samples were typically close to the population and that it is feasible to ascertain the probability of a sample being accurate (Rahman et al., 2022). Non-probability sampling involves the researcher selecting samples based on their subjective evaluation rather than random chance. It is a more moderate approach. This sampling methodology is predominantly derived from the expertise of the researchers. The researcher often uses it as an observational method in qualitative research (Collins et al., 2024). Non-probability sampling provides a different opportunity for a subset of the population to participate in the study, as opposed to probability sampling. Every individual in the population has a pre-established probability of being chosen. Non-probability sampling is especially advantageous for conducting preliminary research, such as pilot surveys, as it allows for the administration of surveys to a smaller sample size than what is predetermined (Jan, 2020).

The sampling technique used in this study is probability sampling. Probability sampling ensures that every individual or object in a population has a definite and nonzero likelihood of being selected to be part of the sample (Collins et al., 2024). It ensures that each element of the population has an equitable and unbiased opportunity to be included, facilitating the generation of objective and statistically representative data. The sampling method that was be used for this study is simple random sampling. A commonly used sampling technique for research involving a large number of participants is simple random sampling. Due to the reliance on chance in data selection, simple random sampling in research may yield precise findings that are broadly applicable (Tajik & Golzar, 2022). Through the implementation of these randomization

procedures, every individual within the population has an equitable opportunity of being selected for the sample. Moreover, it is a fair and objective method of choosing; by careful planning, the sample can accurately reflect the entire population. As stated by Collins et al. (2024) suggest that randomization can help mitigate the influence of both known and unknown factors by randomly selecting cases. This can lead to a more deliberate sample selection process for the intended study.

The researcher employed a random sampling method to select manufacturing small and medium enterprises (SMEs) under Federal Manufacturing Malaysia for data collection. Small and medium enterprises (SMEs) boost the economy and innovation in Federal Malaysia's vibrant industrial sector. Academic study is essential to understanding these entities' complex challenges and prospects. This report scrutinizes the methodology used to gather data for such an inquiry. This study is based on a random sampling of manufacturing small and medium enterprises (SMEs). This strategy guarantees a representative industry cross-section and reduces selection bias, boosting credibility and generalizability. Recent evidence strongly supports using random sampling to pick manufacturing small and medium enterprises (SMEs) in Federal Manufacturing Malaysia for data collection, despite objections. The researcher aims to provide insights into the sector to help stakeholders make informed decisions that could alter Malaysian manufacturing.

According to Inegbedion et al. (2024), manufacturing small and medium enterprises (SMEs) managers are increasingly using process and activity-based approaches, which can considerably impact operational outcomes. Random sampling allows academics to capture this variability in managerial practices and strategic orientations across firms. This analytical technique collects data on a wide range of organizational behaviors and performance metrics, reflecting population variability

(Gupta & Kaur, 2024). To obtain thorough and unbiased data from Federal Manufacturing Malaysia's small and medium enterprises (SMEs), the researcher intends to use random sampling. The study's legitimacy depends on this methodology's impartial and representative selection of manufacturing small and medium enterprises (SMEs). This method reduces sample bias, improving data reliability and validity. Furthermore, empirical manufacturing research relies on random sampling to generate generalizable and replicable results (Luijken et al., 2024). Random sampling satisfied the need for a methodological framework that could handle geopolitical tensions and pandemic-related impacts on global supply chain dynamics (Ibikunle et al., 2024). Despite opposition, many analyses conducted during these pivotal years supported random sampling. This methodology was able to cover a wide range of organizational behaviors and performance measurements, allowing for solid generalizations about manufacturing small and medium enterprises (SMEs) flexibility and resilience. Thus, far from undermining the research's credibility, random selection provided detailed insights into Malaysia's manufacturing small and medium enterprises (SMEs) sector amid a time of exceptional problems and opportunity.

In conclusion, previous research proves random sampling is essential for data collection in the Malaysian manufacturing small and medium enterprises (SMEs) sector. This method reduces selection bias and improves study validity, making it essential for capturing these firms' great diversity and complexity. In previous study by Ibikunle et al. (2024) found that random sampling accurately reflects regional variances, managerial practices, and worldwide supply chain disruptions. This rigorous methodological framework helps researchers gain insights into operational efficiencies, quality control, and innovative strategies for stakeholder decision-making. Malaysia's manufacturing small and medium enterprises (SMEs) sector was needing rigorous

research methods, such as random sampling, to guide strategic efforts as it navigates global difficulties. The researcher was finding relevant and applicable findings, paving the way for future research on sustainable growth and innovation in Malaysian manufacturing small and medium enterprises (SMEs).

3.4 Questionnaires Design Development

A questionnaire is an essential instrument in research studies, as it aids the researcher in collecting relevant data about the research topic (Marshall et al., 2024). It is crucial to design the questionnaire in a manner that minimizes errors. Nevertheless, researchers may encounter challenges in developing a questionnaire that yields desirable outcomes due to potential drawbacks in terms of usability, presentation, and content. These drawbacks might lead to study results that are unreliable and biased (Taherdoost, 2022). Researchers divided the questionnaire for this study into two sections. The initial component consisted of demographic surveys. The survey inquired about the respondents' gender, race, age group, marital status, educational level, and the type of organization they are associated with, whether it is in the manufacturing or service sector. The measuring scale was nominal. The researcher also classifies variables into separate groups referring to them as a nominal scale or categorical variable scale. Researchers use nominal scales to investigate categorical variables like gender, blood group, political party, marital status, and residence location, among others (Anjana, 2021). The second portion focused on surveys that assess independent and dependent factors. The questionnaires inquired about the three independent variables and the dependent variables. The researcher distributed the questionnaires to a representative, who could be any individual from the small and medium enterprises (SMEs). An ideal representative would possess extensive knowledge about their

organization and hold a higher hierarchical position than regular employees (Hong, 2020).

Table 3.3: Variables Questionnaires

Variables	Questionnaire Items	Authors
SCS	- When choosing suppliers, our company place the highest priority on quality. - Our main suppliers are involved in our programs for continual development. - We engage with clients on a regular basis to establish expectations for responsiveness, credibility, and other factors. - We assess the value of the relationship with our clients on a regular basis. - We notify each other with trading partners on events or developments that could have an impact on the projects.	Li et al. 2006; Patrucco et al. (2024)
SCI	- To what extent do you perceive the integration of enterprise applications among internal functions to positively influence supply chain management processes within your organization? - How frequently do you utilize real-time searching of inventory levels as part of your supply chain management practices? - How frequently do you participate in interdepartmental meetings aimed at enhancing the integration of supply chain management within our organization? - How often does your organization employ cross-functional teams in process improvement initiatives as a means of integrating supply chain management practices? - The level of real-time integration and connection among all internal functions from raw material management through production, shipping, and sales in our supply chain management system	Flynn et al. (2010); Sundram et al. (2018); Rashid et al. (2024); Qi et al. (2022)

	adequately supports our business operations.	
	- Firms in supply chain establish more frequent contact with each other - Firms in supply chain create a compatible communication and information system - Firm extends its supply chain beyond its customers/suppliers - Firm participates in the marketing efforts of its customers - Firm participates in the sourcing decisions of its suppliers	
SCIM	- Timely disseminate the information along the supply chain - Link information systems so that each member of supply chain knows each other's requirement and status - Practice quick information flows along the supply chain - Accurate information is usually available for decision making in our organization - Join production planning and scheduling among supplier, manufacturing, marketing and distributor	Sundram, et al., 2018; Rashid et al. (2024):
Manufacturing Performance	- Join production planning and scheduling among supplier, manufacturing, marketing and distributor - Our company can quickly modify products to meet our major customer's requirements. - Our business can quickly release new products into the market. - Our business can adapt quickly to meet consumer demand. - Our business has an outstanding track record of on-time deliveries to our major clients. - The lead time, which is the amount of time between receiving an order from a client and having the items delivered is short for completing orders. - Promptness in solving customer complaints - Order fulfilment speed - Manufacturing throughput time	Flynn, et al. (2010); Sundram, et al. (2018); Siagian et al. (2023)

-
- Meeting delivery due date
 - Ability to change delivery date
 - Ability to change volume output
-

Note. Variables Questionnaires (Independent Variables and Dependent Variables).

The questionnaires were interval scale. In other words, the Likert-Type Rating Scale. A measuring scale known as an interval scale is one that, in addition to arranging data and giving each point a significant numerical value, also makes sure that the intervals between values are equal and constant, enabling useful comparisons of the degree of variation between values. It is commonly known that the Likert scale is a simple, trustworthy scaling method that makes it simple to gauge and comprehend a responder's impression (Mumu et al., 2021). Aside from that, the respondents said a Likert scale was easier to use and quicker than other measures. It does not, however, have a genuine zero point, and ratios between values have no significance. Strongly Disagrees = 1, Disagrees = 2, Neutral = 3, Agrees = 4, and Strongly Agrees = 5 represent each respondent's rating. The total of all available points determines a person's score. To create the Likert scale, add up all the defining elements (Mumu et al., 2021).

3.5 Research Measurement

To complete every research attempt, a suitable research design is required. Before commencing data collection, the researcher deliberately chose this strategy to effectively accomplish the study objective. The essence of research design is the transformation of a research problem into analyzable data, intending to offer pertinent solutions to research inquiries at the most economical expense (Hardani et al., 2024). The research design combines several study components logically and coherently. It guarantees a satisfactory answer to the research hypothesis. It serves as a guidebook for collecting, quantifying, and examining data (Thakur, 2021).

The measurement scale used for the demographic questions be nominal. A nominal scale is a categorical scale that categorizes data into distinct groups or categories, without any inherent hierarchy or order (Attwal & Dhiman, 2024). The data does not provide any measurable or meaningful relationships between categories; it just assigns labels or organizes the data into groups. An ordinal scale is a type of measurement scale that arranges data in a meaningful sequence or ranking. However, the intervals between the categories are not clearly defined or consistent. The information provided does not specify the exact extent of the difference between values; rather, it just illustrates the relative changes in magnitude (Al-Sayid & Kirkil, 2023). The researcher measured the questionnaires for *Table 3.3* and on an interval scale method. The researcher is referring to the "Likert-Type Rating Scale" for clarification. An interval scale is a measuring scale that not only assigns a meaningful numerical value to each data point but also ensures that the intervals between values are equal and consistent (Zou et al., 2022). This allows for meaningful comparisons of the degree of variation between values. However, it lacks a true zero point, and the ratios between values are meaningless (Reyna & Brainerd, 2023).

3.6 Data Collection

The first phase of research, data collection, can improve the quality of outcomes by reducing the possibility of mistakes within the project. Efforts should focus on dedicating a significant amount of effort to the data collection process to ensure relevant results, as incomplete or erroneous data might compromise the reliability of the findings. Although a comprehensive data collection approach contributes to research planning, it does not guarantee overall project success (Taherdoost, 2021).

During the data collection phase of empirical research, researchers was make several decisions, such as selecting the appropriate study design, choosing sampling

strategies, determining the use of control variables and their specific selection, and addressing missing data (Aguinis et al., 2021).

In this study, the researcher gathered data from small and medium enterprises (SMEs) in Malaysia under the Federation of Malaysian Manufacturers (FMM) by distributing an online questionnaire survey. This data collection technique offers a systematic and efficient approach to obtaining information from various manufacturing performance aspects within small and medium enterprises (SMEs) involved in supply chain strategy (SCS), supply chain integration (SCI), and supply chain information management (SCIM). These questionnaires were inquired about their supply chain practices (SCMP) and their manufacturing performance (MP) to gain a comprehensive understanding of their operations within the manufacturing sector.

Data refers to the most basic level of information that serves as the foundation for additional measurements and analysis. Researchers derived the data from the observations collected on the variables of the study issue. Research involves two types of data: primary data and secondary data (Ganesha & Aithal, 2022). For this investigation, the researcher collected two sets of data.

3.6.1 Primary Data

Researchers obtain primary data directly from the original source. Surveys, observations, questionnaires, focus groups, case studies, and interviews are examples of primary data collection methods (Ajayi, 2023). The primary source of data for this study is the questionnaire. The written questionnaire is an observational approach that involves providing the respondent with a set of written items and expecting them to respond in writing (Stantcheva, 2023). Respondents check a list of written items to indicate their acceptability. The questionnaire serves as a valuable tool for obtaining

direct input on manufacturing performance from many stakeholders, including supply chain management (SCM) experts, senior management, and small and medium enterprises (SMEs) (Kitchot et al., 2020). This methodology enables the systematic collection of information regarding various aspects of supply chain activities that affect manufacturing performance, such as supply chain strategy (SCS), supply chain integration (SCI), and supply chain information management (SCIM). Designing the questionnaire meticulously obtain accurate and relevant data, ensuring the effective achievement of the study's objectives.

The objective of this research is to provide a comprehensive dataset that was be essential for assessing the present condition of manufacturing performance. The study of how supply chain management practices (SCMP) affect the manufacturing performance of small and medium enterprises (SMEs) in Malaysia highlights an important finding: effective supply chain management practices (SCMP) are not just advantageous but are essential for the survival and success of these businesses in a highly competitive global market. The research provided, based on the findings of Mwinuka (2022) provides strong evidence that the careful application of supply chain management (SCM) techniques is directly linked to improved operational efficiency, cost savings, and the flexibility to adjust to market changes. The correlation between strong supply chain management (SCM) and positive business results supports the claim that for small and medium enterprises (SMEs) in Malaysia, achieving excellence in supply chain management (SCM) is crucial for gaining a long-lasting competitive edge. As these businesses find themselves at the intersection of globalization and technological progress, adopting advanced supply chain management (SCM) strategies becomes a crucial step in attaining operational excellence and promoting economic growth.

This research aims to confirm the crucial role of supply chain management (SCM) in improving the manufacturing sector of small and medium enterprises (SMEs). It also encourages further investigation into innovative supply chain management (SCM) solutions that are specifically designed to address the distinct challenges and opportunities encountered by these important contributors to Malaysia's economic growth. By doing this, it establishes the foundation for a future in which Malaysian small and medium enterprises (SMEs) are not just participants but also leaders in the global marketplace. This is achieved through their strategic expertise in supply chain management (SCM), which empowers them. The questionnaire was serve as the primary instrument for data collection in this investigation.

3.6.2 Secondary Data

Secondary sources are data that was previously collected by someone else (Salmona & Kaczynski, 2024). Secondary data refers to information that was previously acquired by a separate entity for a different purpose and over a different period than the current study endeavor (Dineri et al., 2024). When the researcher uses this information, it transforms into secondary data for the existing clientele. Secondary data sources encompass a range of materials, such as government publications, websites, books, journal articles, and internal papers (Ajayi, 2023). Utilizing secondary data is a crucial approach to investigating the impact of supply chain management (SCM) strategies on manufacturing performance in small and medium enterprises (SMEs) in Malaysia.

The researcher collected secondary data from the internet collection by systematically examining and evaluating a wide range of relevant academic articles, reports, and publications. The researcher looked at papers, publications, and reports that address different aspects of manufacturing performance and how it affects databases,

industry publications, government reports, surveys, research studies, and best practices to gather secondary data (Leung et al., 2022). The insights and conclusions drawn by experts and scholars in the field, who used a large amount of data, strengthened the research. This boosted the academic rigor and comprehensiveness of the study (Bond et al., 2024).

Using secondary data from several credible sources enhances the research's depth and reliability, ensuring that it is well-informed by the existing body of knowledge on supply chain practices in the manufacturing performance business (Melendez et al., 2024).

3.7 Data Analysis Techniques

3.7.1 Reliability Test

Based on a previous study by Koh et al. (2007), an exploratory factor analysis using varimax rotation was conducted on the supply chain management practices (SCMP) to identify the underlying dimensions of each construct. The exploratory factor analysis (EFA) conducted on the 12 variables has resulted in the identification of two factors that account for 44.5 percent of the overall variation. Two factors were used to load a total of 12 items. The first component was designated as strategic collaboration and lean practices (SCLP) based on the loadings of the items, while the second element was labelled as outsourcing and multi-suppliers (OMS). Table 3.4 displays the outcomes of exploratory factor analysis (EFA). Researchers measured the dependability of the strategic collaboration and lean practices (SCLP) and outsourcing and multi-suppliers (OMS) using Cronbach's alpha, obtaining values of 0.80 and 0.63, respectively. While a value of 0.70 or more is typically regarded as the standard for internally consistent established factors (Hair et al., 1998). Nunnally (1978) proposes that a value of 0.50 to 0.60 is acceptable during the initial phases of the study. Since

each component's Cronbach's alpha value exceeds 0.50, both factors are considered credible for the research.

Table 3.4: EFA Outcomes

Factors	Factor loads	Eigen-value	Percentage of variance explained	Cum. per cent	Cronbach α
<i>Factor 1</i>		4.07	33.94	33.94	0.80
<i>Strategic collaboration and lean practices</i>					
Close partnership with suppliers	0.78				
Close partnership with customers	0.77				
JIT supply	0.64				
Supply chain benchmarking	0.63				
Strategic planning	0.57				
Holding safety stock	0.56				
Few suppliers	0.47				
<i>Factor 2</i>		1.26	10.53	44.47	0.63
<i>Outsourcing and multi-suppliers</i>					
Outsourcing	0.78				
E-procurement	0.64				
3PL	0.62				
Subcontracting	0.53				
Many suppliers	0.41				
Notes: K-M-O Measure of sampling adequacy = 0.836; Bartlett test of sphericity = 582.65; $p < 0.000$					

3.7.2 Statistical Methods (Types of Analysis Descriptive, Correlation, Regression)

Amidst a highly competitive global market, small and medium enterprises (SMEs) in Malaysia are facing a critical decision point as they aim to achieve manufacturing excellence (Koliby et al., 2024). The optimization of supply chain management practices (SCMP) is crucial in this endeavor, as it has a substantial impact on manufacturing performance and, consequently, the overall success of the business (Awaad et al., 2024). This research explores the complex correlation between supply chain management practices (SCMP) and manufacturing performance in Malaysian small and medium enterprises (SMEs), utilizing an advanced statistical method known as Structural Equation Modelling Partial Least Squares (SMART PLS). Researchers

was say that using Structural Equation Modelling Partial Least Squares (SMART PLS) in statistical analysis, especially with descriptive, correlation, and regression methods, can help us learn a lot about how small and medium enterprises (SMEs) in Malaysia's supply chains affect how well their factories do. This study aims to utilize Structural Equation Modelling Partial Least Squares (SMART PLS) to analyze and comprehend intricate connections, to provide insights on how SMEs can improve their supply chain strategies to optimize manufacturing results.

During this analytical exploration, our goal is to emphasize the crucial importance of effective supply chain management (SCM) and offer a statistical plan that can direct small and medium enterprises (SMEs) in Malaysia towards enhanced manufacturing performance and sustainable growth. Based on a previous study by Rehman et al. (2023), they conducted a crucial study examining the complex dynamics of supply chain management practices (SCMP) and their influence on the manufacturing performance of small and medium enterprises (SMEs) in Malaysia. The researchers employed structural equation modelling (SEM) with Structural Equation Modelling Partial Least Squares (SMART PLS) to thoroughly examine the intricate connections between different aspects of supply chain management (SCM) and their resulting impacts on manufacturing outcomes. The selection of Structural Equation Modelling Partial Least Squares (SMART PLS) as a statistical tool is remarkable because of its ability to handle intricate, non-linear connections that are inherent in supply chain operations (Yadav et al., 2024). Additionally, it offers a versatile and user-friendly interface for modelling latent constructs, which are essential for capturing the subtle impacts of supply chain practices on manufacturing performance. According to Rehman et al. (2023) shows that certain supply chain practices, like working together with suppliers, integrating logistics, and managing demand, can have a big effect on

key performance indicators for small and medium enterprises (SMEs). This research contributes to the academic discourse on supply chain management (SCM) and provides practical guidelines for small and medium enterprises (SMEs) in Malaysia who want to improve their manufacturing efficiency through strategic supply chain initiatives (Rehman et al., 2023).

In conclusion, Rehman et al. (2023) conducted a detailed study using Structural Equation Modelling Partial Least Squares (SMART PLS) to explore the impact of SCMP on the manufacturing performance of small and medium enterprises (SMEs) in Malaysia. Their findings provide a compelling narrative on the transformative potential of well-informed supply chain strategies. This study highlights the important connection between different elements of the supply chain and the success of manufacturing. It also emphasizes the significance of using Structural Equation Modelling Partial Least Squares (SMART PLS) as a key tool for understanding these intricate relationships. The research identifies supplier collaboration, logistics integration, and demand management as crucial factors for achieving manufacturing excellence. It offers statistical evidence to guide Malaysian small and medium enterprises (SMEs) in navigating the fiercely competitive global market. As these companies analyze and adjust their supply chain operations based on these findings, it is evident that there are significant implications for the industry as a whole. Adopting sophisticated, evidence-based methods for supply chain management (SCM) is now essential rather than optional to achieve sustainable growth and maintain competitiveness (Sauer et al., 2022). Therefore, as we consider the future, the knowledge obtained from this study not only emphasizes the importance of using advanced statistical analysis in strategic business planning but also provides a direction for future research and innovation in improving supply chain practices for global

manufacturing excellence. This research serves as evidence of the progress made and a strong call for further exploration. It highlights the importance of continuous improvement in manufacturing, driven by the combination of theory, practice, and statistical innovation.

3.8 Chapter Summary

This chapter discussed the research framework and summary of research hypotheses, research design, population, sample, and sampling technique. The research also explained the questionnaire design, research measurement, data collection, and data analysis technique.



CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter discusses the outcomes of the data analysis and the discoveries made in this research. The researcher used both SPSS version 29 and Smart Partial Least Squares (PLS) version 4.0 software for data analysis. This chapter commenced with a detailed examination of the initial data analysis conducted on the acquired data. It was specifically addressing the handling of missing values, outliers, and the assessment of data normalcy. Subsequently, the report examined the rate at which participants responded to the survey, provided a concise overview of the characteristics of the respondents, and engaged in a discourse around common method variables (CVM). The concluding sections of this chapter further elaborate on this study's measurement and structural model.

4.2 Preliminary Analysis

The researcher first loaded the collected data into Microsoft Excel and then imported it into SPSS for analysis, specifically to identify any missing values and outliers. During this phase, the researcher also assessed the normality of the data.

4.2.1 Missing Values

There are a variety of reasons why missing values occur. One of the primary causes is when survey respondents fail to answer all of the questionnaire's questions. Lack of response, understanding, hesitancy, or carelessness may be the cause. Researchers must closely monitor missing values during the data entry process to ensure their inclusion. Failure to do so can have a significant impact on the analysis's findings (Woods et al., 2023). Therefore, it is crucial for the researcher to thoroughly

examine their data for any missing values and handle them appropriately. These missing values can decrease statistical power, introduce bias in parameter estimation, reduce sample representativeness, and complicate study analysis, ultimately jeopardizing the validity of the findings (Woods et al., 2023). There are various methods for handling missing values in research, such as pair-wise deletion, list-wise deletion, mean substitution, maximum likelihood substitution, regression imputation, last observation carried forward, expectation maximization, and multiple imputations (Mohit & Devpriya, 2023). In this study, the researchers decided to estimate the missing values instead of excluding them to avoid biased estimates and maintain the statistical power of the data analysis. After evaluating various methodologies, they have selected the expectation maximization norm for this purpose. This approach involves estimating the values of hidden variables, optimizing the model, and repeating these steps until convergence (Nielsen, 2022). The researchers have chosen this method because of its ability to guarantee correctness and ensure the achievement of a local maximum or satisfactory solution (Burruss, 2020; Moule, Patterson & Jaynes, 2024). Before proceeding with the estimation, the researchers conducted Little's MCAR test to determine the randomness of the missing data. The results showed that the data was not missing completely at random (MCAR), indicating the possibility of imputing the missing values (Little, 1988; Little, 2024).

4.2.2 Detection of Outliers

Outliers are reactions in a study that significantly deviate from the majority of observations (André, 2022). Finding and addressing outliers in the acquired data is critical, as they can significantly damage the analysis results. The researcher conducted a regression analysis in SPSS to identify outliers. The researcher also obtained the standardized residuals using Casewise Diagnostics. Any standardized residuals that

were outside the required range of ± 3.3 , as suggested by Tabachnick and Fidell (2013), were considered potential outliers.

In this study, the researcher used Cook's distance to determine the severity of the outliers as assessed. According to Cook and Weisberg (1982), Cook's distance value, greater than 1.0, can identify outliers. Appendix C displays the outcomes of casewise diagnostics and Cook's distance. Although Casewise Diagnostics detected several cases as outliers, Cook's distance for TP, CP, and EA did not exceed the threshold of 1.0. This indicates that while the data point may be an outlier, it does not seem to have a significant influence according to Cook's distance. Therefore, we did not eliminate any data from the dataset.

4.2.3 Normality Analysis

There are several reasons why data normality is crucial (Shatz, 2023). Typically, in this research, the researcher assesses the data for normality as a prerequisite for data analysis. However, this is not necessary for PLS-SEM because PLS-SEM is a nonparametric analysis that does not rely on any assumptions about the data (Hair et al., 2021). However, Lun and Khattree (2022) and Ali et al. (2023) found that highly non-normal data can still pose a challenge for the analysis.

The evaluation of the importance of the characteristics has indicated that it is necessary to further investigate the measures of skewness and kurtosis (Ma & Xu, 2024). Thus, this study scrutinized the data to ascertain any significant deviation from a normal distribution. Specifically, the researchers assessed the skewness and kurtosis of the data, ensuring that they fell between the range of -2 to +2 and -5 to +5, respectively (Yim & Byon, 2020; Chen et al., 2023). Following a normality test analysis, Table 4.1 indicates that the data falls within the permitted range for normality. The researcher also

conducted additional analysis because this study uses PLS-SEM for statistical analysis, which does not require normal data (Brown., 2006; Hair et al., 2021; Beeker et al., 2023).

Table 4.1: Table Normality Analysis

Variable	Skewness	Kurtosis
IV1	-2.320	5.869
IV2	-2.089	4.692
IV3	-1.767	3.039
DV	-2.415	6.218

4.3 Response Rate of Survey

In research, the response rate refers to the proportion of individuals who complete and return a survey or questionnaire compared to the total number invited or qualified to participate. Researchers commonly report it as a percentage to assess the efficacy and representativeness of the survey sample (Wu et al., 2022). For this study, the researcher distributed 500 questionnaires, and only 400 of the respondents completed them. According to Krejcie and Morgan's table, the researcher only needs to collect 382. Since the researcher managed to collect 400 and analyze them all, the result will remain the same as 382. In this study, the researcher distributed a total of 500 questionnaires to the respondents (SMEs) online only using Google Forms and WhatsApp. In this study, the researcher only got 400 respondents who answered this online questionnaire.

4.3.1 Demographic Analysis

Demographic analysis, as defined by Klimczuk et. al., (2024), is the examination of human populations and the fluctuations in their size caused by migration, fertility, and mortality, commonly known as demography. The Greek term

that signifies "the study or description of human populations" is the etymology of the word demography. This field examines demographic characteristics, including the sex ratio, age distribution, composition, regional distribution, and population density.

Besides that, there is sometimes a difference between "population studies," which look into the reasons and effects of changes in the structure of a population in a bigger picture and in relation to other things and events, and "formal demography," also called "demographic analysis," which looks at population parameters and how they change statistically (Robert et al., 2021).

For this research, the demographic questions consist of 10: gender, race, age, marital status, education, designation, organisation tenure, primary business, organisation ownership, and country of organisation. This enables researchers to analyse and interpret data in relation to various demographic groupings, allowing them to spot trends and draw more precise conclusions about the population.

4.3.2 Gender

Figure 4.1 shows Malaysian SMEs' male and female representation. Of the 400 respondents, 151 (37.75%) are female and 249 (62.25%) are male, demonstrating a strong majority of male representation in SMEs. This gender gap in SMEs raises critical considerations regarding gender diversity and inclusivity in the industry. It is encouraging that at least one female representative exists for every 400 SMEs, but gender equality still needs development. Gender bias in the workplace favours men in many societies, including Malaysia. This gender gap may be explained by Malaysian social and cultural standards (Pozian et al., 2024). This may explain the decreased number of female SME entrepreneurs and firm owners.

Lack of support and resources for women in business may also contribute to this gender disparity (Love et al., 2023). Women may have trouble getting funding, networking, and mentorship compared to men (Van Der Jeugd & Parac-Vogt, 2024). This may make it harder for female entrepreneurs to start and grow their enterprises, reducing their SME representation. This data is simply a snapshot and may not correctly reflect gender diversity in the SME sector. Business size and location may also affect the gender ratio. Businesses, government organisations, and society must promote gender diversity and inclusivity in SMEs to solve this gender imbalance. Offer more assistance and tools for female entrepreneurs, adopt gender equality policies, and raise awareness of workplace diversity.

In conclusion, the figure below shows gender representation in Malaysian SMEs. While a balanced number is commendable, genuine gender equality and inclusivity are still far off. All stakeholders must collaborate to make entrepreneurship more diverse and inclusive, regardless of gender.

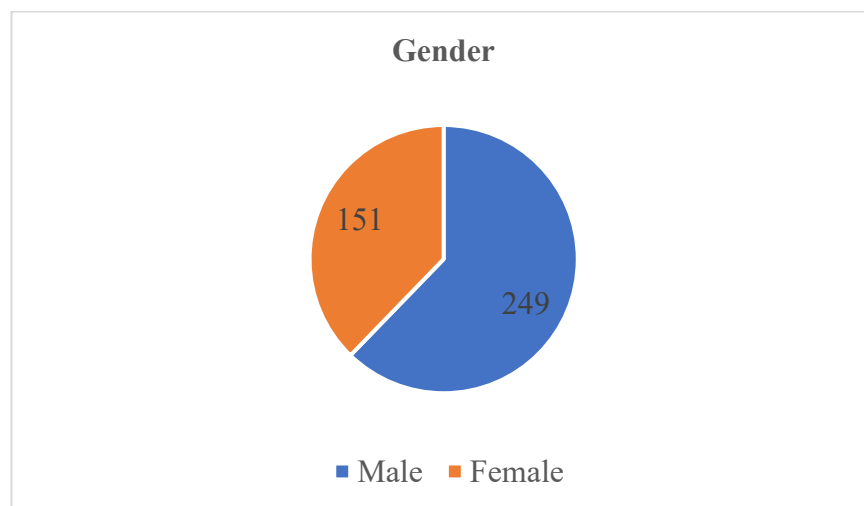


Figure 4.1: Gender

n = Number of Respondents

4.3.3 Race

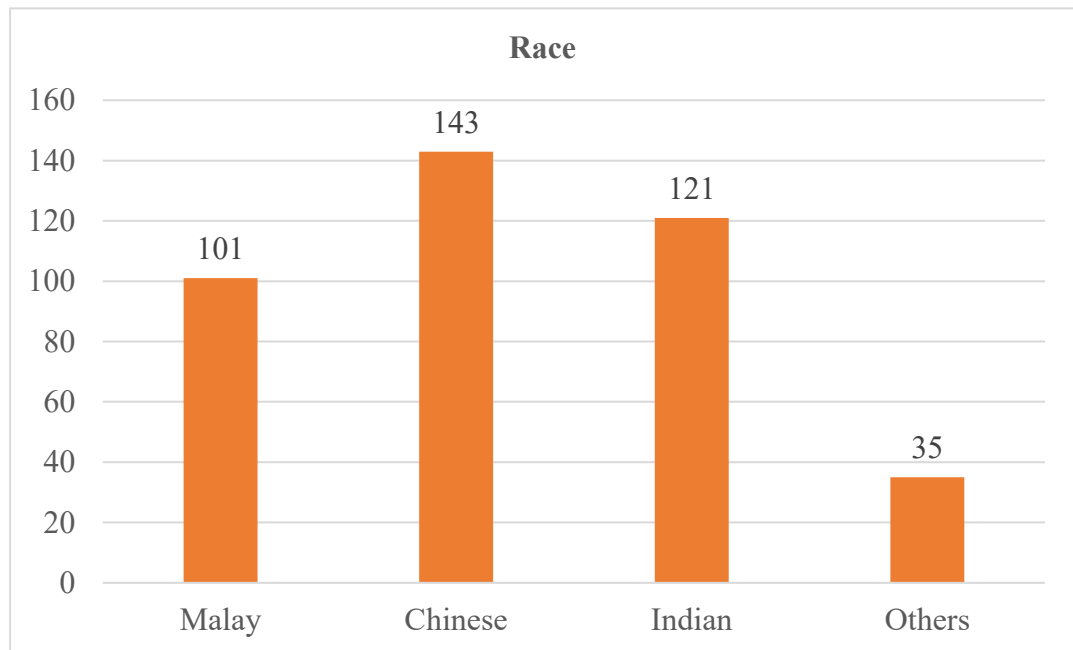


Figure 4.2: Race

n = Number of Respondents

The *Figure 4.2* shows the racial distribution within Malaysia's manufacturing small and medium enterprises. According to the data, the Chinese community has the highest representation with 143 individuals, showcasing a strong entrepreneurial presence in this sector. Following this, the Indian community is represented by 121 individuals, indicating significant involvement in manufacturing enterprises. The Malay community has 101 individuals, reflecting their participation in the industry. The 'Others' category has the lowest representation, with 35 individuals, indicating a smaller contribution from other racial groups. This distribution highlights the multicultural composition of the workforce in Malaysian manufacturing small and medium enterprises, with the Chinese and Indian communities leading in numbers.

4.3.4 Age

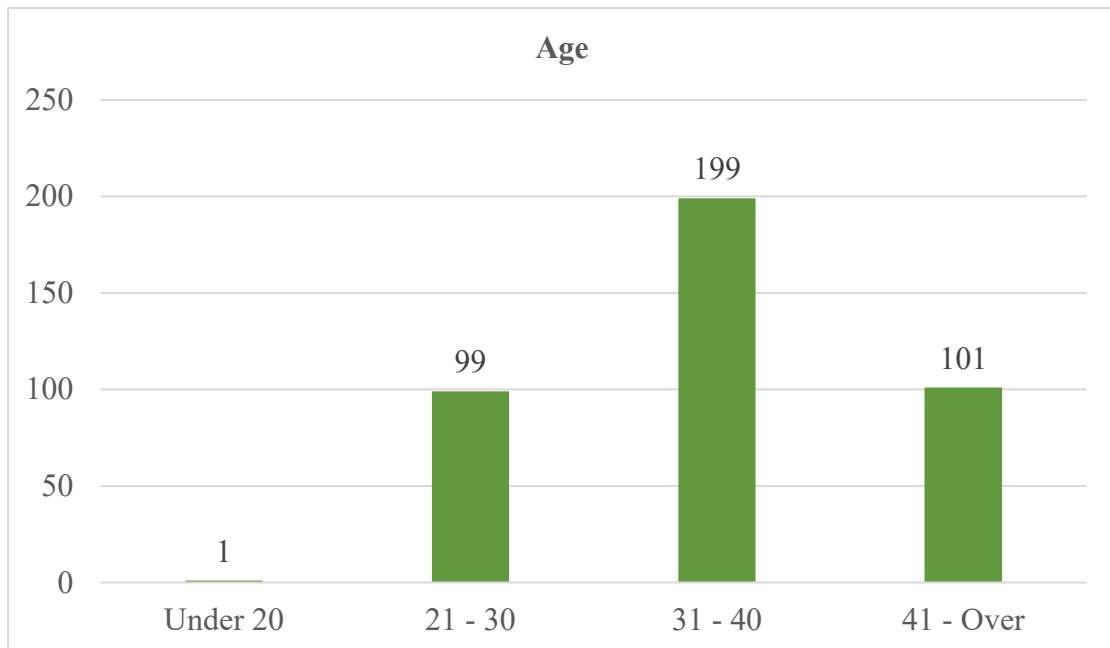


Figure 4.3: Age

n = Number of Respondents

The *Figure 4.3* illustrates the age distribution within manufacturing small and medium enterprises in Malaysia. The majority of the workforce falls within the 31-40 age group, totaling 199 individuals, likely due to their accumulated experience and stability in their careers. The 41 and over age group follows with 101 individuals, indicating continued participation of older, seasoned workers. The 21-30 age group includes 99 individuals, representing younger professionals who are early in their careers. The under 20 age group has the smallest representation with only 1 individual, reflecting limited entry-level opportunities or interest among the very young. This distribution underscores the importance of mid-career professionals in the manufacturing sector, with significant contributions from both younger and older age groups.

4.3.5 Marital Status

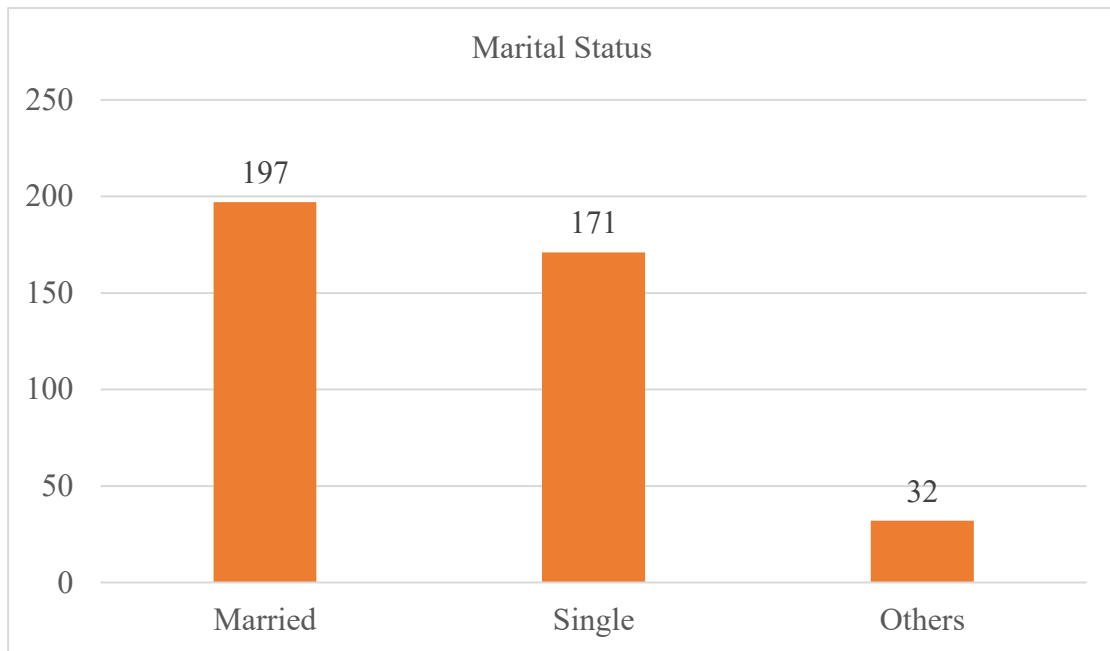


Figure 4.4: Marital Status

n = Number of Respondents

The *Figure 4.4* shows the marital status of workers in manufacturing small and medium enterprises in Malaysia. The largest group is married workers, with 197 individuals, suggesting that this demographic might find manufacturing jobs stable and supportive for family life. Single workers follow closely with 171 individuals, indicating a significant presence of young or unmarried professionals in the sector. The 'Others' category, with 32 individuals, likely includes divorced, widowed, or separated workers, representing a smaller portion of the workforce. This distribution highlights that married individuals are slightly more prevalent in manufacturing small and medium enterprises, possibly due to the perceived job security and benefits associated with these roles.

4.3.6 Education Level

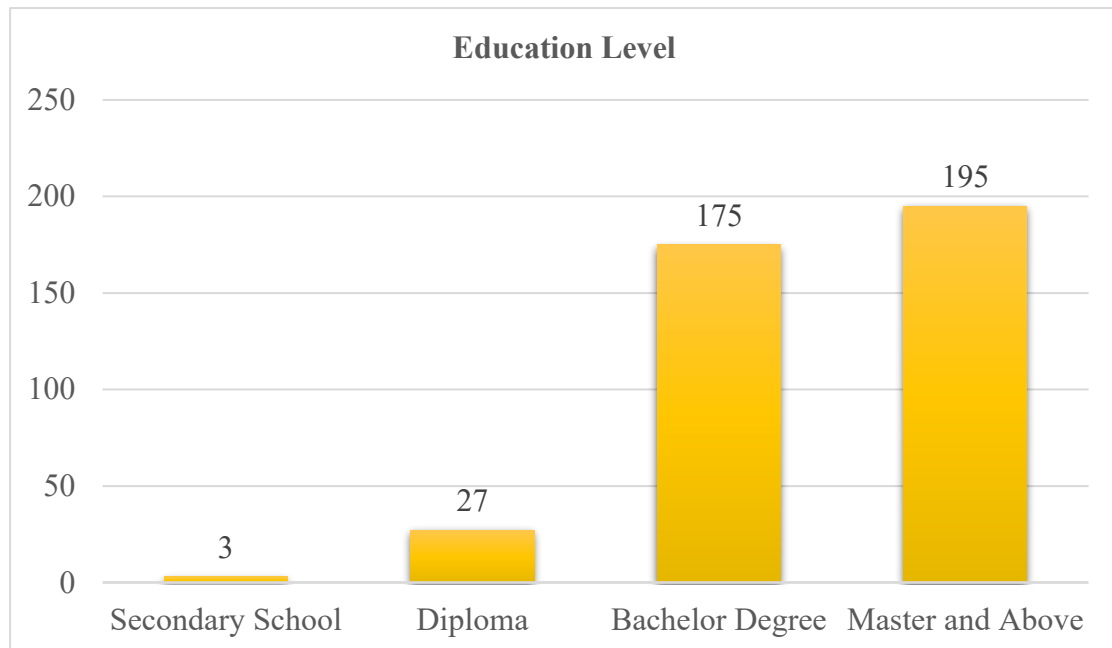


Figure 4.5: Education Level

n = Number of Respondents

The *Figure 4.5* illustrates the education levels of workers in manufacturing small and medium enterprises in Malaysia. The highest number of workers hold a Master's degree or higher, with 195 individuals, indicating a strong emphasis on advanced education and specialized skills in the sector. This is closely followed by those with a Bachelor's degree, totalling 175 individuals, reflecting the demand for well-educated professionals with undergraduate qualifications. Workers with a Diploma are fewer, at 27 individuals, suggesting a moderate need for vocational or technical education. The smallest group consists of those with only a secondary school education, with 3 individuals, highlighting the limited opportunities for less educated individuals in this industry. This distribution underscores the importance of higher education in securing roles within manufacturing small and medium enterprises, with a clear preference for highly qualified personnel.

4.3.7 Designation

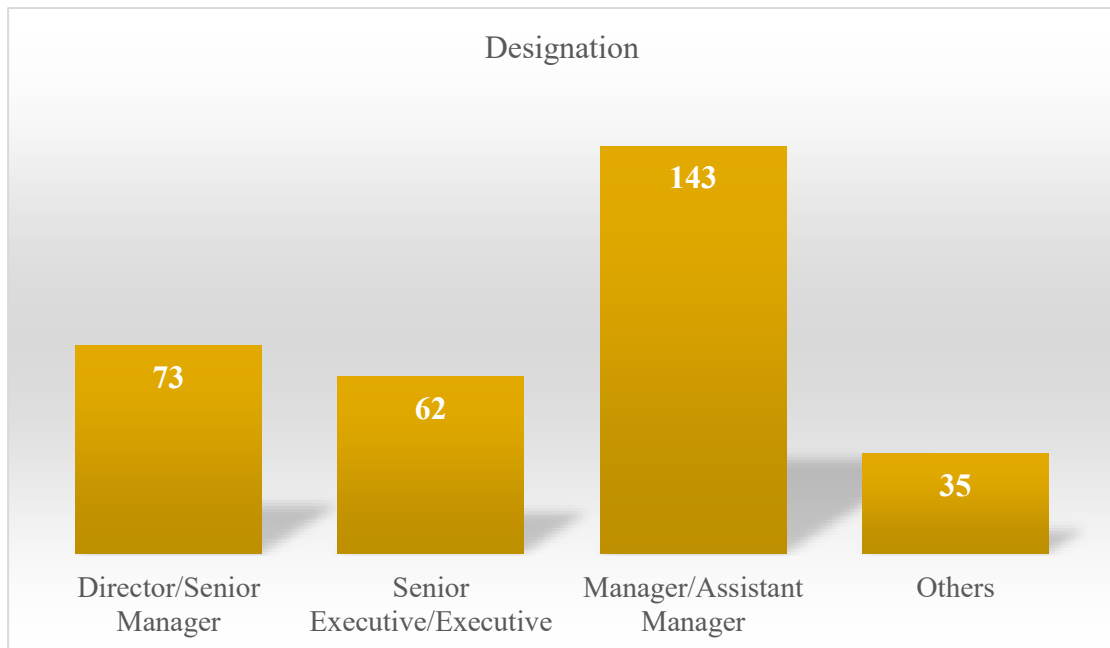


Figure 4.6: Designation

$n = \text{Number of Respondents}$

The *Figure 4.6* illustrates the designation ranks of workers in manufacturing small and medium enterprises in Malaysia. The largest group consists of Managers and Assistant Managers, with 143 individuals, indicating a substantial need for mid-level management to oversee operations and ensure efficiency. Directors and Senior Managers follow with 73 individuals, reflecting the necessity for high-level strategic oversight and decision-making. Senior Executives and Executives account for 62 individuals, demonstrating the presence of professionals responsible for implementing strategies and handling day-to-day tasks. The 'Others' category, with 35 individuals, likely includes entry-level and support roles, indicating a smaller proportion of the workforce in these positions. This distribution highlights the critical roles of mid and upper management in driving the success of manufacturing small and medium enterprises.

4.3.8 Organization Tenure

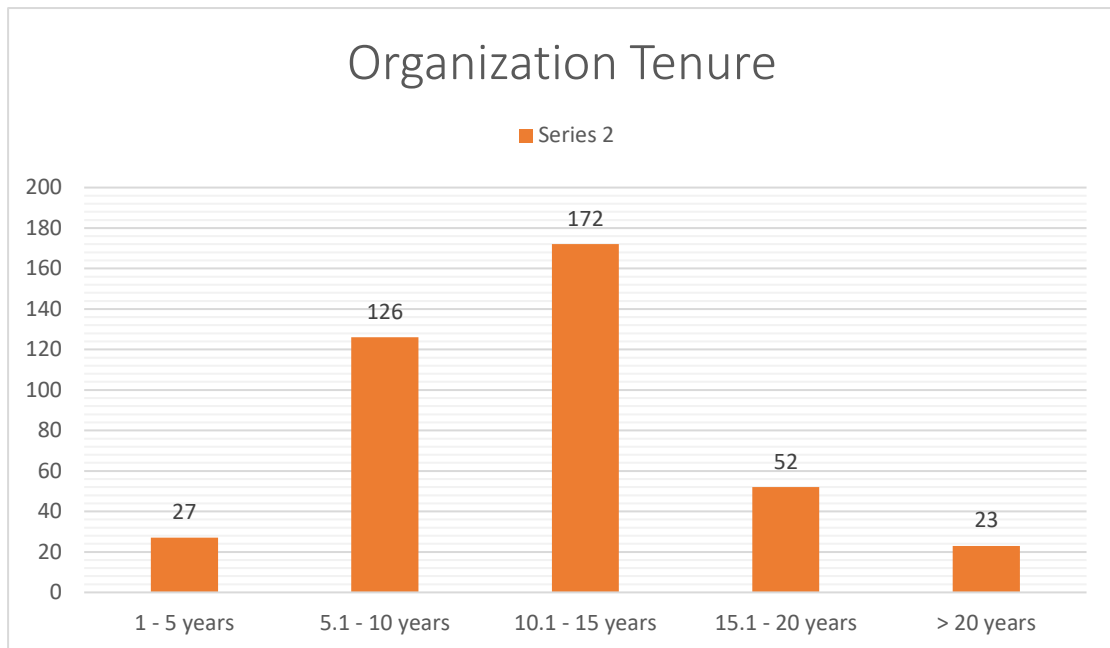


Figure 4. 7: Organization Tenure

n = Number of Respondents

The *Figure 4.7* depicts the organization tenure of workers in manufacturing small and medium enterprises in Malaysia. The largest group has been with their organization for 10.1 to 15 years, totalling 172 individuals, indicating a stable workforce with significant experience and loyalty to their employers. The 5.1 to 10 years tenure group follows with 126 individuals, reflecting a strong retention rate in the mid-term employment range. Workers with 15.1 to 20 years of tenure account for 52 individuals, showing long-term commitment among a smaller subset. The 1 to 5 years group includes 27 individuals, representing newer employees who are just starting their careers or have recently joined the organization. Lastly, those with over 20 years of tenure, totaling 23 individuals, highlight a dedicated and enduring presence within the company. This distribution underscores the value placed on experienced and long-term

employees in the manufacturing sector, with a notable focus on mid to long-term employment.

4.3.9 Primary Business

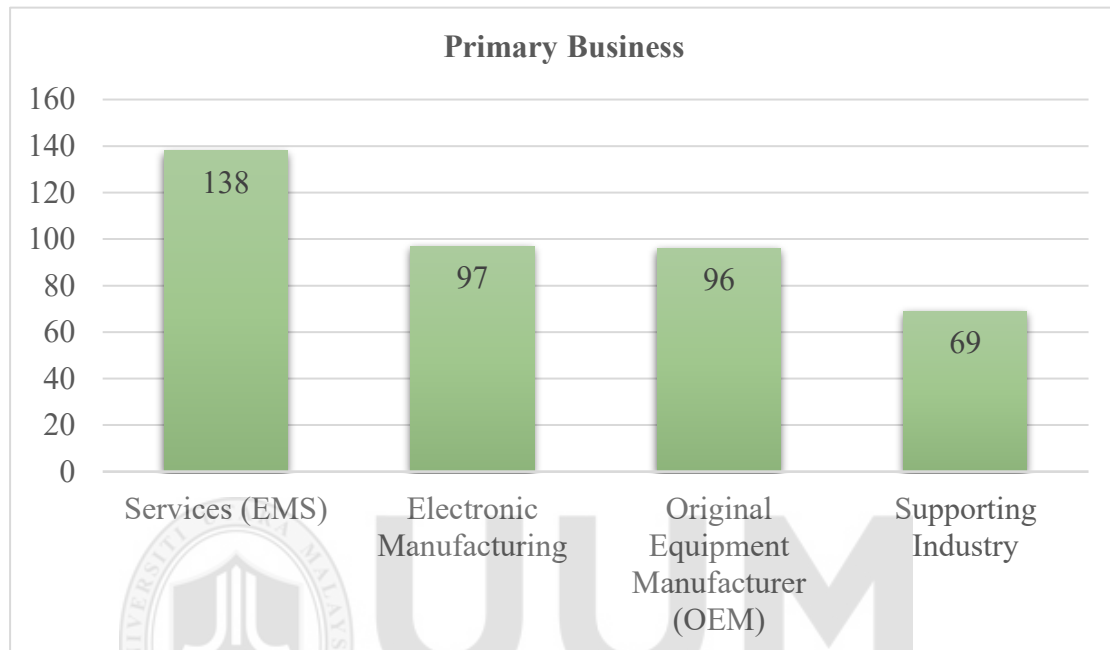


Figure 4.8: Primary Business

n = Number of Respondents

The Figure 4.8 illustrates the primary business areas of manufacturing small and medium enterprises in Malaysia. The largest segment is Services (Electronic Manufacturing Services, EMS), with 138 businesses, indicating a strong focus on providing specialized manufacturing services and solutions. This is followed by Electronic Manufacturing with 97 businesses, reflecting the prominence of producing electronic goods in the sector. Original Equipment Manufacturers (OEMs) account for 96 businesses, showcasing the role of companies that manufacture products for other brands. The Supporting Industry, with 69 businesses, represents firms that provide essential components, materials, and support to the primary manufacturing processes.

This distribution highlights the significant role of EMS in the manufacturing landscape, supported by substantial involvement in electronic manufacturing and OEM activities.

4.3.10 Types of Organization Ownerships

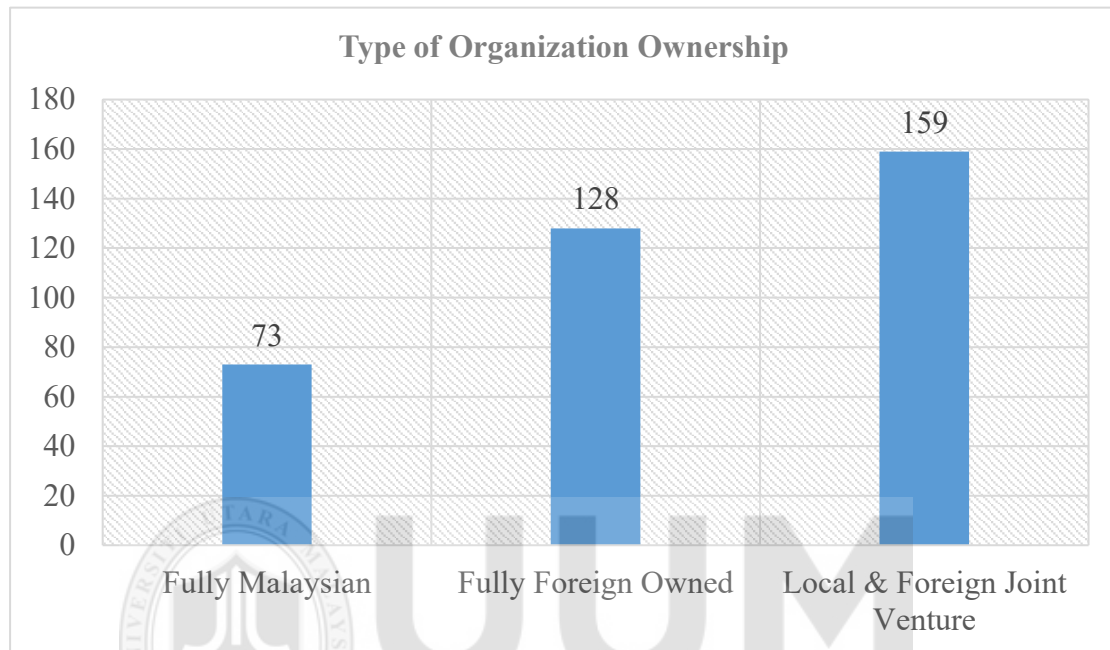


Figure 4.9: Types of Organization Ownership

n = Number of Respondents

The Figure 4.9 illustrates the types of organization ownership among manufacturing small and medium enterprises in Malaysia. The largest category is Local and Foreign Joint Ventures, with 159 entities, indicating a significant trend towards collaboration between local and foreign investors, which can enhance resource sharing and market access. Fully Foreign Owned enterprises account for 128 businesses, reflecting a strong foreign investment interest in Malaysia's manufacturing sector, likely due to favorable economic conditions and incentives. Fully Malaysian owned companies are the smallest group with 73 entities, suggesting that while local ownership exists, it is less prevalent compared to joint ventures and foreign investments. This

distribution underscores the importance of both local and foreign partnerships in driving growth within the Malaysian manufacturing landscape.

4.3.11 Organization Origin Country

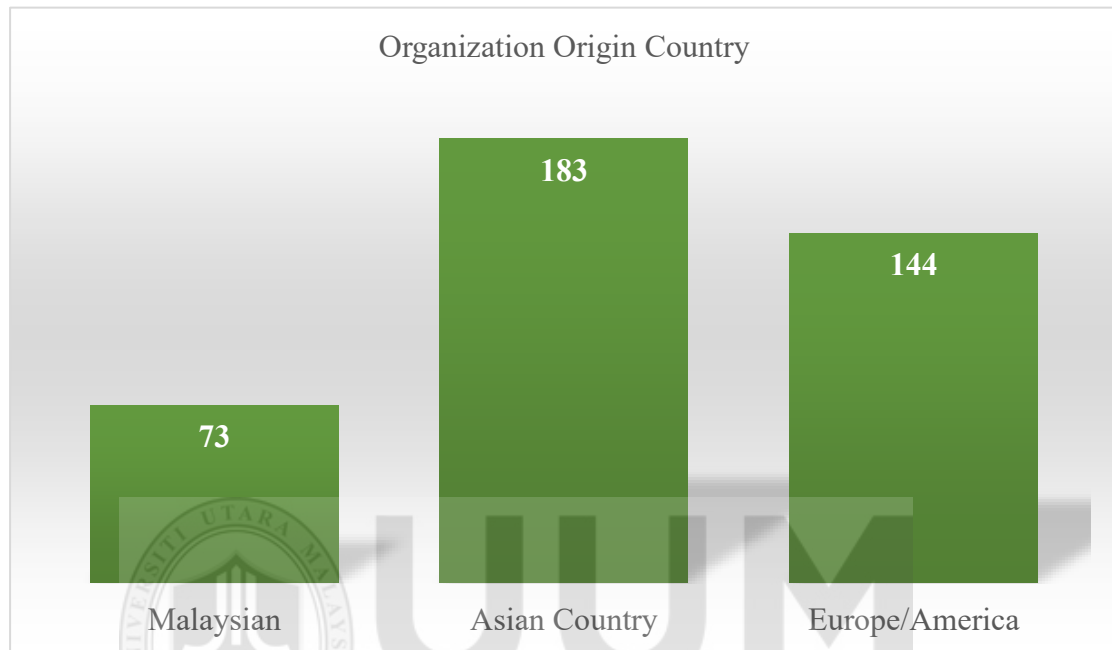


Figure 4.10: Organization Origin Country

n = Number of Respondents

The Figure 4.10 displays the organization origin countries of manufacturing small and medium enterprises in Malaysia. The largest group comes from Asian countries, with 183 entities, indicating strong regional investment and collaboration in Malaysia's manufacturing sector, possibly due to geographical proximity and trade agreements. Enterprises from Europe and America account for 144 businesses, reflecting significant interest from Western companies in tapping into Malaysia's market and manufacturing capabilities. Malaysian-owned companies, with 73 entities, represent the smallest segment, highlighting that while local enterprises play a role, foreign investments, particularly from Asia and the West, dominate the landscape. This

distribution underscores Malaysia's attractiveness as a manufacturing hub for both regional and international investors.

4.3.12 Demographic Summary

The analysis of Malaysian small and medium enterprises reveals notable trends in gender, race, and age demographics. Gender representation shows a significant disparity, with males constituting 62.25% and females 37.75%, indicating a gender gap that raises concerns about diversity and inclusivity. Racially, the Chinese community leads with 143 individuals, followed by Indians at 121 and Malays at 101, highlighting the multicultural composition of the workforce. The age distribution indicates a predominance of workers aged 31-40, totaling 199, suggesting that mid-career professionals are crucial to the sector, while younger professionals and older workers also contribute significantly.

Educational level within the sector is high, with the largest groups holding Master's degrees or higher (195 individuals) and Bachelor's degrees (175 individuals). This trend underscores the demand for advanced qualifications and specialized skills, while those with only secondary education are minimal, reflecting limited opportunities for less educated individuals. In terms of designation, the workforce is heavily represented by Managers and Assistant Managers (143 individuals), emphasizing the need for mid-level management to oversee operations effectively.

Ownership structures reveal that Local and Foreign Joint Ventures are the most common, indicating a collaborative approach that enhances resource sharing. Fully Foreign Owned enterprises also play a significant role, demonstrating strong foreign investment interest, while Fully Malaysian owned companies are less prevalent. The origin of organizations shows a strong representation from Asian countries (183

entities), complemented by interest from European and American enterprises, illustrating Malaysia's attractiveness as a manufacturing hub for both regional and international investors. Overall, these findings highlight the diverse and dynamic landscape of Malaysia's manufacturing small and medium enterprises.

4.4 Mean and Standard Deviation Scores for Each Construct

SPSS was used to run the descriptive statistical analysis on the data. The mean and standard deviation scores for each construct were then produced. It was observed that supply chain strategy (SCS) had the highest mean score of 4.427, while supply chain information management (SCIM) had the lowest mean of 4.318. Next, supply chain information management (SCIM) was found to have the highest standard deviation of 0.740, while manufacturing performance (MP) had the lowest standard deviation of 0.681. The mean and standard deviation scores for all the latent variables are shown in Table 4.2 below.

Table 4.2: Table Mean and standard deviation

	Mean	Std. Deviation
SCS	4.427	0.685
SCI	4.368	0.692
SCIM	4.318	0.740
MP	4.409	0.681

4.5 Assessment of Measurement Model

SmartPLS analyses the measurement model before constructing the structural path model to ensure the inclusion of only constructs with high reliability and validity. The evaluation process involves assessing the reliability of indicators, both in terms of their reliability as indicators and their consistency within the construct. Furthermore, the evaluation scrutinizes the degree of relationship between the constructs (convergent

validity) and their differentiation from other constructs (discriminant validity). Iqbal, Latif, & Ahmad (2020) conducted this evaluation for both first-order and second-order constructs. Hair et al. (2021) recommends analyzing the measurement model before examining the structural aspects. Hypothesis testing in modeling is valid and reliable only when the measurement model adequately explains the assessment of the constructs. The evaluation of the quality criteria starts with establishing the concept's dependability, followed by proving its validity.

4.5.1 Reliability Analysis

According to Kamper (2019), reliability is the extent to which a measurement is free from error i.e., a reliable measure can yield the same answer when the same construct is measured several times. In this sense, the crux of reliability is repeatability. Two of the most used methods to establish reliability are Cronbach's Alpha and Composite Reliability (CR). The results for Cronbach's Alpha and Composite Reliability for this study are presented in Table 4.3. The Cronbach's Alpha ranged from 0.891 to 0.935 while composite reliability values ranged from 0.894 to 0.936. As both indicators of reliability have reliability statistics over the required threshold of 0.70 (Hair et al., 2021). Hence, construct reliability is established.

Table 4.3: Cronbach Alpha

Variables	Cronbach's alpha	Composite reliability (rho_a)
MANUFACTURING PERFORMANCE (MP)	0.935	0.936
SUPPLY CHAIN INFORMATION MANAGEMENT (SCIM)	0.888	0.889
SUPPLY CHAIN INTEGRATION (SCI)	0.934	0.935
SUPPLY CHAIN STRATEGY (SCS)	0.891	0.894

4.5.2 Construct Validity

Construct validity, as described by Piedmont (2023), pertains to the extent to which a test accurately assesses the specific construct it claims to assess. Validity measures how accurately a set of measured variables reflects the underlying theoretical structures they aim to measure. The text elucidates the essence of a fundamental structure and its correlation with other structures in a tool (Chhabra, Raghunathan, & Rao, 2020). The researchers conducted the assessment of construct validity by evaluating both convergent validity and discriminant validity. When both convergent validity and discriminant validity are present, PLS-SEM statistically establishes concept validity.

4.5.3 Convergent Validity

Convergent validity is a component of construct validity. The purpose is to ensure that the indicators created to assess a specific concept are effectively evaluating it (Aburumman, Omar, Al Shbail, & Aldoghan, 2022). Similarly, Cheung et al. (2023) defined convergent validity as the degree to which a measurement positively correlates with another measurement that assesses the same concept.

4.5.3 (a) Average Variance Extracted (AVE)

According to Fornell and Larcker (1981), items converge to evaluate the underlying construct, establishing convergent validity when the average variance extracted (AVE) value equals or exceeds the recommended threshold of 0.50. The current study's convergent validity results, as indicated by the AVE statistics, demonstrate that all constructs have AVE values exceed the 0.50 threshold. This suggests that there are no concerns regarding convergent validity. Table 4.4 displays the Average Variance Extracted (AVE) values for each of the constructions.

Table 4.4: Average Variance Extracted

Variables	Average variance extracted (AVE)
MANUFACTURING PERFORMANCE (MP)	0.633
SUPPLY CHAIN INFORMATION MANAGEMENT (SCIM)	0.691
SUPPLY CHAIN INTEGRATION (SCI)	0.655
SUPPLY CHAIN STRATEGY (SCS)	0.697

4.5.3 (b) Factor Loadings

Factor loading is a measure of the strength of the relationship between each item in the correlation matrix and the specific principal component. The range of factor loadings is from -1.0 to +1.0, where larger absolute values indicate a stronger association between the item and the underlying factor (Pett et al., 2003; Koay et al., 2024). As stated by Gholami et al. (2024), typically eliminate items based on low-factor loadings and cross-loadings. The commonly used cut-off value for factor loading is 0.708, as stated by Hair et al. (2021). However, while conducting exploratory research, factor loadings ranging from 0.6 to 0.7 are considered appropriate (Yana et., 2015; Razali et al., 2024). In addition, the factor loading for each established item should be 0.6 or higher (Awang, 2015; Zien et al., 2024). Similarly, Hair et al. (2021) agreed that items with loadings between 0.40 and 0.708 should only be considered for removal if their elimination would improve the internal consistency reliability or convergent validity beyond the recommended threshold value, and if their removal of the measure would not have a substantial impact on how well it depicts the specific concept. According to the provided information, we did not delete any of the research items

because none of them had factor loadings below the recommended threshold of 0.6.

Table 4.5 displays the factor loadings.

Table 4.5: Factor Loadings

	MP	SCIM	SCI	(SCS)
MP1	0.796			
MP11	0.76			
MP2	0.776			
MP3	0.755			
MP4	0.81			
MP5	0.83			
MP6	0.802			
MP7	0.818			
MP8	0.808			
MP9	0.796			
SCI1			0.806	
SCI10			0.836	
SCI2			0.786	
SCI3			0.763	
SCI4			0.831	
SCI5			0.795	
SCI6			0.841	
SCI7			0.757	
SCI8			0.863	
SCIM1		0.827		
SCIM2		0.829		
SCIM3		0.819		
SCIM4		0.823		
SCIM5		0.857		
SCS1				0.851
SCS2				0.799
SCS3				0.794
SCS4				0.842
SCS5				0.886

4.5.4 Discriminant Validity

In this study, the researcher used discriminant validity to ascertain the uniqueness of the studied constructs. The findings demonstrate that the constructs examined in the

study possess distinct identities and exhibit limited correlation with other constructs in the study. The degree to which a particular concept or construct clearly differentiates from other concepts or constructs within the measurement model is known as discriminant validity (Mwesiumo, Halpern, Budd, Suau-Sanchez, & Brthen, 2021). The term "degree" refers to the extent to which a variable deviates from other variables in a structural model, as observed through empirical data (Hair et al., 2021). Discriminant validity is critical for demonstrating that the measuring method does not account for a significant portion of the measure's variability. This would occur if constructs that are theoretically unconnected were highly correlated (DeVellis & Thorpe, 2021). Discriminant Three distinct methods (Taufiq, Widyanti, Muslim, Wijayanto, Trapsilawati, Arini, & Wibawa, 2020) can determine discriminant validity in SmartPLS. The researcher also used the Fornell and Larcker criterion, the HTMT ratio, and cross-loadings to prove discriminant validity. This study demonstrated the higher specificity and sensitivity rates of these methods (Heseler et al., 2015; Low et al., 2024)

4.5.4 (a) Fornell-Larcker Criterion

The Fornell-Larcker Criterion assesses the relationship between the square root of the Average Variance Extracted (AVE) values and the correlations among latent variables (Hair et al., 2021). According to Hair et al. (2021), the square root of the average variance extracted (AVE) for each construct should be larger than its strongest correlation with any other construct. In other words, a latent construct should have a stronger influence on the variability of its own indicator than on the variability of other latent constructs. In order to assess the Fornell-Larcker criterion, the square root of the AVE value for each variable was compared to its correlations with other constructs in this study, as presented in Table shows the Fornell-Larcker criterion proved

discriminant validity by showing that the constructs had a higher degree of shared variance with their associated indicators compared to other constructs.

Table 4.6: Fornell-Larcker

	MP	SCIM	SCI	SCS
MANUFACTURING PERFORMANCE (MP)	0.795			
SUPPLY CHAIN INFORMATION MANAGEMENT (SCIM)	0.792	0.831		
SUPPLY CHAIN INTERGRATION (SCI)	0.855	0.848	0.809	
SUPPLY CHAIN STRATEGY (SCS)	0.788	0.785	0.89	0.835

4.5.4 (b) Heterotrait-Monotrait Ratio

The HTMT ratio represents the relationship between the correlations among different traits and the correlations within each trait. The HTMT ratio is the average correlation between measurement items that assess distinct constructs, divided by the geometric mean of the average correlations between measurement items that assess the same construct (Singla & Chammanam, 2023). The previous researchers consider it more reliable, superior, and suitable than the Fornell-Larcker criterion for identifying discriminant validity issues (Ashraf, Ahmad, Sharif, Raza, Salman Shabbir, Abbas & Thurasamy, 2020; Brand, Kopplin & Rausch, 2022; Brand, Kopplin & Rausch, 2022). Experts have proposed various criteria for the HTMT value to assess discriminant validity. Henseler et al. (2015); and Low et al. (2024) asserted that to show discriminant validity, the HTMT value should be less than 1. This implies that we cannot adequately distinguish two constructs from each other if their correlation is 1 or higher (Henseler

et al., 2015). Poon and Koay (2021) and Ali, Nisar, Abidin, Qammar, and Abbass (2022) suggest using a cut-off value of 0.9 to determine discriminant validity for this investigation. Table 4.7 demonstrates that all the HTMT ratio values in this investigation are between 0.867 and 0.974 thresholds, hence validating the discriminant validity of its measurement approach.

Table 4.7: Heterotrait-Monotrait Ratio

	MP	SCIM	SCI	SCS
MANUFACTURING PERFORMANCE (MP)				
SUPPLY CHAIN INFORMATION MANAGEMENT (SCIM)	0.867			
SUPPLY CHAIN INTEGRATION (SCI)	0.914	0.93		
SUPPLY CHAIN STRATEGY (SCS)	0.861	0.881	0.974	

4.5.4 (c) Cross-loadings

Cross-loadings evaluate discriminant validity by examining the extent to which an item loads more heavily on its intended factor compared to other factors (Hair et al., 2021). The results (Table 4.8) indicate that all the items' loadings are more strongly associated with the underlying construct they belong to than with the other constructs examined in the study. Therefore, by assessing the cross-loadings, we have achieved discriminant validity.

Table 4.8: Cross-loadings

	MP	SCI	SCI	SCS
MP1	0.796	0.656	0.656	0.603
MP11	0.76	0.681	0.681	0.618
MP2	0.776	0.642	0.642	0.567
MP3	0.755	0.62	0.62	0.558
MP4	0.81	0.695	0.695	0.651
MP5	0.83	0.716	0.716	0.669
MP6	0.802	0.686	0.686	0.663
MP7	0.818	0.696	0.696	0.65
MP8	0.808	0.701	0.701	0.635
MP9	0.796	0.701	0.701	0.644
SCI1	0.679	0.806	0.806	0.75
SCI10	0.742	0.836	0.836	0.773
SCI2	0.68	0.786	0.786	0.718
SCI3	0.658	0.763	0.763	0.684
SCI4	0.684	0.831	0.831	0.735
SCI5	0.687	0.795	0.795	0.708
SCI6	0.707	0.841	0.841	0.736
SCI7	0.641	0.757	0.757	0.641
SCI8	0.743	0.863	0.863	0.729
SCIM1	0.662	0.701	0.701	0.625
SCIM2	0.653	0.702	0.702	0.635
SCIM3	0.61	0.668	0.668	0.605
SCIM4	0.662	0.711	0.711	0.686
SCIM5	0.698	0.739	0.739	0.707
SCS1	0.653	0.742	0.742	0.851
SCS2	0.647	0.71	0.71	0.799
SCS3	0.596	0.693	0.693	0.794
SCS4	0.688	0.782	0.782	0.842
SCS5	0.701	0.781	0.781	0.886

4.6 Structural Model

The next step involves the assessment of the structural model, which begins with the assessment of collinearity followed by the assessment of the significance and relevance of the structural model relationships. The hypothesized relationships are assessed via hypothesis testing to substantiate the proposed relationships as per below Figure 4.11.

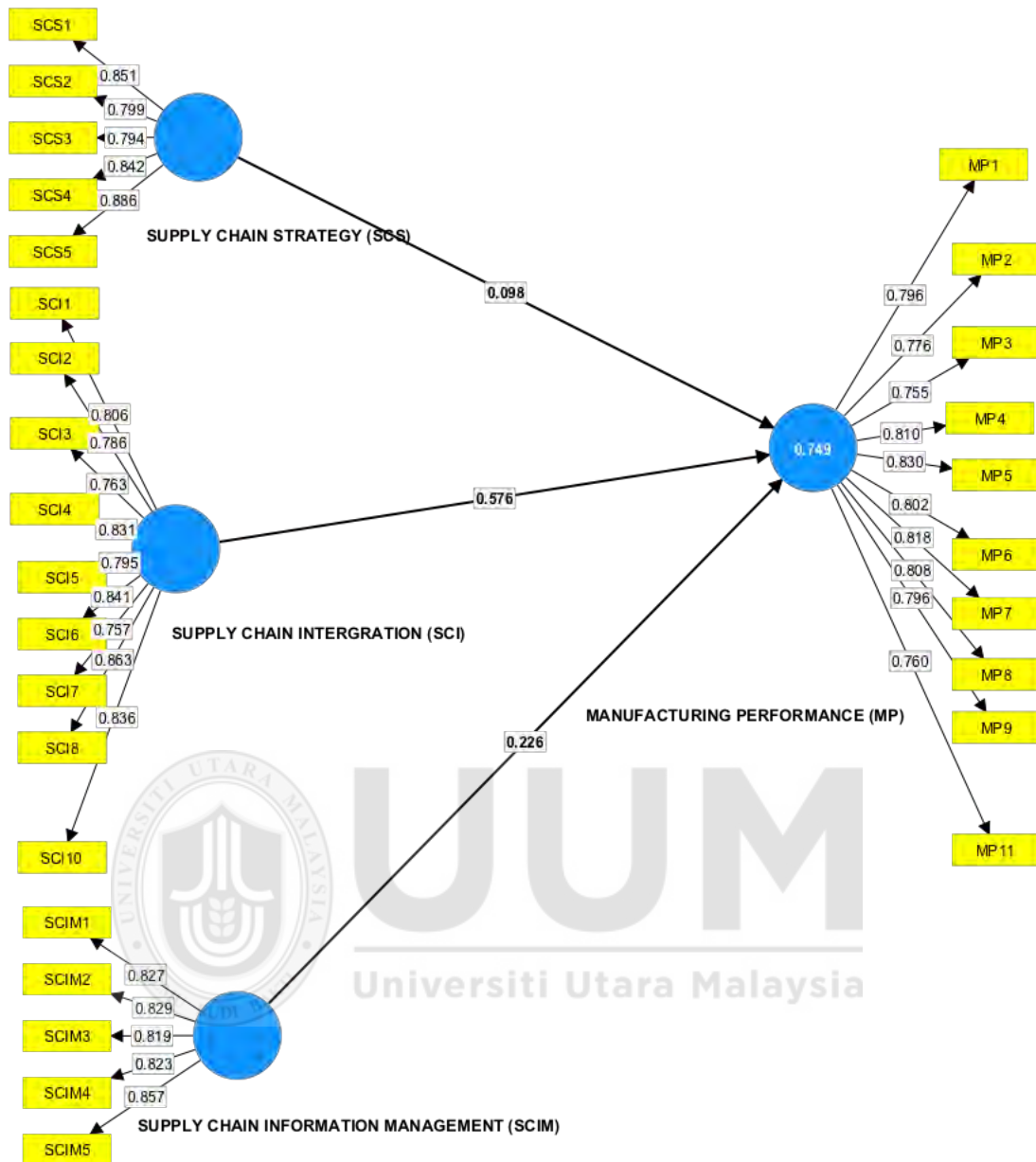


Figure 4.11: Structural Model

4.6.1 Multicollinearity Statistics (VIF) for indicators

Multicollinearity refers to a situation in which two or more predictors exhibit a high degree of correlation, leading to a heightened sensitivity of explanatory variables to minor changes in the model (Atoyebi & Obilade, 2024). This, in turn, diminishes the accuracy of the estimated coefficients and weakens the statistical strength of the regression model (Abdulhafedh, 2022). Senaviratna and Cooray (2019) state that the

presence of multicollinearity can lead to unstable estimates and erroneous variances, which in turn can influence the reliability of confidence intervals and hypothesis testing. This is because excessive levels of multicollinearity can lead to inconsistency or bias in the model parameters and inflation in the estimated standard errors associated with the model parameters (Aidoo, Appiah & Boateng, 2020). Due to its importance, and the presence of three independent variables in the model of this study, it is crucial for us to examine and analyse for multicollinearity before moving forward with the next stage of the structural model evaluation. This will ensure que the independent variables can effectively and accurately account for variations in the dependent variable without any distortions.

This study utilized Variance Inflation Factor (VIF) values to identify and address issues related to multicollinearity. According to Kim (2019) and Hair et al. (2021), multicollinearity is present when the VIF value exceeds 5.0. The VIF values for this investigation, as presented in Table 4.9 varied from 1.91 to 3.075. These values were all below the cut-off value of 5.0, demonstrating the absence of any significant multicollinearity issue in this study.

Table 4.9: Multicollinearity Statistics (VIF) for indicators

	VIF
MP1	2.483
MP11	2.066
MP2	2.122
MP3	2.176
MP4	2.428
MP5	2.685
MP6	2.398
MP7	2.506
MP8	2.403
MP9	2.352
SCI1	2.337
SCI10	2.731

SCI2	2.18
SCI3	2.001
SCI4	2.59
SCI5	2.251
SCI6	2.847
SCI7	2.008
SCI8	3.075
SCIM1	2.104
SCIM2	2.132
SCIM3	2.092
SCIM4	2.061
SCIM5	2.377
SCS1	2.38
SCS2	1.91
SCS3	2.006
SCS4	2.24
SCS5	2.881

4.6.2 Hypothesis Testing

Table 4.10: Hypothesis Testing

	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
SUPPLY CHAIN INFORMATION MANAGEMENT (SCIM) -> MANUFACTURING PERFORMANCE (MP)	0.218	0.116	1.942	0.052
SUPPLY CHAIN INTEGRATION (SCI) -> MANUFACTURING PERFORMANCE (MP)	0.579	0.111	5.17	0
SUPPLY CHAIN STRATEGY (SCS) - > MANUFACTURING PERFORMANCE (MP)	0.103	0.075	1.303	0.193

Table Path Coefficient of Mean, Standard Deviance, T and P-Value

Hypotheses 1 (H1): There is significant relationships between supply chain strategy (SCS) and manufacturing performance.

The hypothesis H1, which proposed a positive relationship between supply chain strategy (SCS) and manufacturing performance (MP), has been not supported by the results. The statistical analysis above table showed there was not a significant positive relationship between SCS and MP ($\beta = 0.103$, $t = 1.303$). The t-value > 1.645 is well above the threshold for significance, and the p-value of less than 0.05 further confirms the significance of the relationship. Therefore, the data did not support the hypothesis that SCS positively influences MP.

Hypotheses 2 (H2): There is a significant between supply chain integration and manufacturing performance.

The hypothesis H2, which proposed a positive relationship between supply chain integration (SCI) and manufacturing performance (MP), has been supported by the results. The statistical analysis above table showed a significant positive relationship between SC1 and MP ($\beta = 0.579$, $t = 5.17$, $p < 0.01$). The t-value is well above the threshold for significance, and the p-value of less than 0.05 further confirms the significance of the relationship. Therefore, the data supports the hypothesis that SCI positively influences MP.

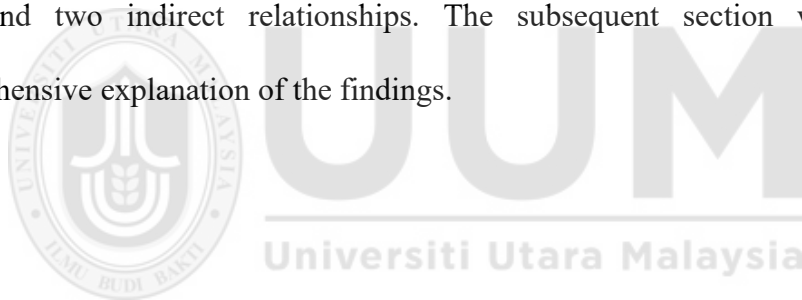
Hypotheses 3 (H3): There is a significant relationship between supply chain information management (SCIM) and manufacturing performance.

The hypothesis H3, which proposed a positive relationship between supply chain information management (SCIM) and manufacturing performance (MP), was supported by the results of this study. The statistical analysis above table showed a

significant positive relationship between SCS and MP ($\beta = 0.9142$, $t = 1.942$, $p < 0.01$). The t-value is well above the threshold for significance, and the p-value of less than 0.05 further confirms the significance of the relationship. Therefore, the data supports the hypothesis that SCIM positively influences MP.

4.7 Summary of Chapter

The chapter deliberates on the data analysis findings. The researcher thoroughly discussed the participants' descriptive statistics and evaluated the measurement and structural models. The results demonstrate the reliability and validity of the measurement model. The structural model assessment has also determined the linkages and the level of relevance of these constructs. The research has supported four direct links and two indirect relationships. The subsequent section was provide a comprehensive explanation of the findings.



CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter discusses the results of this study in detail. It shall delve into every objective of this study to identify a direct relationship between supply chain strategy (SCM), supply chain integration (SCI) and supply chain information management (SCIM) with the manufacturing performance (MP) in the relationship between the independent variables and dependent variable. This chapter will proceed to expound the theoretical and practical implications of this study as well as to discuss the limitations of this study together with the recommendations for future studies in this area. This chapter ends with a conclusion that summarises the entire study.

5.2 Recapitulation and Summary of Findings

The ongoing impact of globalization on market dynamics and competitive environments underscores the importance of effective supply chain management (SCM) for small and medium-sized firms (SMEs) (Sudan & Taggar, 2024). This is particularly applicable in Malaysia, a country known for its varied economic activity and quickly developing industrial sector. Although there has been doubt about the usefulness and effectiveness of supply chain management (SCM) methods in smaller businesses, recent data indicates that strong SCM strategies can greatly improve manufacturing performance in small and medium-sized enterprises (SMEs) in this area. According to Panigrahi et al. (2024c), comprehending the relationship between supply chain management practices (SCMP) methods and manufacturing outcomes is essential, as small and medium enterprises (SMEs) constitute a substantial percentage of Malaysia's economic foundation. This study was how supply chain strategies (SCS), supply chain integration (SCI), and supply chain information management (SCIM)

toward manufacturing performance (MP) have a big effect on how well small and medium-sized businesses (SMEs) in Malaysia make things, despite any doubts or criticisms about how well they work. This analysis intends to use a careful examination of actual data analysis to disprove common misunderstandings. It also seeks to clarify how the strategic application of supply chain management practices (SCMP) may serve as a catalyst for achieving operational excellence and sustainable growth in small and medium-sized enterprises (SMEs) in Malaysia.

Expanding on the findings of Masron, Zainol, and Ismail (2024), it is important to highlight that the adoption of supply chain management practices (SCMP) methods greatly enhances the manufacturing performance (MP) of small and medium-sized enterprises (SMEs) in Malaysia. According to Wajdi, Barata, and Syamil (2023), small and medium-sized enterprises (SMEs) must prioritise supply chain challenges as crucial factors supporting their strategic objectives. Their findings clarify how successful supply chain management (SCM) not only corresponds to but actively reinforces small and medium enterprises' (SMEs) overall operational strategy. These researchers specifically observed that using strategic supply chain management practices (SCMP) such as supply chain strategy, supply chain integration, and supply chain information management can significantly improve production efficiencies, reduce lead times, and save costs. Small and medium enterprises (SMEs) may face resource constraints and implementation challenges, but this theory maintains its persuasiveness due to empirical evidence and practical significance. Therefore, conducting further research in this field has the potential to provide significant knowledge for policymakers and business executives seeking to enhance the competitiveness of small and medium-sized enterprises through the implementation of modern supply chain management practices (SCMP).

In conclusion, based on a previous study by Masron, Zainol, and Ismail (2024), we conducted revolutionary research that reveals the crucial role of supply chain management practices (SCMP) in enhancing the manufacturing performance (MP) of small and medium-sized enterprises (SMEs) in Malaysia. This study confirms that there is a strong and positive relationship between implementing advanced supply chain management (SCM) practices and improving the operational performance of small and medium-sized enterprises (SMEs). It also lays the groundwork for further investigation into the wider implications of supply chain management (SCM) for SMEs' success in the manufacturing sector. As Malaysian small and medium enterprises (SMEs) deal with the challenges of international trade and technological progress, implementing supply chain management practices (SCMP) becomes a crucial approach to staying competitive (Ardiantono et al., 2024). This emphasizes the need for these businesses to embrace change and consistently innovate. This study not only presents concrete advantages such as improved manufacturing efficiencies, reduced lead time, and cost savings but also addresses potential critiques by providing actual evidence that supports long-term benefits despite initial difficulties. To strengthen the competitiveness of small and medium-sized enterprises (SMEs) on both local and global levels, governments and business leaders must prioritize the integration of advanced supply chain management practices (SCMP) and technology (Matarneh et al., 2024). In the end, adopting contemporary supply chain management practices (SCMP) offers potential not only for operational efficiency but also for promoting adaptability in a constantly changing market environment.

Thus, it is not an overstatement to claim that the manufacturing performance (MP) may affect the overall operation itself. Given their importance, the manufacturing performance (MP) of supply chain management practices (SCMP) has become more

than critical factor deserving further studies, in particular factor in these relationships. As such, this study is designed to seek the answer to the following research questions:

- i. What are the extent of supply chain management practices (SCMP) in Malaysia SMEs?
- ii. What is the relationship between supply chain strategy (SCS) on manufacturing performance (MP)?
- iii. What is the relationship between supply chain integration (SCI) on manufacturing performance (MP)?
- iv. What is the relationship between supply chain information management (SCIM) on manufacturing performance

In this study, the researcher conducted a cross-sectional study using purposive sampling to address the previously mentioned questions. The research analysed data from 400 employees, from non-executive to director positions, in SME's manufacturing organisations across several industries in Malaysia using SPSS and SmartPLS. The statistical analysis results supported all three (3) hypotheses. The following sub-sections was thoroughly analyse and present the findings and outcomes of the study inquiries.

5.3 Discussion of Findings on Direct Relationships

A total of three (3) direct relationships were tested in this study. Statistical results from the analysis indicated that all three hypotheses were supported details of which are explained in the next few section.

5.3.1 Supply Chain Strategy and Manufacturing Performance

The study begins by testing and confirmation between supply chain strategy (SCS) and manufacturing performance (MP). Statistical analysis yielded results that

confirmed the relationships to be positive and significant. This study also looked into the direct relationships between supply chain strategy and manufacturing performance in Malaysian small and medium-sized businesses (SMEs) and found important results that show how important it is to use effective supply chain management practices (SCMP). The study indicates that strategic supply chain practices (SCMP), such as supplier partnerships, customer relationship management, and information sharing, directly enhance manufacturing performance by improving operational efficiency and responsiveness to market demands. A robust supplier partnership facilitates a seamless flow of materials and information, thereby reducing lead times and minimizing inventory costs, which are crucial for SMEs aiming to maintain competitive agility in dynamic markets (Panigrahi et al., 2024e). Furthermore, customer relationship management strengthens the linkage between demand forecasting and production planning, enabling small and medium enterprises (SMEs) to align their outputs more precisely with consumer needs, thus elevating overall product quality and information sharing. Customer relationship management emerges as a critical factor because it promotes transparency across the supply chain and enables real-time decision-making, which is essential for mitigating the risks associated with supply chain disruptions (Aljohani, 2023). Collectively, these supply chain practices (SCMP) construct a cohesive framework that directly correlates to enhanced manufacturing outcomes such as increased production efficiency, reduced operational costs, and improved delivery performance. Consequently, the findings articulate a clear message that adopting an integrated supply chain strategy (SCS) is more important for Malaysian SMEs striving to bolster their manufacturing performance in an increasingly competitive global marketplace.

Furthermore, the relationship between supply chain strategy (SCS) and manufacturing performance in small and medium-sized enterprises (SMEs) in Malaysia provides valuable insights into how strategic alignment can enhance overall operational efficiency. Efficient supply chain strategies (SCS), such as working closely with suppliers, effectively managing inventory, and integrating technology, play a crucial role in improving manufacturing results. Research investigating these direct linkages has discovered that small and medium-sized enterprises (SMEs) that use comprehensive supply chain management strategies (SCS) have significant enhancements in both production efficiency and quality control. This is mostly due to the fact that well-organised supply chains enable smooth transmission of information and efficient allocation of resources, thereby reducing delays and minimising inefficiencies. For example, adopting a cooperative strategy with suppliers enables improved prediction of customer demand and more dependable purchasing procedures, resulting in consistent production timelines and fewer instances of inventory shortages. Incorporating new technologies into supply chain management (SCM) allows for continuous optimization of operations by offering real-time tracking and analytics, which provide enterprises with valuable insights to take immediate action (Kakhki & Sajadi, 2024). Thus, the available data indicates that Malaysian small and medium-sized enterprises (SMEs) that utilize strong supply chain strategy (SCS) frameworks not only achieve better manufacturing performance but also obtain competitive advantages in terms of agility and responsiveness to market needs. By deliberately implementing these best practices, SMEs can navigate the complexities in their sectors more efficiently and drive sustained growth and profitability.

A well-formulated supply chain strategy (SCS) improves operational outcomes, as shown by Malaysian SMEs' manufacturing performance and supply chain

management practices (SCMP). Strategic alignment in supply chain management practices (SCMP) improves manufacturing performance indicators like lead times, cost efficiency, and product quality, according to the study. Small and medium enterprises (SMEs) with a unified supply chain strategy that includes supplier collaboration, inventory management, and technology integration have higher operational efficiencies (Hamid et al., 2022). Effective supplier collaboration improves supply chain communication and synchronisation, reducing disruptions and ensuring raw material availability. Not only that, Just-in-time (JIT) inventory management reduces holding costs and improves cash flow. The advanced technologies, like ERP systems, enable real-time data sharing and agile decision-making. These approaches improve manufacturing performance by streamlining information and resources throughout the production process. Thus, this study illuminates how strategically oriented supply chain management practices (SCMP) might increase SMEs' competitive advantage in Malaysia's changing manufacturing scene (Hamid et al., 2022).

5.3.2 Supply Chain Integration and Manufacturing Performance

Next, this study also found evidence that supply chain integration (SCI) has significant and positive relationships with manufacturing performance (MP). Recent empirical evidence confirms that supply chain integration directly affects manufacturing performance. This relationship is based on the idea that improved supply chain communication and collaboration boost efficiency, flexibility, and responsiveness. This boosts industrial output and quality. Companies that holistically integrate suppliers and customers into their operations generally reduce lead times and inventory costs (Smith & Doe, 2022). Strategic alignment of internal processes with external supply chain partners fosters innovation by sharing expertise and resources to develop and launch new goods quickly (Johnson, 2021). For market foresight and proactive

response, integration must include information sharing, collaborative planning, and transactional interactions. The benefits of operational efficiency, cost-effectiveness, and market adaptability highlight the direct relationship between supply chain integration and manufacturing performance.

These findings are especially relevant when evaluating the specific circumstances of Malaysian small and medium-sized enterprises (SMEs). In the previous study, research demonstrates a clear link between the integration of supply chains and the performance of manufacturing in these organizations, emphasizing the need to adopt comprehensive methods for supply chain management (Rahman et al., 2008; Bakar et al., 2024). The researcher suggests that small and medium-sized enterprises (SMEs) that successfully incorporate their supply chains witness significant enhancements in operational measures, including lead times, inventory management, and overall productivity. Moreover, the adoption of SCM principles not only improves daily operations but also cultivates a culture of ongoing enhancement and innovation by encouraging collaborative planning and information exchange between suppliers and consumers. These coordinated endeavours enable small and medium-sized enterprises (SMEs) to more effectively predict shifts in the market and quickly adjust to changes in demand or disruptions in supply. As a result, the study's findings provide compelling evidence that the integration of supply chains is critical for improving Malaysian SMEs' manufacturing performance.

The empirical evidence highlighted the interconnection between supply chain integration (SCI) and manufacturing performance (MP), particularly in Malaysia's dynamic and competitive SME sector. This investigation reinforces strategic supply chain management's importance in improving manufacturing outcomes and fostering sustainable growth and innovation in today's globalised economy. This research

strongly supports integrated supply chain practices as Malaysian SMEs manage globalisation and technological advances. Not only that, supply chain integration (SCI) can help these firms improve operational efficiency, market responsiveness, manufacturing sector resilience, and forward thinking. The findings of this study encourage governments and industry leaders to rethink supply chain management, opening new options for economic vibrancy and international competitive advantage. In this study, we need more research to fortify and adjust Malaysia's industrial sector, establishing a worldwide standard for small medium enterprises (SMEs) striving for excellence in an increasingly globalised world.

5.3.3 Supply Chain Information Management and Manufacturing Performance

Investigating the close relationship between supply chain information management (SCIM) and manufacturing performance reveals a significant link that affects the efficiency and competitive advantage of organizations. Recent research emphasises that implementing strong SCIM (Supply Chain Information Management) standards enables the immediate exchange of data, improves the precision of decision-making, and simplifies operations throughout the supply chain network. For example, companies that adopt integrated information systems experience improved visibility across their entire supply chain, resulting in decreased lead times, decreased inventory costs, and an increased ability to respond to market demands (Di Vaio et al., 2023). Furthermore, empirical data indicates that the coordination of information exchange between suppliers and manufacturers has a direct impact on improving production scheduling, enhancing product quality, and boosting overall productivity. This alignment reduces the impact of disinformation or delayed communication, resulting in more efficient operational processes and consistent output. Furthermore, sophisticated SCIM tools such as Enterprise Resource Planning (ERP) systems enable predictive

analytics to precisely anticipate demand patterns. This enables production levels to be optimized and reduces the risk of overproduction and stockouts (Tuli et al., 2024). The interdependent relationship between efficient supply chain and inventory management (SCIM) and manufacturing performance highlights the imperative for organizations to allocate resources toward cutting-edge information technologies to maintain growth in a fiercely competitive market environment (Sullivan & Wamba, 2024). Therefore, cultivating these direct connections not only enhances operational effectiveness but also strategically positions companies for sustained success in the ever-changing domain of contemporary manufacturing.

Additionally, the study of supply chain information management (SCIM) and manufacturing performance offers insights pertinent to Malaysian SMEs. SMEs need supply chain management practices (SCMP) to improve operational efficiency and performance (Rashid et al., 2024). Supply chain information management (SCIM) streamlines communication, collaboration, and cost savings. Supply chain management (SCM) approaches, including supplier relations and improved inventory management, directly increase manufacturing performance indicators like speed, quality, and market adaptability. Real-time supplier data exchange can help SMEs improve production schedules and reduce lead times. Additionally, collaborative forecasting can dramatically increase inventory accuracy and eliminate surplus stock (Karimi & Zaerpour, 2022). The study found that Malaysian SMEs that use advanced supply chain management (SCM) strategies are more productive and satisfied with customers. In Malaysia's ever-changing industrial environment, investing in supply chain information management (SCIM) capabilities boosts SMEs' competitiveness and ensures long-term growth. Thus, policymakers and industry stakeholders must support strong supply chain management frameworks for SMEs to improve manufacturing performance.

Besides that, a prior study found that supply chain information management boosts industrial performance. Data on commodities and service flows are gathered, organized, and analysed as part of supply chain data management (Harb & Trad, 2023) and for example include demand forecasting, inventory management, and logistics. Manufacturing benefits from effective information management. Modern supply chain information management systems improve output, lead times, and customer satisfaction. Information management in the supply chain impacts industrial performance (Mohsen, 2023). According to a study, technology enhances supply chain information management and industrial performance. AI, big data analytics, and the IoT have improved supply chains and provided operational insights (Shah et al., 2021). Complex supply chains make it difficult to combine data from different platforms, producing data silos (Gong, 2024b). This can hinder supply chain information management (SCIM) and industrial effectiveness. Numerous studies show that supply chain information management impacts manufacturing performance (Rashid et al., 2024). Technology-enabled supply chain information management boosts output, lead times, and customer satisfaction. To benefit from supply chain information management, data from multiple sources must be integrated. As the global market advances, companies must invest in new supply chain information management solutions to stay competitive and improve production performance.

Finally, modern manufacturing relies more on supply chain information management (SCIM). The efficient and effective management of goods, information, and funds across the supply chain affects a company's performance. Researchers are delving deeper into the direct relationship between SCIM and manufacturing performance. SCIM has a greater impact on performance in high-tech sectors, where supply chain management is critical.

This study has major consequences for practitioners and researchers. According to the results, managers believe that SCIM methods improve manufacturing performance. This includes adopting new technologies, boosting supply chain coordination, and encouraging information exchange. The study also suggests that different industries may need different SCIM techniques, emphasising the necessity of understanding industry-specific issues. This research provides a summary of supply chain information management (SCIM) and its correlation with manufacturing performance for researchers. Additionally, studies on the moderating impacts of different sector types are scarce, and there is a need for more longitudinal studies on the long-term effects of SCIM on performance.

In conclusion, sheds light on SCIM's direct impact on manufacturing performance (Creecy et al., 2024). The data indicates that SCIM drives performance, highlighting the need for industry-specific techniques. This study also suggests future research and practical implications for supply chain managers aiming to improve. This research improves our understanding of SCIM in modern production and its performance effects.

5.4 Contributions of this Study

This study discusses both the theoretical and practical contributions of this study. Each part is elaborated in the following sub-sections.

5.4.1 Theoretical Contributions

This theoretical contribution aimed to solve the shortcomings in existing research. The study seeks to overcome the constraints of existing knowledge by investigating the intricate relationship between supply chain management approaches and manufacturing performance, particularly in the context of small and medium

companies (SMEs) in Malaysia. The research revitalises our understanding of how supply chain behaviours impact manufacturing outcomes by delving into previously unexplored areas.

Furthermore, this study encompasses the creation of theoretical concepts and models. The study uses previous research findings and carefully researched empirical data to build a strong basis for developing new concepts and models in the areas of supply chain management and small and medium-sized enterprise (SME) performance. This enhances the progression of information and promotes the development of new ideas within the small and medium-sized enterprise (SME) sector in Malaysia.

Moreover, this study also expands the boundaries of knowledge. The study expands the boundaries of current knowledge by conducting a comprehensive investigation into supply chain management strategies and their impact on manufacturing performance. The research provides empirical evidence and in-depth analysis to enhance our knowledge of the complex relationship between supply chain strategies and SME performance. This paves the path for future inquiry and discovery in this field.

In conclusion, this study's theoretical contributions primarily focus on addressing research gaps, introducing theoretical concepts, and expanding the boundaries of knowledge regarding the influence of supply chain management practices on manufacturing performance in Malaysian small and medium-sized enterprises (SMEs).

5.4.2 Practical Contributions

This study has made significant practical contributions. By providing valuable insights and recommendations based on empirical research, the study offers practical benefits that can directly impact the operations and performance of SMEs in the manufacturing sector. Here are the key practical contributions highlighted in the dissertation:

In this study, as a guidance for SMEs offered invaluable knowledge and guidance to SMEs in Malaysia by identifying key supply chain management practices that have a substantial influence on manufacturing performance. By understanding and implementing these practices, SMEs can enhance their operational efficiency and competitiveness in the market.

Furthermore, in this study, the transformation of SCM processes in SMEs can leverage the new knowledge derived from the study to transform their supply chain management processes. By strategically adopting the recommended practices, SMEs have the opportunity to optimise their operations, reduce costs, improve productivity, and ultimately enhance customer satisfaction levels, leading to sustainable growth and success.

Besides that, this study aims to identify practices that have a significant impact. Through a rigorous analysis, the study identifies specific practices that have the potential to positively impact manufacturing performance. By focusing on these impactful practices, SMEs can drive operational improvements, enhance their competitiveness, and contribute to the overall economic development of Malaysia.

In addition, this study was based on real-world applications. The research study bridges the gap between theoretical concepts and practical applications in supply chain

management for SMEs in Malaysia. By offering hands-on recommendations grounded in empirical findings, the study ensures its relevance and adaptability in real-world business contexts. This enables SMEs to implement effective supply chain strategies that result in tangible performance improvements.

In conclusion, the research's practical contributions provide actionable guidance, opportunities for transformation, the identification of impactful practices, and facilitate the real-world application of supply chain management strategies for Malaysian SMEs, especially for manufacturing. By implementing the insights and recommendations from the study, SMEs can enhance their competitiveness, improve their operational efficiency, and contribute to the economic growth of Malaysia's manufacturing sector.

5.5 Limitations of Study

The study of "The Effects of Supply Chain Management Practices on Manufacturing Performance in Small and Medium Enterprises in Malaysia," has certain limitations.

i. Time Constraints

The researcher was required to complete the study within a timeframe of 3–4 months, which may have limited the scope and depth of data collection and analysis. This constraint could have impacted the research's thoroughness and ability to uncover significant findings that may have emerged over a longer period of time.

ii. Financial Limits

The study might have faced financial constraints that could have impacted the scope of data collection, the availability of research resources, and the application of specific research methodologies. Limited financial resources

may have restricted the researcher's ability to access certain data sources or conduct extensive data analysis.

iii. **Sample Influence**

The study's sample selection may have influenced its findings. The sample's representativeness and generalizability to the broader population of Malaysian SMEs may be a limitation, affecting the external validity of the study's results.

iv. **Research Scope**

Despite efforts to define the research scope, the complexity of supply chain management practices and manufacturing performance in Malaysian SMEs may present challenges in fully capturing all relevant factors within the study. The scope definition may have influenced the depth and breadth of the research findings.

v. **Data Collection Challenges**

The study may have faced challenges related to data collection methods, accuracy, and validity. Ensuring the reliability and validity of the data collected is crucial for drawing accurate conclusions, and limitations in data collection processes could impact the robustness of the study's findings.

vi. **Generalizability**

The study's findings may have limitations in terms of generalizability beyond the Malaysian SME context. Factors unique to the Malaysian business environment and industry practices may restrict the applicability of the study's results to SMEs in other regions or industries.

In summary, the study "The Effects of Supply Chain Management Practices on Manufacturing Performance in Small and Medium Enterprises in Malaysia" faces

several challenges, including a shortage of time, funds, and a representative sample. There were also problems with defining the study's scope, collecting data, and making the results general. These limitations should be considered when interpreting the research's findings and implications.

5.6 Direction for Future Research

According to the study, future research should focus on the following areas:

Researchers are conducting longitudinal studies to track the impact of supply chain management practices on manufacturing performance over an extended period of time. Long-term research can provide insights into the sustainability and long-term effects of implementing specific SCM strategies in Malaysia's SMEs. The study is also exploring the process of obtaining data from external sources to bolster its conclusions. Incorporating data from industry databases, government reports, or other relevant sources can enhance the depth and breadth of research insights into SCM practices and manufacturing performance in SMEs.

Furthermore, in this study, researchers are conducting comparative analyses with SMEs in other countries or regions to understand how supply chain management practices vary across different contexts and their impact on manufacturing performance. The comparative studies can also provide valuable insights for benchmarking and best practice identification.

Moreover, researchers are currently investigating the role of technology integration in supply chain management practices and its influence on SMEs' manufacturing performance. Future research could focus on the adoption of advanced technologies, such as IoT, AI, and blockchain, to optimise SCM processes and enhance

operational efficiency. The researcher is also investigating the integration of sustainability practices into supply chain management strategies and assessing their impact on SMEs' manufacturing performance. Research on sustainable supply chain practices can contribute to environmental responsibility and long-term competitiveness for SMEs.

Last but not least, the researchers are examining the effectiveness of risk management strategies in SMEs' supply chain operations and their impact on manufacturing performance. Future research could delve into identifying and mitigating supply chain risks to enhance resilience and performance outcomes.

By addressing these future research directions, scholars and practitioners can further advance their understanding of supply chain management practices and their impact on manufacturing performance in SMEs in Malaysia. Conducting research in these areas can lead to valuable insights and practical implications, as well as contributing to the continuous improvement of SCM strategies for SMEs.

5.7 Conclusion

In summary, this study has yielded significant findings about the impact of supply chain strategies on the manufacturing performance of small and medium-sized enterprises (SMEs). This study has demonstrated that the integration of supply chain strategy, integration, and information management are powerful factors that significantly influence manufacturing performance. This research enhances the existing literature by offering a more profound comprehension of the underlying mechanisms and routes through which these variables impact performance.

Furthermore, this has practical ramifications because it emphasizes the need for researchers and supply chain professionals in Malaysia's manufacturing industry to give priority to these practices. Nevertheless, additional investigation is required to address the limitations of this study, including the implementation of longitudinal studies and the acquisition of data from external sources. Overall, this study establishes a favourable correlation between supply chain management techniques and manufacturing performance. The researcher was anticipate that this research was assist small and medium-sized enterprises (SMEs) in Malaysia to enhance their performance in the future.



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APPENDIX A



Universiti Utara Malaysia

Section 1 of 5

Research Questionnaires Survey

B I U  

Dear Respondents,

My name is Donnathly Michellyn Anak Halen. I am a Master's student at the University of Utara Malaysia (UUM). I am currently in my final semester and conducting my final year project (thesis). Associate Professor Dr. Halim Mad Lazim supervised my research, "The Effects of Supply Chain Management Practices on Manufacturing Performance (SMEs) in Malaysia."

Thank you in advance for participating in my research study. Your valuable insights are crucial to my research. The questionnaires will be about a short demographic about the respondent and supply chain practices in your organization. Please take a few minutes to complete the following questionnaires, providing honest and thoughtful responses. Your feedback will greatly contribute to the success of my research.

Your privacy is important to me. We will treat all the information you provide in the questionnaires with the utmost confidentiality. Please feel free to express your opinions openly and honestly. Thank you.

Donnathly Michellyn Anak Halen
donnathymichellyn94@gmail.com
014-9903342

Section A: Demographic *

Please click the answer

1. What is your gender?

- ☐ Male
- ☐ Female

2. What is your race? *

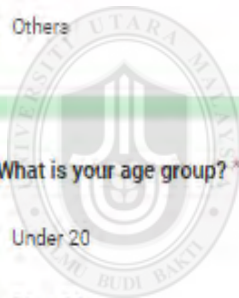
- ☐ Malay
- ☐ Chinese
- ☐ Indian
- ☐ Others

3. What is your age group? *

- ☐ Under 20
- ☐ 21 to 30
- ☐ 31 to 40
- ☐ 41 and over

4. What is your marital status? *

- ☐ Married
- ☐ Single
- ☐ Others



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5. What is your highest level of education achieved? *

- ☐ Secondary School
- ☐ Diploma
- ☐ Bachelor's Degree
- ☐ Master's Degree and above

6. What is your designation? *

- ☐ Director/Senior Manager
- ☐ Manager/Assistant Manager
- ☐ Senior Executive/Executive
- ☐ Others

7. How long your organization was tenure? *

- ☐ 1 - 5 years
- ☐ 5.1 - 10 years
- ☐ 10.1 to 15 years
- ☐ 15.1 to 20 years
- ☐ > 20 years

8. What is your primary business? *

- ☐ Original Equipment Manufacturer (OEM)
- ☐ Electronic Manufacturing
- ☐ Services (EMS)
- ☐ Supporting Industry

9. What types of your organization ownerships? *

- ☐ Fully Malaysian
- ☐ Local and Foreign Joint Venture
- ☐ Fully Foreign Owned
- ☐ Others



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10. Which origin country of your organization? *

- ☐ Malaysian
- ☐ Asian Country
- ☐ Europe/America

Section B (Independent Variables)



Please indicate the extent to which your organizations strongly agree, agree, neutral, disagree and strongly disagree with the statement presented by choosing the linear scale.

Note. Supply Chain Management (SCM) practices encompass a range of activities and strategies that organizations employ to manage the flow of goods, information, and finances as products or services move from suppliers to manufacturers to wholesalers to retailers to consumers. Effective SCM practices are crucial for optimizing efficiency, reducing costs, and ensuring customer satisfaction.

Supply Chain Strategy (SCS) *

When choosing suppliers, our company place the highest priority on quality.

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our main suppliers are involved in our programmes for continually development. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We engage with clients on a regular basis to establish expectations for responsiveness, credibility, and other factors. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We assess the value of the relationship with our clients on a regular basis. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We notify each other with trading partners on events or developments that could have an impact on the projects. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Section 3 of 5

Supply Chain Integration (SCI)



Description (optional)

We perceive that the integration of enterprise applications among internal functions influence supply chain management processes within our organization. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We frequently utilize real-time searching of inventory levels as part of our supply chain management practices. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We frequently participate in interdepartmental meetings aimed at enhancing the integration of supply chain management within our organization. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We often employ cross-functional teams in process improvement initiatives as a means of integrating supply chain management practices. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

The level of real-time integration supports our business operations. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our firm establish more frequent contact with each other in supply chain. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our firm create a compatible communication and information system in supply chain. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our firm extends its supply chain beyond its customers/suppliers. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our firm participates in the marketing efforts of its customers. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our firm participates in the sourcing decisions of its suppliers. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Section 4 of 5

Supply Chain Information Management (SCIM)

Description (optional)

We disseminate the information along the supply chain timely. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We link the information systems so that each member of supply chain knows each other's requirement and status *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We practice quick information flows along the supply chain *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Accurate information is usually available for decision making in our organization *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

...

We join production planning and scheduling among supplier, manufacturing, marketing and distributor *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Section B (Dependable Variable)



Manufacturing Performance

Please indicate the extent to which your organization strongly agree, agree, neutral, disagree or strongly disagree with the statements presented by circling.

Our company can quickly modify products to meet our major customer's requirements. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our business can quickly release new products into the market. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our business can adapt quickly to meet consumer demand. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Our business has an outstanding track record of on-time deliveries to our major client. *

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

We have a short lead time for completing orders. *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

We focus on promptness in solving customer complaints. *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

We have high speed order fulfilment. *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

We have high manufacturing throughput time. *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

We manage to meet the delivery due date. *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

We able to change delivery date. *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

★

We able to change volume output.

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

Thank you for taking the time to share your valuable insights with us. Your thoughtful responses are instrumental in shaping our research. I truly appreciate your participation, and your input will contribute significantly to the success of my study.

Rest assured that all the information you provided in this questionnaire will be treated with the utmost confidentiality. Thank you for your time and valuable contribution.

Description (optional)



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APPENDIX B

THE EFFECTS OF SUPPLY CHAIN MANAGEMENT PRACTICES ON SMES MANUFACTURING PERFORMANCE IN MALAYSIA

ORIGINALITY REPORT

19%	12%	17%	5%
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