# THE RELATIONSHIP BETWEEN SUPPLIER ASSESSMENT, COLLABORATIVE GOAL SETTING AND PERFORMANCE MONITORING ON MALAYSIAN AUTOMOTIVE MANUFACTURING PERFORMANCE

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**Abstract**

The Malaysian automotive industry plays a critical role in national economic development, yet faces persistent challenges in quality, efficiency, and global competitiveness. Supplier Development Programs (SDPs) have emerged as strategic initiatives aimed at enhancing the capabilities and performance of suppliers to support manufacturing excellence. This study investigates the impact of three key SDP components which are supplier assessment, collaborative goal setting, and performance monitoring on automotive manufacturing performance in the Malaysian automotive sector. Utilizing a quantitative research approach, data were collected through structured questionnaires from industry professionals involved in SDPs across automotive manufacturing firms. The findings reveal positive relationships between each SDP component and automotive manufacturing performance indicators, including quality, cost efficiency, and lead time. The study emphasizes the importance of aligning supplier development strategies with operational goals to foster sustainable improvement and competitive advantage. These insights contribute to both academic literature and practical applications, guiding manufacturers and policymakers in optimizing supplier engagement for enhanced manufacturing outcomes.



**Keywords**: *Supplier Development Programs, Automotive manufacturing performance, Supplier Assessment, Collaborative Goal Setting, Performance Monitoring*

**Abstrak**

Industri automotif Malaysia memainkan peranan penting dalam pembangunan ekonomi negara, namun masih menghadapi cabaran berterusan dalam aspek kualiti, kecekapan, dan daya saing global. Program Pembangunan Pembekal (SDP) telah muncul sebagai inisiatif strategik untuk meningkatkan keupayaan dan prestasi pembekal bagi menyokong kecemerlangan dalam pembuatan. Kajian ini meneliti kesan tiga komponen utama SDP iaitu penilaian pembekal, penetapan matlamat secara kolaboratif, dan pemantauan pembekal terhadap prestasi pembuatan dalam sektor automotif Malaysia. Pendekatan penyelidikan kuantitatif telah digunakan dengan pengumpulan data melalui soal selidik berstruktur daripada profesional industri yang terlibat dalam SDP di syarikat pembuatan automotif. Dapatan kajian menunjukkan hubungan yang signifikan dan positif antara setiap komponen SDP dengan indikator prestasi pembuatan termasuk kualiti, kecekapan kos, dan masa penghantaran. Kajian ini menekankan kepentingan penjajaran strategi pembangunan pembekal dengan matlamat operasi bagi mencapai peningkatan mampan dan kelebihan daya saing. Penemuan ini menyumbang kepada literatur akademik dan aplikasi praktikal dalam membantu pengeluar dan penggubal dasar mengoptimumkan penglibatan pembekal untuk hasil pembuatan yang lebih baik.



**Kata Kunci:** *Program Pembangunan Pembekal, Prestasi Pembuatan,, Penilaian Pembekal, Penetapan Matlamat Kolaboratif, Pemantauan Pembekal*

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## List of Abbreviations

| | |
|---|---|
| ASEAN | Association of Southeast Asian Nations |
| AFTA | ASEAN Free Trade Area |
| EV | Electric Vehicle |
| FDI | Foreign Direct Investment |
| GDP | Gross Domestic Product |
| KPI | Key Performance Indicator |
| MP | Automotive manufacturing performance |
| OEM | Original Equipment Manufacturer |
| RBV | Resource-Based View |
| SDP | Supplier Development Program |
| SDPs | Supplier Development Programs |
| SME | Small and Medium-sized Enterprise |
| SPSS | Statistical Package for the Social Sciences |
| SRM | Supplier Relationship Management |
| TCE | Transaction Cost Economics |
| TNC | Transnational Corporation |
| TQM | Total Quality Management |
| VRIN | Valuable, Rare, Inimitable, and Non-substitutable |

# CHAPTER 1

# INTRODUCTION

## 1.1 Introduction

This chapter discusses the background of the study, problem statements, research objective, research questions, the scope of the study, and the significance of the study of research.

## 1.2 Background Study

The history of the automotive industry in Malaysia is marked by significant milestones that have shaped its development and growth over the decades.

In the early years, the Malaysian automotive industry was primarily focused on assembly operations. Major Western and Japanese automobile transnational corporations (TNCs) moved their auto assembly production to Malaysia from 1967 to 1977 (Veloso & Kumar, 2024). This era was characterized by a strong reliance on imported vehicle parts, which were assembled locally to meet the rising demand for automobiles.

A major turning point came in the 1980s with the launch of the national car project. In 1983, Perusahaan Otomobil Nasional (Proton) was established, marking Malaysia's first foray into the manufacturing of fully local cars (Anazawa, 2021). Proton's first model, the Proton Saga, was launched in 1985 and quickly became a symbol of national pride and industrial progress (Wong, 2022). This initiative was driven by the Malaysian government under the leadership of Prime Minister Mahathir Mohamad, who envisioned an automotive industry that would contribute to the country's economic development and technological advancement.

Following Proton's success, a second national car company, Perusahaan Otomobil Kedua Sdn. Bhd. (Perodua), was established in 1993 in collaboration with Daihatsu (Anazawa, 2021). Perodua focused on producing compact and fuel-efficient cars, which complemented Proton's offerings and further boosted the domestic automotive market.

Throughout the 1990s and 2000s, the Malaysian automotive industry continued to evolve. Both Proton and Perodua expanded their product lines and technological capabilities. During this period, foreign automotive companies also increased their presence in Malaysia, either through joint ventures or by setting up manufacturing facilities, further diversifying the market and contributing to the industry's growth (Veza et al., 2022).

Today, Malaysia's automotive industry is a crucial part of the country's economy, contributing significantly to industrial output and employment. According to recent data from The Ministry of International Trade and Industry, the industry contributes approximately 4% to Malaysia's Gross Domestic Product (GDP), reflecting its importance in the nation's industrial landscape (Sin et al., 2024). This sector not only fuels economic growth but also stimulates the development of related industries, including manufacturing, logistics, and services as they are under the same roof of the supply chain.

Geographically, the automotive industry in Malaysia is predominantly located around key industrial zones, primarily in the states of Selangor, Penang, Pahang, and Johor. These areas host numerous assembly plants and manufacturing facilities operated by both local and international automotive companies (Nippon Express, 2020). Klang Valley is the central hub of Malaysia's automotive industry and the concentration of headquarters, showrooms, dealerships, and service centers. Penang supports automotive production, particularly in the development of electronic components used in vehicles such as Bosch. DRB-HICOM operates a major automotive complex in Pekan, assembling vehicles for brands such as Mercedes-Benz,

Isuzu, and Suzuki. Johor is emerging as a growing hub for automotive logistics and component manufacturing, leveraging its strategic location near Singapore and port facilities. Klang Valley's central role, Penang's electronics expertise, Pekan's assembly capabilities, and Johor's logistical advantages collectively create a robust industry foundation. The concentration of automotive activities in these areas is supported by well-developed infrastructure, skilled labor, and government incentives designed to attract foreign investment and technology transfer.

The automotive sector stands as a significant pillar of employment in Malaysia, playing a pivotal role in job creation across the nation. In 2008, the automotive manufacturing and assembly sectors, along with the parts and components industry, created close to 50,000 jobs contributing significantly to both direct and indirect job creation. Proton and Perodua employed the majority of workers, accounting for nearly 70% of the total workforce in motor vehicle manufacturing (Anazawa, 2021). The automotive industry provides a variety of jobs, including assembly line workers, engineers, and corporate staff. Assembly line workers at companies like Proton or Perodua help produce vehicles, ensuring quality standards. Engineers focus on designing, developing, and testing new automotive technologies for innovation and efficiency. Corporate staff handle operations, marketing, sales, and other essential business functions to keep the companies competitive and profitable.

This paper looks at the growth of the Malaysian automotive sector from its initial stage of assembly and simple manufacturing systems to the current stage with national endeavors and foreign collaborations. Originally, the automotive industry that emerged relying on the purchase of transnational corporations can be traced back to an important turning point with the creation of Proton in 1983, to cultivate the industrial consciousness of the nation and auto-industrialization but faced with problems such as quality, innovation, and government-dependent (Otaku, 2023). Entering 1993, Perodua was introduced as a collaboration with

Daihatsu which made the production of compact vehicles; however, it also revealed the conflict between cooperation and individual development. The late 1990s saw the opening up of a competitive front to foreign investors thus the importance of effective supplier development programs for local industries. The industry has shown signs of strategic but uneven growth focusing on selected areas such as Klang Valley and Penang. While adopting technology is becoming evident in the sector, workforce capability and skill remain highly critical in supporting innovation and competitiveness (Saari et al., 2021). Overcoming these challenges is crucial for Malaysia's auto industry to compete in the world market that is fast-liberalizing.

The problems it experiences influence its stability and development: these are the challenges that the Malaysian automotive industry. Dependence on importation makes local manufacturers sensitive to external proceedings, which was evidenced by the recent semiconductor issues (Gu et al., 2024). Besides, there is no investment in electric vehicle technology and Malaysia can be left behind in the transition to electric vehicles (Muzir et al., 2022). The others include quality and innovation whereby companies such as Proton experience brand image issues associated with the quality element of the Industry 4.0 solution, and skills deficiency in the existing workforce makes it difficult for them to adopt advanced manufacturing techniques or techniques associated with Industry 4.0. Last but not least, it means that regulatory activities differ from one country to another making it hard for manufacturers, if not impossible to predict their next moves; this shows how important it is for policymakers to come up with stable policies that was enhance growth and innovation. Solving all these problems is crucial to the industry's competitiveness in the world arena.

Proton is Malaysia’s first and only car manufacturing company that has been has been struggling with serious challenges which have affected its expansion and competitiveness. Proton used to have a good market share but in recent years lost ground to local car

manufacturers like Perodua and other widely recognized foreign car makers like Honda, Toyota, etc. as they bring in better technology and variety to their product portfolios (Kok & Siripipatthanakul, 2023; Ng, 2024). Recent Quality problems have worsened the reputation of Proton cars because customers have been perceiving the reliability of some models for some time now (Lio, 2024). Separately, operational mistakes in strategic management concerning product development have emerged as major threats to competitive advantage; this is because the firm reacted rather sluggishly to the growing market demand for sport utility vehicles and electric cars. Management also changes frequently hence causing strategic confusion, and therefore is challenging for the company to achieve a clear and consistent vision. Therefore, for Proton to succeed it has to tackle these complex issues and regain market confidence in the new car industry.

The Malaysian automotive industry has been advantaged through partnerships with global original equipment manufacturers especially the Japanese automobile firms including Daihatsu which has brought in knowledge and technology transfer to local automobile manufacturers like Perodua through its subsidiary of Daihatsu Motor Co., Ltd (Daihatsu Motor Co., Ltd., 2021). However, great challenges are traced to this reliance on foreign expertise especially when promoting the indigenisation of automotive technology. It reduces the industry's research and development local spending, hinders innovation, and results to risk on the supply chain, especially in cases of disruptions such as COVID-19 (Pató et al., 2022). Third, the heavy reliance on FHDs can hamper the development and consolidation of a domestic industry, where players from Malaysia are mostly limited to bundling activities based on their specialized capabilities (Anis et al., 2022). As a result, the government and auto industry stakeholders must invest more in Indigenous technology to boost local innovation and build a competitive domestic auto sector (Monye et al., 2023).

Malaysia's automotive industry and in particular Proton's competitiveness is at the heart of the country's auto industry sustainability. Though domestic-wise it has scored notable achievements, Proton wrestles many problems when attempting to penetrate the global market, with the two major problems being perceived quality and durability (Proton, 2023). Fears of building quality and technology hamper its chances of capturing global consumers, which leads to low overseas market share every year. Further, the carmaker is comparatively slow in adopting changes within the industry including electric vehicles and smart technologies meaning its competitiveness is tame (Veza et al., 2022). A strong domestic focus on strategic management has also limited its export orientation, hence the need to have a sound international strategy. These issues go along the areas of difficulties that Proton is experiencing and thus reveal the general future need for the improvement of the quality of the Malaysian automotive market, the changes in the strategies that the industry has to apply in the conditions of the growing roles of technology as a driving force for development (Shuwuen & Shuwuen, 2024).

Tariff barriers including importing of cars and auto parts were first adopted to protect Proton and build the embryonic auto industry of Malaysia. Whereas these policies protected Proton against foreign competitors and enabled the company to establish brand equity and domestic production capacity, the sustainability of such strategies is now in doubt (Muzir et al., 2022). The use of this method may slow down competition in quality, innovation, and user demands, which are relevant drawbacks among domestic manufacturers (Furceri et al., 2021). With changing trends in global trade, having such protectionist features keeps industries and markets from learning new trends and innovations globally, thereby slowing down growth. In the same manner, the use of trade sanctions from affected countries would further distort the export prospects for Malaysian auto industries (Lee, 2021). So, to move up along the quality for sustained competitiveness, from this protectionist environment of the auto industry in Malaysia, there is a need to change gears for innovation, competition, and open trade. Therefore,

although protectionism gave some support in the early stages, it is clear that further more balanced policy aimed at the stimulation of innovations and collaboration is required to build an efficient and competitive future of the industry in the context of a long-term global change.

The setting up of a national car program in Malaysia such as Proton was meant to boost patriotic feelings, technological as well as industrialization. At first, it had a favourable impact on economic growth in terms of supporting local assembly lines' production, employment opportunities, and other rotary industries the automobile industry has become a major phenomenon contributing to the Gross Domestic Product (GDP) of Nigeria (Otaku, 2023). Thus, however, critics assert that numerous resource commitments on a national car project have diverted resources and energy from potentially more competitive sectors such as electronics and biotechnology, thereby hampering the consolidation of economic diversification and innovation (Raj-Reichert, 2019). The policies that have been implemented for Proton to compete also might hinder competition as well as inhibit change where necessary. Additionally, Monye et al. (2020) point out that the automotive industry's innovative prowess is being threatened by global phenomena such as carbon-free automobiles, and the longevity of annual automobile projects does not seem viable. Last but not least, although has positively shifted industrial development momentum and has engendered nationalism, its efficiency in economic returns and diversification of the nation's economy in terms of competitiveness in the global economy merits critical appraisal.

The Association of Southeast Asian Nations (ASEAN) plays a crucial role in regulating the automotive industry of member countries, including Malaysia, through trade liberalizations such as ASEAN Free Trade Area (AFTA), (Dianzah, 2022). Such agreements also help Malaysian automotive manufacturers to enjoy preferential access to markets of neighbouring countries since tariffs affecting national car makers like Proton and Perodua have been lowered.

However, they also imply that these manufacturers must compete with established automotive industries in other ASEAN countries, which require innovation and efficiency to maintain Their market share (Barus, 2024). Besides, ASEAN trade agreements create cooperation opportunities and openings for investments, so Malaysian firms can build up capabilities through partnerships and regionalization of production networks. They derive from balancing standards among the member states since inconsistent standards hinder trade (Challapalli, 2023). In sum, ASEAN trade agreements offer potential avenues of integration for Malaysia and its automotive manufacturers but the competition, ecological responsibility issues, and relentless global market liberalization pose challenges to sustainable growth and future competitiveness of the Malaysian automotive industry.

The Malaysian automotive industry has also been influenced by globalization and liberalized trade policies in the automotive industry. In response to increasing competition from other Southeast Asian countries such as Thailand and Indonesia where foreign investments are attracted mainly by cheaper labor and efficient supply networks, Malaysia has sought to improve its local supply network and has embraced technology as well as innovation (Lee et al., 2022). The ASEAN Free Trade Area (AFTA) and other commitments have encouraged export opportunities for Malaysian manufacturers, but at the same time have raised the competition which in turn requires enhancements in the quality of goods and business sizing techniques (Sukegawa, 2021). However, the relocation of manufacturing networks raises sustainability issues, and Malaysia needs to increase efficiency and skilled human capital while utilizing geographic location and infrastructure. To sustain long-term growth, the industry needs to adapt to innovation, and take foreign partners and markets beyond ASEAN to find more new markets for exports (Gu et al., 2024). Lastly, enhancing innovation and local development helps Malaysia sustain the automotive industry's global competitiveness.

A few of the shifts it has experienced include the global change strategy like the emergence of electric cars and the application of the use of robots in the manufacturing process. Since many countries worldwide have set targets and goals in the switch from conventional internal combustion engine vehicles to electric and hybrid cars to fight climate change, the challenges are great for Malaysia (Muzir et al., 2022). Some of the major challenges include the requirement of significant investment in charging too much infrastructure, battery development, and local assembly resources. Local automotive companies such as Proton and Perodua have to develop and search for strategic alliances to improve their competitiveness (Zakaria et al., 2023). Thus, only with the help of such shifts, can the government promote this transition and support by policies and incentives. The industry also requires automation and Industry 4.0 technologies to seek efficiency and effectiveness to address the challenges of labor scarcity (Monye et al., 2023). However, the dependency on importing technologies inhibits innovation, and therefore, Malaysia needs to develop research & development and encourage more technology partnerships within academia, startups, and the automotive industry. Thus, by using strategies of LEAP analysis, it is possible to conclude that Malaysia can improve and develop the areas that would amplify its role in the new conditions of increased competitiveness in the global automotive industry.

The automotive industry in the Malaysian market is at a critical juncture where it has major issues when striving for international competitiveness with innovations such as EVs and autonomous driving. Some advancement has been observed in the concept of local assembly and manufacturing but progress to smart technologies has been poor. The industry is highly dependent on foreign technology, equipment, and collaborations, which are worrying signs of its viability (Ling et al., 2020). Moreover, long and winding before it organizes a definite strategy, and complicated procedure for obtaining autonomous driving tech hampers Malaysia's competitive position compared to South Korea, Japanese, and Germany, which have

a perfectly innovative environment (Alanazi, 2023). Exacerbating these factors is enormous competition from some of the Southeast Asia neighbors such as Thailand and Indonesia region which certainly adopt attractive policies for FDI. Malaysia needs to provide more attention to the education and training sector to create human capital, encouraging local companies and research institutions to collaborate, as well as supporting the development of an environment that encourages innovation (Amin et al., 2023). Additionally, building up indigenous skills and maintaining innovativeness was the key to continuously regnant Malaysian competency in the international automotive industry environment.

Lastly, the automotive sector generates jobs in related industries. Parts suppliers need a skilled workforce for manufacturing and quality control. The logistics sector employs drivers, warehouse workers, and coordinators to manage the distribution of vehicles and parts. Service providers like repair shops, maintenance centers, and automotive finance companies also create jobs for vehicle servicing, repairs, and customer support (Helmold, 2021).

In summary, the Malaysian automotive industry continues to navigate a complex landscape shaped by historical milestones, strategic alliances, regional competition, and evolving technological demands. For Malaysia to strengthen its automotive sector, policymakers and industry stakeholders must foster innovation, support skill development, and refine strategic approaches to compete within the fast-evolving global market.

### 1.3 Problem Statement

The automotive industry relies heavily on a complex network of suppliers to maintain high product quality and production efficiency in terms of cost and lead time (Kumar et al., 2020). However, ensuring that suppliers consistently meet strict quality and performance standards is a major challenge. The risks arise when the firm decides to source for new suppliers when the current supplier cannot meet the requirements and standards that align with the

company's policy. They might opt for *"supplier switching",* finding alternative suppliers, and sourcing the product from a range of more capable suppliers (Jafarian et al., 2021).

However, choosing a new supplier comes with its own set of difficulties and uncertainties, such as the complexity and time needed for market research, evaluations, and negotiations, with no guarantee of better performance. Given these uncertainties and the significant costs associated with transitioning to a new supplier, companies often decide to stay with their current suppliers and work collaboratively to address deficiencies (Nyaberi, 2020). Therefore, many companies implement Supplier Development Programs (SDPs) aimed at improving the capabilities and reliability of their suppliers. This approach can involve rewarding and recognizing supplier's performance improvements, collaborating with suppliers in materials improvement, and certification of suppliers (Benton et al., 2020).

Supplier switching, despite being a challenging process if not strategically complex and often capital-intensive, can offer competitive benefits from access gaining value-adding technologies, new capabilities, and expertise resulting in improved product quality, optimum costs, and opportunities for product differentiation (Holma et al., 2021). Lastly, managing the supply base effectively reduces the reliance on a single supplier, this challenges for instance, geopolitical or economic upset, competition that is affordable price as well as better service (Prajogo et al., 2020). When selecting between switching suppliers and continuing with supplier development, firms consider characteristics such as supplier capability shortfall, the possibility of supplier enhancement through training and cooperation, and the costs of switching (Pratono, 2023). If the problems can be categorized as not very severe, and everything can be solved through the development of the supplier relationship, then it is better to continue the relationship. Nonetheless, where a supplier seriously undermines performance and, hence, company norms, switching may be a greater long-run payoff despite its costs.

SDPs are tools that can make the supply base more robust but do not lack potential pitfalls that automotive players have to navigate. The first risk is a high level of investment with unclear profitability; this is because improvements that firms make to their suppliers' capabilities may not be converted into performance increases or competitive advantage, making such investments sunk costs (Dias et al., 2020). Small or less developed suppliers may lack some of the necessary structures and knowledge to optimally reap from development initiatives, which may result in costs being incurred to no avail (Mzougui et al., 2020). A final risk is dependency; a high level of investment in a particular supplier means that sourcing is not very flexible and if the supplier ever experiences difficulties, this could be a problem for the company. To minimize these risks, the firms can perform auditor pre-assessment to determine the supplier's preparedness and conformity to strategic long-term plans which makes for better decision-making and overall SDP strategy execution (Sanci et al., 2021).

Examples from the automotive industry highlight how Supplier Development Programs (SDPs) can work for the better but also about the difficulties. This shows successful implementation by Toyota in buying long-term supplier relationships, investing in the supply base training, quality, and lean manufacturing skills returning a well-performing, trustworthy supply chain that mirrors Toyota (Potter & Wilhelm, 2020). This approach demonstrates that through a well-designed SDP, there is the potential for progressive improvement of the suppliers and win-win development. On the other hand, late 1990s Ford witnessed some risks; while some of its countless supplier investments could not achieve lean manufacturing because of the various shortcomings in their various capacities, thus the need for pre-assessment and baseline capacities for development for such suppliers (Sanci et al., 2021). More recent and similar works like Bai & Satir, (2020) also point out that organizations with inadequate supplier assessments are likely to incur higher costs and also experience underperformance problems to

endorse the importance of adequate planning as well as evaluation to get the right value for money on the investments made towards SDP.

Supplier Development Programs (SDPs) in the automotive industry of Malaysia have not been subject to immense research effort for several reasons. Lack of independence in implementing SDPs is common for Malaysian companies, especially small and medium-sized enterprises, as they depend on foreign technology and expertise since many countries offer cutting-edge competencies (Otaku, 2023). Despite the formulated industry-supportive government policies indorsing Malaysian suppliers, which are acknowledged as positive for growing the suppliers' sector technological and operational competence required for optimum exploitation of SDPs, these government policies have scared buyers from heavy involvement in these programs as the supplier pool is still in development stages (Bakar et al., 2020). Besides, the automotive sector is not large in Malaysia which hampers the possibility of spending more focus and attention on the research and development of SDP as the considerations such as cost and effectiveness become more important (Khan et al., 2021). These factors explain the lack of research on SDP in Malaysia, thus highlighting the importance of research on strategies relevant to Malaysia's industrial environment to improve the performance of local suppliers.

Supplier Development Programs (SDPs) in automotive manufacturing hold a great potential to increase operational performance in lead time, quality as well as cost. It is also established that suppliers' processes can be shortened because the use of SDPs entails undertaking joint training with lean practices to eliminate work waste (El-Khalil & Nader, 2021). Quality enhancements are Applicable in quality assurance training and control leads to the elimination of defects and returns; Toyota has examples of implementing measures that reduce the defects and increase customer satisfaction (Fathurohman et al., 2021). Through its efficient use of technology, SDPs also contribute to cost efficiency by guiding the suppliers to

use appropriate technology that was in the end enable the buying firm to reduce procurement costs. Vital benefits include lead time, defect rate, cost/unit, and fulfillment rate; these help the firms gauge these benefits as well as the effectiveness of particular SDPs in supplier management (Bento et al., 2020).

Supplier Development Programs (SDPs) improve lead time, cost, and quality by improving the suppliers' knowledge, processes, and tools to capture the buying firm standards (Ndanusa & Cross, 2020). In the area of lead time, SDPs apply the lean principle and inventory management systems to accelerate the order cycle for quicker delivery, and better delivery reliability. Cost efficiency also increases because SDPs enhance suppliers' abilities to implement efficient technologies to utilize available resources and viable costs per unit and procurement cost reduction ratios, achieved by (Hoque et al., 2020). Conventional SDP for quality-oriented areas recapitulates good quality provider training and certifications and this can be measured in terms of defects, returns, and first-pass yield as suggested by Bento et al. (2020). A range of business-altering KPIs recommends operational supplier's investment from SDP perspectives, maintaining measurable performance improvements.



Changes are occurring in Supplier Development Programs (SDPs) due to the automotive industry's move towards mainly electric vehicles (EVs) and higher standards of sustainability (Jagani et al., 2024). For EVs, SDPs currently focus on vocational training of batteries and electronics, establishing partnerships for enhanced technological research and development, and recalibrating benchmarks for battery performance and recoupment, durability, and lifespan (Lukin et al., 2022). Essentials of sustainability push SDPs into mainstreaming environmental concerns and assessing suppliers based on the carbon footprint and resource consumption coupled with focusing on developing long-term relationships with suppliers on sustainability (Bohnsack et al., 2020). Implementing changes to these trends in the

context of the utilization of SDPs assists automotive firms in making improvements to supplier performance as well as respond and conforming to contemporary market and ecological conditions to remain viable.

Many automotive manufacturers and suppliers are more conscious that they need to shift to electric vehicles (EVs) and sustainable practices as a result of regulation, demand, and dual relationships with the environment (Althaqafi, 2023). EVs and sustainability have become the major focus of most manufacturers as many are seeking to incorporate them into their businesses by funding research, training their workers, and planning systematically. Supplier Development Programs (SDPs) are also becoming more among these goals to incorporate sustainable sourcing, green technology adoption, and life cycle assessment for dynamic environmental impact (Jagani et al., 2024). The SDPs currently contain firm-specific KPIs for sustainability and enhancing cooperation as well as partnership to spur sustainable supply chain development in the long run (Ramirez-Peña et al., 2020). In addition to the improvement of supplier competencies, the proposed strategy improves manufacturers' leadership in a competitive, demand-booster sustainability market.



Supplier Development Programs (SDPs) are defined as any action taken by a buyer to enhance a supplier's performance and capabilities to meet the buyer's short-term or long-term supply requirements (Finger & Lima-Junior, 2022). Both the buying firm and the supplier engage in this practice to compete in the global market. From the company's viewpoint, it's essential to maintain ongoing engagement with suppliers to address any areas where they may fall short. This not only preserves the long-term relationship with the supplier but also enhances the supplier's ability to work more effectively as a gesture of loyalty and trust.

However, empirical studies highlight that the implementation of supplier development programs often encounters obstacles such as resistance to change, insufficient resources, and

misaligned objectives between manufacturers and suppliers (Bai & Satir, 2020). Addressing these challenges requires a holistic approach that encompasses strategic alignment, continuous communication, and mutual commitment to improvement (Harris, 2020).

While the concept of supplier development has been present in the Malaysian automotive industry for many years, there is limited documentation on its actual implementation, particularly within the established Automotive manufacturing and supplier performance. This gap highlights the need for more attention and research on how supplier development programs are practiced and their impact on automotive manufacturing performance.

### 1.4 Research Questions

To fill the existing knowledge gap, this research question aims to investigate the effect of the Supplier Development Program on Automotive manufacturing performance in the Malaysia Automotive Industry.

a) What is the extent of the Supplier Development Program's impact on automotive manufacturing performance in Malaysian automotive manufacturing organizations?
b) What is the relationship between supplier assessment and automotive manufacturing performance?
c) What is the relationship between performance monitoring and automotive manufacturing performance?
d) What is the relationship between collaborative goal setting and automotive manufacturing performance?

### 1.5 Research Objectives

The research focuses on three main objectives which are:

a) To investigate the extend of Supplier Development Program's impact on Automotive manufacturing performance in Malaysia Automotive manufacturing organizations.

b) To investigate the relationship between supplier assessment and Automotive manufacturing performance?

c) To investigate the relationship between Performance Monitoring and Automotive manufacturing performance.

d) To investigate the relationship between Collaborative Goal Setting and Automotive manufacturing performance.

## 1.6 Significance of Study

In the context of the Malaysian automotive industry, understanding the impact of supplier development programs (SDP) on automotive manufacturing performance is crucial for both theoretical advancements and practical applications. Supplier development programs, which include supplier assessment certification, communication, training and incentives are designed to enhance the capabilities and performance of suppliers (Benton et al., 2020). This study aims to investigate how these programs affect various operational metrics including cost efficiency, product quality and delivery timeliness within the automotive sector in Malaysia.

From a theoretical perspective, this research contributes to the existing body of knowledge by providing empirical evidence on the effectiveness of supplier development programs. It integrates concepts from supply chain management, operations management, and industrial organization theory to explore the dynamic relationships between manufacturers and suppliers. By examining these relationships in the context of the Malaysian automotive industry, the study offers insights into how supplier development can lead to improvements in quality, cost efficiency, delivery performance, and innovation. Theoretical frameworks, such as the Resource-Based View (RBV) and Transaction Cost Economics (TCE), can be applied to

analyse how resource allocation and supplier relationships influence performance outcomes (Ketokivi & Mahoney, 2020).

Practically, this study has significant implications for industry stakeholders, including automotive manufacturers, suppliers, and policymakers. For manufacturers, understanding the impact of supplier development programs can guide strategic decisions on investments in supplier capabilities, ultimately leading to enhanced competitiveness and operational efficiency (Overvest, 2024). Suppliers can leverage these programs to improve their processes, adopt new technologies, and meet stringent quality standards, thereby becoming more reliable partners in the supply chain. Policymakers can use the findings to formulate supportive policies that encourage collaboration and innovation within the industry, promoting sustainable growth. For example, the success of Proton Holdings Berhad supplier development initiatives underscore the practical benefits of such programs, leading to improved supply chain resilience and performance (Proton, 2024).

In conclusion, this study is significant as it bridges theoretical concepts and practical applications, offering a comprehensive understanding of how supplier development programs can enhance automotive manufacturing performance in the Malaysian automotive industry.



**1.7 Scope of Study**

The research objective of the study is to examine the effects of supplier development programs on the performance indicators of manufacturing firms in Malaysia. For this research, key players refer to automotive suppliers in Malaysia, the study assesses the effectiveness of supplier development programs in achieving targeted outcomes relevant to the automotive supply chain including lead time, costs, product quality, and supply chain performance.

Hence, the research's importance is that it offers meaningful insights into supplier development practices to support the specific supplier development efforts to improve

competitive advantage and performance efficiency in the context of intense competition and continuous change in the identified business. The study aims to identify best practices that was score successful in enhancing the key performance of these suppliers, as well as their reliability and better partnership.

The study examines the participant attributes and knowledge concerning supplier development through training, communication, supplier evaluation, and collaborative objectives established between OEMs and first-tier suppliers. To achieve this scope, the study is expected to employ both primary data collection tools of interviews and surveys and secondary data in the form of operations and notational performance data. The results from this data was useful for the assessment of the supplier development programs as well as the impact of these programs on the operational performance of the automotive manufacturing industry in Malaysia directly.

All in all, there is a list of limitations in the study that is worth mentioning although the study is systematic and covers a wide range of issues. First, the study is confined to the Malaysian automobile industry and, therefore may not be universal for other regions or industries. Also, due to the high variability of the automotive industry, likely, some factors that may affect companies' operational performance do not depend on supplier development programs, such as economic shifts, changes in legislation, and the development of technologies.



### 1.8 Definition of Key Term

a) Supplier Development Program (SDP)

Supplier Development Program is defined as any action taken by a buyer to enhance a supplier's performance and capabilities to meet the buyer's short-term or long-term supply requirements (Saghiri & Mirzabeiki, 2021). SDP play a vital role in organization to ensure

the best possile outcomes or deliverables is received from the organization suppliers, vendors, and service providers. Supplier development program I highly encouraged and suggested method to improve every supplier, vendors and service provider to continuously provide their fullest outcome and creating a win-win situation on both parties the organization and to the vendors in longer term goal setting any success achievement.

b) Automotive manufacturing performance (MP)

Automotive manufacturing performance which focuses on several important measures describes how successfully and efficiently an organization uses its resources to accomplish its objectives (De Waal, 2021). Effectiveness evaluates how successfully desired objectives are achieved, whereas efficiency measures the best use of resources. Productivity measures the output in relation to the input, whereas quality guarantees that goods and services fulfil requirements without flaws. While cost management concentrates on keeping costs under control to preserve profitability, timeliness examines the reliability and speed of supply. Customer satisfaction measures how well the organization meets the expectations of its customers, and innovation and flexibility show how well it can adapt and create new goods and services. Enhancing overall competitiveness and accomplishing strategic goals through the identification of inefficiencies, the implementation of process changes, and the utilization of technology and training are all components of improving automotive manufacturing performance.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

This chapter undertakes a comprehensive review of the existing literature on supplier development programs (SDPs), supplier relationship management (SRM), and their impact on automotive manufacturing performance (MP) within the automotive industry. It examines the concepts and definitions of these variables, drawing upon recent research findings to provide a nuanced understanding of their interrelationships. By analysing gaps in the literature, this chapter sets the stage for the current research investigation into the effects of SDPs and SRM on the automotive manufacturing performance of Malaysian automotive companies.

## 2.2 Dependant Variable: Automotive manufacturing performance (MP)

### 2.2.1 Concept and Definition



Automotive manufacturing performance (MP) is a multipronged construct that reflects an organization's ability to effectively and efficiently utilize its resources to achieve its strategic objectives (Gutterman, 2023). Within the automotive industry, automotive manufacturing performance encompasses a broad spectrum of metrics that measures the holistic health and competitiveness of a company.

Efficiency, a cornerstone of operational performance, involves minimizing wastage, optimizing resource utilization, and streamlining processes to reduce costs and enhance productivity. Recent research by Dubey et al. (2023) underscores the significance of lean manufacturing principles, such as just-in-time production and continuous improvement, in driving operational efficiency within automotive manufacturing. By adopting these principles,

companies can reduce inventory levels, minimize production cycle times, and eliminate non-value-added activities, ultimately leading to cost savings and improved productivity.

Quality, another critical dimension of operational performance, focuses on ensuring product conformance to specifications, minimizing defects, and meeting or exceeding customer expectations. Kumar et al. (2022) emphasizes the pivotal role of quality management systems, such as ISO 9001, in achieving superior operational performance. By implementing robust quality control measures, conducting regular audits, and fostering a culture of continuous improvement, automotive companies can enhance product quality, reduce warranty claims, and build stronger customer relationships.

Timeliness is a key aspect of operational performance, particularly in the fast-paced automotive industry. It involves meeting delivery deadlines, reducing lead times, and ensuring reliable order fulfilment. Wong et al. (2021) highlight the importance of time-based competition, which emphasizes the speed and responsiveness of operations, as a critical factor in the automotive industry. Optimizing production schedules means, improving supply chain coordination, and leveraging technology for real-time tracking and monitoring, companies can enhance timeliness and gain a competitive edge.

Flexibility, the fourth dimension of automotive manufacturing performance on the other hand, refers to an organization's ability to adapt to changes in demand, customize products to meet customer needs, and respond quickly to market fluctuations. Zhang & Sharifi (2020) argue that agility and flexibility are essential for maintaining competitiveness in the dynamic automotive industry. By adopting flexible manufacturing systems, fostering a culture of innovation, and building resilient supply chains, companies can effectively respond to evolving customer preferences, emerging technologies, and unforeseen disruptions.

### 2.2.2 Previous Research Findings

Extensive research has explored the determinants of automotive manufacturing performance in the automotive industry. Studies have consistently shown that effective supply chain management practices, technological advancements, and strategic partnerships significantly influence operational outcomes. For instance, (Suurmond et al., 2020) found a positive relationship between supplier development initiatives and improvements in product quality, lead times, and cost reduction. Similarly, Nyaberi (2020) highlights the importance of supplier collaboration in enhancing operational efficiency.

Furthermore, a study developed a framework based on the Supply Chain Operations Reference (SCOR) model, emphasizing planning, manufacturing, and customer service as critical factors in supplier selection. Interestingly, sustainability and delivery were found to be less prioritized in the selection process (Meena et al, 2022). Besides that, research conducted in Nuevo León, Mexico, found that both process quality and product innovation positively impact competitiveness in the automotive manufacturing sector. This suggests that suppliers should invest in quality assurance and innovative product design to enhance their market position (La Rosa et al, 2020).

The research findings emphasize the critical role of supplier selection, quality, innovation, and sustainability in enhancing automotive manufacturing performance in the automotive industry. Effective supplier evaluation frameworks, risk management strategies, and optimization models are essential for improving competitiveness and efficiency. These insights can guide automotive companies in developing strategic partnerships and enhancing their supply chain operations.

## 2.3 Independent Variable 1: Supplier Assessment

### 2.3.1 Concept and Definition

Supplier assessment is a systematic process of evaluating and rating the performance and capabilities of suppliers against predetermined criteria (Giannakis et al., 2020). It involves collecting and analysing data on various aspects of supplier performance, such as quality, delivery, cost, responsiveness, and innovation. The assessment process can be conducted through various methods, including surveys, audits, site visits, and performance data analysis (Brazier et al., 2023).

The primary goal of supplier assessment is to identify strengths and weaknesses in the supplier base, enabling buying firms to make informed decisions about supplier selection, development, and management. By understanding the capabilities and limitations of their suppliers, firms can tailor their supplier development programs (SDPs) to address specific areas for improvement and leverage existing strengths (Rashidi et al., 2020).



### 2.3.2 Previous Research Findings

Research has consistently shown that supplier assessment is a critical component of effective supplier relationship management (SRM) and can significantly impact operational performance. Alghababsheh and Gallear (2020) found that firms that regularly assess their suppliers are more likely to identify and address performance issues proactively, leading to improved supplier performance and stronger buyer-supplier relationships.

In the automotive industry, supplier assessment is particularly important due to the complex nature of the supply chain and the stringent quality requirements. A study by La Rosa et al. (2020) found that automotive manufacturers that implemented rigorous supplier assessment programs experienced significant improvements in product quality, reduced defect rates, and lower warranty costs.

In terms of sustainability, a quantitative analysis using self-assessment questionnaires (SAQ) revealed that supplier sustainability performance is significantly influenced by factors such as headcount and business category, with manufacturing suppliers generally performing better than service providers (Bartos et al, 2022). Similarly, Yoon and Sohn (2024) conducted research about the shift towards electric vehicles (EVs), assessing suppliers' technological adaptability has become crucial. A framework was proposed to evaluate suppliers' adaptability to EV-related technologies using patent portfolio analysis, which helps in understanding the degree of modification required for internal combustion engine vehicle components to be suitable for EVs.

The research findings highlight the complexity and multifaceted nature of supplier assessment in the automotive industry. Methods such as Fuzzy Multi-Criteria Decision Making are employed to address decision-making challenges, while technological adaptability and sustainability are increasingly prioritized. Trust and optimization models play significant roles in enhancing supplier relationships and supply chain efficiency. These insights collectively contribute to a more robust and strategic approach to supplier assessment in the automotive sector.



## 2.4 Independent Variable 2: Collaborative Goal Setting

### 2.4.1 Concept and Definition

Collaborative goal setting is a process in which buying firms and suppliers work together to establish mutually agreed-upon performance targets and objectives. This involves open communication, joint planning, and a shared commitment to achieving common goals (Castañer & Oliveira, 2020). Collaborative goal setting can encompass various aspects of supplier performance, such as quality improvement, cost reduction, lead time reduction, and innovation.

The primary aim of collaborative goal setting is to align the interests of buyers and suppliers, fostering a sense of partnership and shared responsibility for achieving success. By working together to define clear and measurable goals, both parties can focus their efforts on areas that are most critical to the overall performance of the supply chain.

### 2.4.2 Previous Research Findings

Research suggests that collaborative goal setting is a key driver of supplier performance improvement and can significantly impact operational outcomes. A study Zamboni et al. (2020) found that collaborative goal setting is positively associated with increased supplier commitment, improved communication, and enhanced performance.

In the automotive industry, collaborative goal setting has been shown to be effective in driving supplier improvement initiatives. For example, a case study by Farouk et al. (2020) on a major automotive manufacturer revealed that collaborative goal setting led to significant reductions in supplier lead times, improved on-time delivery performance, and enhanced product quality.



Research in the automotive sector highlights the importance of environmental collaboration among supply chain partners to achieve sustainable consumption and production goals. A case study using the Situation-Actor-Process–Learning-Action-Performance (SAP-LAP) model in an Indian automobile firm underscores the strategic significance of collaborating with suppliers, customers, and internal departments to enhance supply chain performance (Mishra et al, 2022). This collaboration is crucial for addressing environmental orientation and sustainable practices.

Collaborative goal setting in the automotive industry involves strategic partnerships and integration across the supply chain. Environmental collaboration, financial performance enhancement through mutual trust and goal congruence, and cross-functional integration are

key elements. Supplier commitment and proactive customer orientation further support innovation and resilience, highlighting the multifaceted nature of collaboration in achieving industry goals.

## 2.5 Independent Variable 3: Performance Monitoring

### 2.5.1 Concept and Definition

Performance monitoring is the ongoing process of tracking and evaluating supplier performance against established goals and objectives. It involves collecting and analyzing data on various performance metrics, such as quality, delivery, cost, and responsiveness (Giannakis et al., 2020). Performance monitoring can be conducted through various methods, including scorecards, dashboards, regular performance reviews, and supplier self-assessments.

The primary purpose of performance monitoring is to provide timely feedback to suppliers, identify potential performance issues, and track progress towards achieving goals. By regularly monitoring supplier performance, buying firms can proactively address problems, identify opportunities for improvement, and ensure that suppliers are meeting their contractual obligations.

### 2.5.2 Previous Research Findings

Research has consistently shown that performance monitoring is a critical component of effective supplier relationship management (SRM) and can significantly impact operational performance. A study by Shafiq et al. (2022) found that firms that regularly monitor supplier performance are more likely to identify and address performance issues proactively, leading to improved supplier performance and stronger buyer-supplier relationships.

In the automotive industry, performance monitoring is essential for ensuring the quality and reliability of components and subassemblies. A study by Priya et al. (2020) found that

automotive manufacturers that implemented robust performance monitoring systems experienced significant reductions in defect rates, improved on-time delivery performance, and lower warranty costs.

Optimizing supplier ratios and evaluating supplier quality are essential for maintaining competitiveness in the automotive industry. A model developed for the Slovak automotive industry focuses on optimizing supplier ratios to minimize risks associated with supply and inventory (Kádárová et al, 2021). Furthermore, a decision support system using multiple criteria decision-making (MCDM) methods and machine learning has been proposed to evaluate supplier quality, providing more reliable assessments than traditional methods (Ma & Li, 2024).

In terms of financial performance, research has shown that financial performance and firm efficiency are critical in the automotive supply chain. A study using Data Envelopment Analysis (DEA) assessed the efficiency of automotive manufacturers and their suppliers, focusing on cost levels, capital requirements, sales growth, and profit (Brandenburg & Hahn, 2021). The study highlighted the importance of understanding the financial inputs and outputs to evaluate firm efficiency over time, particularly in the context of global economic fluctuations

The research highlights the multifaceted nature of performance monitoring and supplier evaluation in the automotive industry. Performance monitoring not only enhance supplier selection and evaluation but also align with broader sustainability and efficiency goals in the industry.

## 2.6 Underpinning Theories

### 2.6.1 Resource-Based View (RBV)

The Resource-Based View (RBV) is a theoretical framework that emphasizes the role of a firm's internal resources and capabilities in achieving a sustainable competitive advantage

(Freeman et al., 2021). According to RBV, resources that are valuable, rare, inimitable, and non-substitutable (VRIN) enable firms to outperform their rivals in the long run. In the context of this research, supplier development programs (SDPs) can be seen as a strategic investment in developing and enhancing a firm's external resources, namely its supplier network.

By investing in SDPs, buying firms can cultivate a network of reliable suppliers with unique competencies and capabilities. These enhanced supplier capabilities can be considered valuable resources for the buying firm, as they contribute to improved product quality, reduced lead times, and increased responsiveness to market demands. Moreover, if these capabilities are rare and difficult for competitors to imitate or substitute, they can provide a sustainable competitive advantage for the buying firm (Gerhart & Feng, 2021).

Recent research provides empirical support for the relevance of RBV in explaining the impact of SDPs on operational performance. Wilhelm et al. (2022) conducted a study on manufacturing firms and found that those that implemented SDPs to develop suppliers' technological capabilities achieved higher levels of innovation and product quality. This suggests that by enhancing suppliers' technological resources through SDPs, buying firms can gain access to innovative solutions and differentiate their products in the marketplace.

Similarly, Foerstl et al. (2021) examined the relationship between SDP investments and automotive manufacturing performance in the automotive industry. Their findings revealed that investments in supplier relationship-specific assets, such as joint product development and knowledge sharing, lead to improved operational efficiency and cost reduction. This suggests that SDPs can create valuable and inimitable resources in the form of strong, collaborative supplier relationships that contribute to superior operational performance.

Overall, the Resource-Based View provides a compelling theoretical framework for understanding how SDPs can enhance a firm's resource base and contribute to sustainable

competitive advantage. By investing in supplier capabilities through SDPs, firms can not only improve the performance of their suppliers but also strengthen their own internal resources, leading to improved automotive manufacturing performance and long-term success in the competitive automotive industry.

### 2.6.2 Supply Chain Theory

Supply Chain Theory is a framework that encompasses various models and theories aimed at understanding and improving the management of supply chains. It involves the planning, production, and management of goods, services, and information from the point of origin to the point of consumption, coordinating complex patterns of movement and transportation, shipment and receipt, import and export operations, warehousing, inventory management, procurement, production planning, and customer service (Moldovan, 2024).

Supply Chain Theory, particularly Sustainable Supply Chain Management (SSCM), plays a crucial role in achieving sustainable development by integrating environmental, social, and economic sustainability into supply chain operations. This integration helps reduce environmental impacts, improve social conditions, and enhance economic performance, thereby contributing to the SDPs (Filho et al, 2023).

Research conducted by Meena et al (2022) highlighted that supplier selection frameworks that incorporate sustainability and customer service, alongside traditional supply chain functions, are vital for optimizing supply chain performance. Operational efficiency measures are prioritized over cost considerations in supplier selection, highlighting the importance of strategic alignment with corporate goals.

Furthermore, proactive resilience strategies are essential in managing supply chain risks, which significantly affect performance. The automotive industry benefits from these strategies

by mitigating the impacts of demand, logistics, production, and supply risks, thereby maintaining business continuity and achieving sustainability goals (Jum'a et al, 2024).

In summary, the relationship between Supply Chain Theory and automotive manufacturing performance in the automotive industry is characterized by the integration of flexibility, resilience, technology, and sustainability. These elements collectively enhance supply chain performance, ensuring competitiveness and sustainability in a rapidly evolving market.

## 2.7 Gap in the Literature

While existing research has explored the individual effects of supplier assessment, collaborative goal setting, and performance monitoring on operational performance, there remains a gap in understanding the combined and interactive effects of these practices within the Malaysian automotive industry (Miles, 2017). Specifically, limited research has investigated how these three components of supplier development programs (SDPs) work together to influence operational outcomes such as quality, cost efficiency, flexibility, and lead time. Additionally, most studies have focused on large multinational corporations, leaving a gap in understanding the impact of SDPs on small and medium-sized enterprises (SMEs) in the Malaysian automotive sector.

Furthermore, many prior studies have adopted a fragmented approach, analysing each component of SDP in isolation rather than through an integrative lens that reflects real-world implementation (Bai & Satir, 2020; Potter & Wilhelm, 2020). This disjointed perspective fails to capture the synergistic effect that can arise when supplier assessment, collaborative goal setting, and performance monitoring are deployed simultaneously as a strategic package.

Moreover, although frameworks such as the Resource-Based View (RBV) have been applied to understand supplier capabilities (Wilhelm et al., 2022; Foerstl et al., 2021), their

application in the context of SDP-driven automotive manufacturing performance in Malaysian SMEs remains under-explored. The RBV suggests that resources must be valuable, rare, inimitable, and non-substitutable to provide a competitive advantage. Yet, how Malaysian automotive SMEs leverage SDP practices to create such strategic supplier relationships remains poorly understood.

In addition, current research often overlooks contextual variables unique to Malaysia's automotive ecosystem, such as dependency on foreign technology (Otaku, 2023), limited R&D investment (Monye et al., 2023), and the evolving shift toward sustainability and EV supply chains (Jagani et al., 2024; Lukin et al., 2022). These challenges further highlight the need for context-specific studies that investigate how SDP practices can be tailored to enhance local supplier capabilities and support the sector's long-term competitiveness.

Finally, while studies in developed markets have documented success stories in implementing SDPs, such as Toyota's lean-based supplier initiatives (Potter & Wilhelm, 2020), there is a lack of empirical research validating whether similar models yield comparable results in emerging economies like Malaysia. This is particularly critical as SMEs often operate with constrained resources and limited technical capacity, potentially affecting the feasibility and success of comprehensive SDP implementation (Mzougui et al., 2020).

Therefore, this study addresses a crucial research gap by examining the collective influence of supplier assessment, collaborative goal setting, and performance monitoring on automotive manufacturing performance within Malaysian automotive firms. The findings are expected to provide valuable insights into how integrated supplier development strategies can enhance operational performance in a resource-constrained, transitional market context.

## 2.8 Chapter Summary

This chapter has provided a comprehensive review of the literature on operational performance, supplier assessment, collaborative goal setting, performance monitoring, and the theoretical frameworks of the resource-based view (RBV). The chapter has highlighted the importance of these concepts in the context of the Malaysian automotive industry and identified a gap in the literature regarding the combined effects of supplier assessment, collaborative goal setting, and performance monitoring on operational performance, particularly among SMEs. The next chapter was outline the research methodology that was employed to address this gap and investigate the research questions.

# CHAPTER 3

# METHODOLOGY

## 3.1 Introduction

This chapter outlines the research methodology for examining the effects of supplier development on the automotive manufacturing performance of the automotive industry in Malaysia. It discusses the research design, target population, sampling design and sample size, data collection procedures and instruments, determination of reliability and validity as well as data analysis techniques to draw conclusion.

## 3.2 Framework Discussion

In the contemporary automotive industry, Supplier Development Programs (SDPs) play a pivotal role in enhancing the automotive manufacturing performance of companies. This study focuses on the effects of SDPs within Malaysia Automotive Manufacturing industry, a key player in the Malaysian automotive sector. By examining how specific components of SDP such as supplier assessment, performance monitoring, and collaborative goal setting are influencing automotive manufacturing performance metrics such as cost efficiency, lead time, and quality, this research aims to provide a comprehensive understanding of the strategic benefits these programs offer.

### 3.2.1 Conceptual Framework

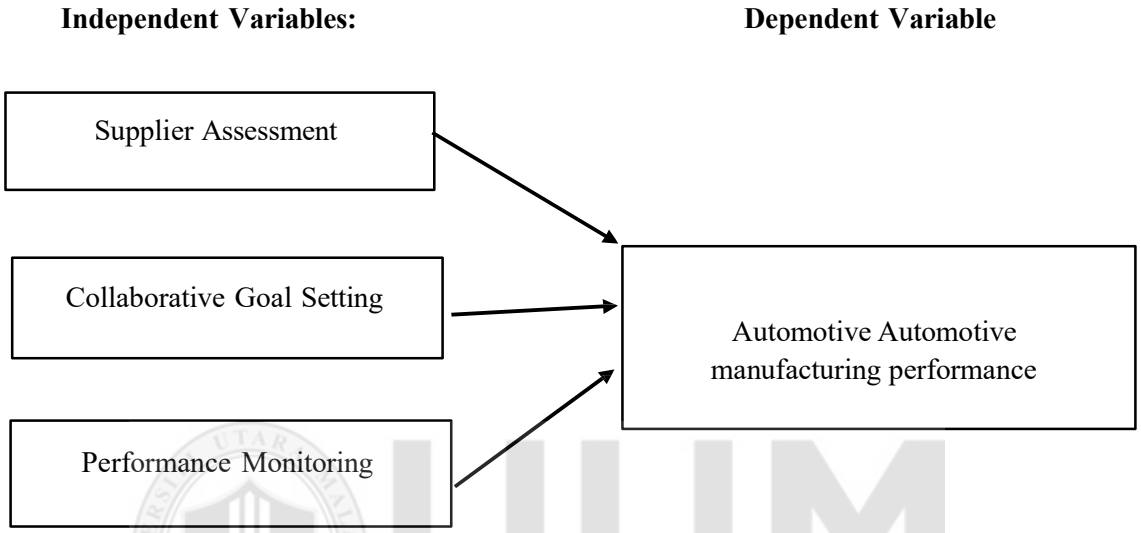


*Figure 3.1: The Conceptual Framework of SDP and MP*



The conceptual framework for this study is designed to explain the relationships between Supplier Development Programs (SDPs) and automotive manufacturing performance in the Malaysia Automotive Manufacturing industry. The primary components of SDPs examined in this framework are supplier assessment, performance monitoring, and collaborative goal setting. These components are posited as independent variables that directly influence key automotive manufacturing performance metrics, including cost efficiency, lead time, and quality. By structuring the framework in this manner, the study aims to explore how targeted supplier development initiatives can lead to measurable improvements in operational outcomes. The framework hypothesizes that effective supplier assessment ensures the selection and evaluation of capable suppliers, performance monitoring facilitates continuous

improvement and accountability, and collaborative goal setting aligns supplier efforts with organizational objectives, thereby enhancing overall operational performance.

### 3.2.2 Theoretical Framework

The theoretical underpinning of this study is grounded in several key theories that explain the dynamics between supplier development and operational performance. Resource-Based View (RBV) theory is central to this framework, positing that a firm's competitive advantage is derived from its ability to effectively manage and develop its internal and external resources, including supplier relationships (Freeman et al., 2021). SDPs are seen as strategic initiatives that leverage suppliers' capabilities to enhance the firm's resource base, thereby improving operational performance.

Another theory is Supply Chain Theory which involves the study and application of strategies to efficiently manage the flow of goods, information, and finances from the initial supplier to the final customer. The theory is crucial for enhancing organizational competitiveness and is increasingly integrated with sustainability considerations to address environmental, social, and economic impacts (Panigrahi et al, 2019). Supply chain theory and SDPs are interconnected through the implementation of SSCM, which aligns supply chain activities with sustainable development goals, thereby promoting a balance between economic growth, environmental stewardship, and social well-being.

Furthermore, the framework incorporates principles from Total Quality Management (TQM) and Lean Manufacturing, which emphasize continuous improvement, waste reduction, and quality enhancement (Deming, 1986; Yadav et al., 2020). These principles align with the goals of SDPs to foster a culture of excellence and innovation within the supply chain. The integration of these theories provides a comprehensive understanding of how SDPs impact

automotive manufacturing performance through improved resource management, cost efficiency, and quality enhancement. This theoretical framework guides the study in investigating the specific mechanisms through which SDPs influence automotive manufacturing performance metrics, offering valuable insights into the strategic benefits of supplier development in the Malaysia Automotive industry.

By integrating both conceptual and theoretical frameworks, this study seeks to offer a holistic view of how Supplier Development Programs influence automotive manufacturing performance within Malaysia Automotive Manufacturing industry. The application of RBV, TQM, and Lean Manufacturing principles provides a robust theoretical foundation to understand the multifaceted impacts of SDPs. This comprehensive approach not only highlights the direct benefits of improved cost efficiency, lead time, and quality but also emphasizes the strategic importance of fostering strong supplier relationships and continuous improvement. Ultimately, the insights gained from this research was contribute to enhancing SDP strategies, thereby driving operational excellence and competitive advantage in the automotive industry.



### 3.3 Hypotheses Development

The hypothesis development for this study focuses on exploring the impact of Supplier Development Programs (SDPs) on the automotive manufacturing performance of Malaysia Automotive Manufacturing industry in Malaysia. This section outlines the hypotheses developed to explore the specific impacts of supplier assessment, collaborative goal-setting, performance monitoring, and the moderating effect of supplier engagement on automotive manufacturing performance within Malaysia Automotive Manufacturing industry.

*Table 3.1: Variable Alpha Values*

| Variable | Items | Scale | Source | Cronbach Alpha Values |
|---|---|---|---|---|
| Demographic | 5 | Ordinal and Nominal | Researcher (Own Work) | - |
| Supplier Assessment (IV1) | 5 | Likert Scale (Interval) | Gandhi et al. (2018) | 0.78 to 0.82 |
| Performance Monitoring (IV2) | 5 | Likert Scale (Interval) | Malapane and Ndlovu (2024) | 0.61 to 0.81 |
| Collaborative Goal Setting (IV3) | 5 | Likert Scale (Interval) | Xu et al. (2023) | 0.72 to 0.88 |
| Manufacturing Operational Performance (DV) | 5 | Likert Scale (Interval) | Lizarelli et al. (2020) | 0.73 to 0.82 |

*Table 3.2: Questionnaires*

| Variables | Questionnaires | Sources |
|---|---|---|
| Demographic | What is your organization size?<br>What is your highest level of education achieved?<br>What is your designation?<br>How long your organization was tenure?<br>What types of your organization ownerships? | Van De Brake et al. (2019)<br>Mardikaningsih (2020)<br>Nikolić et al. (2023) |
| Supplier Assessment (IV1) | Our company consistently monitors the adherence of suppliers to established standards. | Zhang et al. (2021) |
| | We routinely assess the technological strengths and innovation capacity of our suppliers. | Kronemeyer et al. (2022) |
| | We prioritize suppliers with strong operational stability and long-term viability. | Durach et al. (2023) |
| | We regularly examine supplier adherence to environmental and social responsibility guidelines. | Bisetti et al. (2023) |
| | Our supplier evaluation process effectively identifies dependable and trustworthy partners. | Makinde et al. (2020) |
| Collaborative Goal Setting (IV2) | Our company frequently engages in joint goal-setting activities with suppliers. | Nurhayati et al. (2023) |
| | Suppliers are actively involved in setting quality improvement targets. | Fu et al. (2021) |
| | We effectively collaborate with suppliers to set and achieve cost reduction goals. | Yang et al. (2024) |

| | | |
|---|---|---|
| | Our strategic objectives are well-aligned with those of key suppliers. | Chang et al. (2022) |
| | Supplier input is crucial in formulating new product development goals. | Tseng et al. (2022) |
| Performance Monitoring (IV3) | Our company regularly monitors supplier performance metrics. | Changalima et al. (2023) |
| | We track on-time delivery performance from suppliers consistently. | Santoso et al. (2022) |
| | Our monitoring process effectively identifies defect rates in products supplied by partners. | Bernard et al. (2021) |
| | Key performance indicators (KPIs) are extensively used to evaluate supplier performance. | Petkova et al. (2023) |
| | We frequently conduct performance review meetings with suppliers to discuss issues and improvements. | Manthei et al. (2023) |
| Automotive manufacturing performance (DV) | Supplier collaboration has significantly improved our manufacturing efficiency. | Liu et al. (2020) |
| | We regularly measure the impact of supplier relationships on overall operational performance. | Anh and Ha (2020) |
| | The quality of supplier products positively impacts our company's production output. | Sallam and Mohamed (2023) |
| | On-time delivery from suppliers has greatly influenced our company's production schedules. | Carvalho et al. (2022) |
| | Supplier innovation has contributed to improvements in our manufacturing processes. | Modungwa et al. (2020) |

### 3.3.1 Supplier Assessment

The first hypothesis focuses on supplier assessment, a fundamental component of Supplier Development Programs (SDPs) that involves a systematic evaluation of suppliers' capabilities, performance metrics, and adherence to quality standards. This process is crucial for ensuring Malaysia Automotive Manufacturing industry can select and maintain a network of suppliers that are not only reliable but also capable of meeting the company's stringent requirements. Supplier assessment encompasses various aspects, including the evaluation of production processes, financial health, technological capabilities, and compliance with industry

regulations (Saputro et al., 2022). By conducting thorough assessments, Automotive industries can identify potential risks, areas for improvement, and opportunities for strategic collaboration, thereby enhancing the overall robustness of its supply chain.

Effective supplier assessment ensures that Malaysia Automotive Manufacturing industry consistently receives high-quality products and services from its suppliers. This rigorous evaluation process helps in identifying suppliers who excel in quality control and can meet the company's specifications and standards (Sallam & Mohamed, 2023). As a result, Malaysia Automotive Manufacturing industry can reduce the occurrence of defects, delays, and other supply chain disruptions that could negatively impact operational performance. Additionally, ongoing supplier assessments allow for continuous monitoring and improvement, ensuring that suppliers remain aligned with the company's evolving needs and expectations (Rashidi et al., 2020). Consequently, the hypothesis posits that rigorous supplier assessment positively influences the quality of supplies, leading to improved operational performance. By maintaining high standards through meticulous supplier evaluations, Malaysia Automotive Manufacturing industry can achieve greater efficiency, reliability, and overall competitiveness in the automotive industry.



*H1: There is a significant relationship between Supplier Assessment and Automotive manufacturing performance*

### 3.3.2 Collaborative Goal Setting

Collaborative goal-setting between Malaysia Automotive Manufacturing industry and its suppliers involves a structured approach to establishing shared objectives that align with the company's strategic direction. This process is essential for fostering a partnership built on mutual understanding and commitment (Eweje et al., 2020). By collaboratively defining goals,

both parties ensure that supplier activities are not only compliant with operational requirements but also contribute directly to overarching strategic priorities such as cost reduction, quality enhancement, and innovation (Chauhan et al., 2022). This alignment not only enhances clarity and mutual expectations but also promotes proactive communication, efficient coordination of efforts, and effective problem-solving mechanisms throughout the supply chain (Dubey et al., 2020). Ultimately, collaborative goal-setting is expected to cultivate a cohesive and synchronized supply chain ecosystem where all stakeholders are motivated to achieve superior performance together. Hence, it is hypothesized that the practice of collaborative goal-setting significantly enhances alignment between Malaysia Automotive Manufacturing industry and its suppliers, thereby leading to improved operational outcomes.

This collaborative approach not only strengthens relationships but also facilitates the leveraging of supplier capabilities and resources more effectively. By aligning goals, Malaysia Automotive Manufacturing industry ensures that supplier efforts are strategically aligned, minimizing potential conflicts and maximizing synergies across the supply chain (Vosooghidizaji et al., 2019). This proactive alignment not only enhances operational efficiency but also fosters an environment conducive to continuous improvement and innovation (Nguyen et al., 2020). Moreover, by jointly defining objectives and milestones, Malaysia Automotive Manufacturing industry can create a framework for accountability and performance measurement, ensuring that both parties remain focused on achieving mutually beneficial outcomes (Ahearn & Mai, 2023). As such, collaborative goal-setting serves not only as a mechanism for enhancing automotive manufacturing performance but also as a catalyst for long-term sustainability and competitiveness in the automotive industry context.

***H2****: There is a significant relationship between Collaborative goal-setting and Automotive manufacturing performance.*

### 3.3.3 Performance Monitoring

Performance monitoring within Malaysia Automotive Manufacturing industry is integral to maintaining stringent operational standards and optimizing supplier performance. This ongoing process involves systematically tracking, measuring, and evaluating suppliers against predefined benchmarks and contractual obligations (Shafiq et al., 2022). By conducting regular assessments, Malaysia Automotive Manufacturing industry ensures that suppliers consistently meet performance expectations, thereby mitigating risks and enhancing overall operational reliability. Real-time feedback derived from performance monitoring allows prompt identification of issues, facilitating timely corrective actions and adjustments (Lechermeier et al., 2020). This proactive approach not only minimizes disruptions but also fosters a culture of accountability and continuous improvement across the supply chain.

The hypothesized impact of performance monitoring on operational efficiency and effectiveness underscores its strategic importance within SDPs. By systematically monitoring supplier performance, Malaysia Automotive Manufacturing industry aims to achieve sustained enhancements in automotive manufacturing performance metrics such as quality, timeliness, and cost-effectiveness. This hypothesis posits that effective performance monitoring contributes significantly to operational excellence by fostering transparency, responsiveness, and alignment with organizational objectives (Santty et al., 2023). Ultimately, the integration of robust performance monitoring practices is expected to yield tangible improvements in operational outcomes, reinforcing Malaysia Automotive Manufacturing industry competitive position within the dynamic automotive industry landscape in Malaysia.

***H3**: There is a significant relationship between Performance monitoring and automotive manufacturing performance.*

### 3.4 Research Design

This section focuses on exploring the impact of SDPs on automotive manufacturing performance within the Malaysian automotive sector, with a specific emphasis on Malaysia Automotive Manufacturing industry, a prominent player in the industry.

This study adopts a quantitative approach to comprehensively investigate the impacts of Supplier Development Programs (SDPs) within the Malaysian automotive industry. The first component of this approach involves quantitative data collection through structured surveys. These surveys were distributed to a carefully selected group of automotive manufacturers and their respective suppliers actively engaged in SDPs. The primary objective of these surveys is twofold: firstly, to assess the perceived effectiveness of SDPs from the perspective of both manufacturers and suppliers, and secondly, to gather quantitative metrics on various aspects of operational performance. Key performance indicators include cost efficiency measures, quality enhancements, delivery reliability metrics, and the capability to innovate within the supply chain. By gathering this quantitative data, the study aims to establish empirical correlations between participation in SDPs and improvements in automotive manufacturing performance metrics.



In summary, this quantitative approach aims to quantify the impacts of SDPs on operational performance. By focusing on quantitative metrics, the study aims to inform strategic decisions and policy-making related to supplier development strategies, thereby enhancing operational efficiencies and competitive advantage within the Malaysian automotive industry (Tukimin et al., 2020).

### 3.5 Population of Study

The population for this study is derived from key stakeholders within the Malaysian automotive industry, as outlined in the New Industrial Master Plan (NIMP) 2030. According to

the NIMP 2030, Malaysia is currently ranked third in ASEAN for vehicle production and boasts a well-established and growing automotive manufacturing ecosystem. As of the latest data, there are 38 major vehicle manufacturers and assemblers operating in Malaysia, along with 641 registered parts and components manufacturers. This brings the total population relevant to this study to 679 automotive firms.

These firms represent the core of the Malaysian automotive supply chain and play a crucial role in the nation's industrial development, technological advancement, and economic competitiveness. The selected population reflects a broad spectrum of automotive stakeholders, ranging from Original Equipment Manufacturers (OEMs) to Tier-1 and Tier-2 suppliers. These organizations vary in terms of size, capabilities, and technological adoption but are all vital contributors to the national automotive landscape.

The study focuses on participants who are directly involved in supplier development initiatives within their respective organizations. This includes senior-level executives, supply chain managers, SDP (Supplier Development Program) coordinators, quality assurance personnel, and procurement professionals who are actively engaged in decision-making processes and performance monitoring related to supplier relationships. Their insights are critical for understanding how Supplier Development Programs are implemented and how they influence automotive manufacturing performance across key indicators such as quality, cost, lead time, and innovation.

By targeting this defined group of 679 automotive-related manufacturers and suppliers, the study ensures a comprehensive and representative exploration of Supplier Development Program effectiveness in the Malaysian automotive context. This approach also aligns with the industry's strategic focus under the NIMP 2030 on enhancing supplier capabilities,

strengthening local content, and improving overall competitiveness in the ASEAN and global automotive markets.

### 3.6 Sample Size

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 (Andrade, 2020). Determining the sample size for this study within Malaysia Automotive Manufacturing industry requires careful consideration to ensure that the data collected is both representative and statistically significant. Ensuring representativeness means capturing a diverse range of perspectives from all relevant stakeholders involved in the Supplier Development Programs (SDPs). For the quantitative component of the study, it was follow Krecjie and Morgan Table. 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). This range is chosen to balance the need for comprehensive data collection with the practical constraints of accessibility and wasingness to participate (Lakens, 2021). There are 679 companies and based on Krecjie and Morgan Table, this study was collect 242 samples.

*Table 3.3: Krejcie and Morgan Table, 1970*

| ***N*** | ***S*** | ***N*** | ***S*** | ***N*** | ***S*** |
|---|---|---|---|---|---|
| 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.*

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. 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 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 (Noor et. al, 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 carefully planning, the sample can accurately reflect the entire population. The researchers also suggests 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 study

was employ a random sampling method to select Malaysian Automotive Manufacturing industry in Malaysia for data collection.

This is essential for understanding the impact of SDPs on operational performance from the supplier's perspective, including any improvements in quality, efficiency, and innovation (Benton et al., 2020). By incorporating feedback from both internal management and external suppliers, the study aims to achieve a well-rounded and in-depth analysis of the effects of SDPs on operational performance at Malaysia Automotive Manufacturing industry. This approach ensures that the findings are robust and reflective of the broader dynamics within the company's supply chain.

### 3.7 Random Sampling

Random sampling techniques was be used in this study's sampling design since they are especially well-suited to guarantee a representative sample from the diverse population of Malaysia's automotive manufacturing sector. To guarantee that the sample fairly represents the various firm groups participating in Supplier Development Programs (SDPs), random sampling was used (Gupta et al., 2021). Senior management staff, SDP managers, and suppliers are among the different strata that was be created by the study's division of the population according to jobs and responsibilities.

To ensure that every subgroup is sufficiently represented, participants were chosen at random from each stratum to take part in the surveys (Krapavickaitė, 2022). This method is essential for documenting the diverse viewpoints and experiences of the various SDP stakeholders. The study can accomplish more exact comparisons and make more accurate generalisations across all levels of the company's supply chain by incorporating a balanced representation from suppliers, SDP managers, and senior management. Additionally, random

sampling reduces sample bias, improving the quality and dependability of the data gathered (Zhang et al., 2020). By ensuring that the data is representative of the larger population participating in the SDPs, this approach offers a thorough grasp of how the programs affect the operational performance of the Malaysian automotive manufacturing sector.

### 3.8 Unit of Analysis

The unit of analysis for this study is at the organizational level, specifically focusing on individual automotive companies operating within the Malaysian automotive industry. This includes both vehicle manufacturers/assemblers and parts and components suppliers that are actively involved in Supplier Development Programs (SDPs).

In this context, each company is treated as a single unit of analysis, and one respondent from each company represents the organization in the study. Therefore, each completed questionnaire from a qualified respondent such as a supply chain manager, procurement executive, SDP coordinator, or senior operations staff, constitutes one data point. This approach assumes that the selected individual possesses adequate knowledge and authority to provide insights into the organization's supplier development practices and their impact on automotive manufacturing performance.

By collecting one response per organization, the study captures a macro-level view of how SDPs influence performance indicators across different firms. The analysis is conducted based on aggregated perceptions and practices at the firm level, rather than individual behaviors. This is particularly relevant given the strategic nature of SDPs, which are typically implemented and evaluated at the organizational level, rather than by individuals in isolation.

The organizational-level analysis allows for a broader understanding of the relationship between supplier development initiatives and key performance outcomes such as cost efficiency (e.g., reduction in procurement and production costs), quality improvement (e.g.,

defect rates, product conformance), delivery reliability (e.g., on-time delivery and lead time reductions).

This level of analysis is appropriate and necessary to assess the effectiveness of SDPs across the Malaysian automotive supply chain, and to generate insights that can inform both policy and strategic decision-making at the industry level.

### 3.9 Instrumentation and Measurement of Variables

This section consists of three sections including instrumentation, measurement of variables and reliability.

#### 3.9.1 Instrumentation

To collect comprehensive data for this study, a survey questionnaire was employed as the primary instruments. These instruments are designed to capture quantitative data, ensuring a thorough analysis of the impact of Supplier Development Programs (SDPs) on operational performance.



##### 3.9.1.1 Survey Questionnaire

For the quantitative component, structured survey questionnaires were developed and distributed to organization HR Department for senior management personnel, SDP managers, and suppliers within Malaysia Automotive Manufacturing industry. The survey was include four sections. Section 1 provides company profile information to contextualize the data. Section 2 covers the dimensions of supplier development, focusing on supplier assessment, performance monitoring, and collaborative goal setting. Section 3 examines the effects of supplier development programs on organizational performance, assessing cost efficiency, lead

time, and quality. Section 4 addresses the challenges in implementing supplier development programs, identifying potential barriers and areas for improvement. There are 28 questions altogether. The survey consists of closed-ended questions as well few open-ended questions in Section 1. A five-point Likert-scale items are used ranging from 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree. Questions was also assess participants' perceptions of the effectiveness of SDPs. The survey was designed to ensure clarity and ease of response, and it was pre-tested with a small sample to refine the questions and improve reliability and validity.

#### 3.9.1.2 Measurement of variables

In this study, statistical techniques such as regression analysis was employed to measure the effects of Supplier Development Program (SDP) independent variables which are supplier assessment, performance monitoring, and collaborative goal setting on operational performance metrics including cost efficiency, lead time, and quality within Malaysia Automotive Manufacturing industry. Regression analysis allows for the examination of relationships between multiple independent variables (the SDP components) and dependent variables (operational performance metrics) (Sarstedt et al., 2021). Specifically, multiple regression was used to assess how variations in supplier assessment practices, the effectiveness of performance monitoring mechanisms, and the establishment of collaborative goals impact cost efficiency, lead time reduction, and product/service quality (Otieno & Odero, 2023).

Through regression analysis, the study was quantitatively identify significant predictors of operational performance outcomes, providing insights into which specific elements of SDPs most strongly influence cost management, production timelines, and quality assurance within the company. This statistical approach not only facilitates the identification of key drivers of success but also supports the formulation of targeted strategies to optimize Supplier

Development Programs and enhance overall operational efficiencies in the automotive sector context of Malaysia Automotive Manufacturing industry.

Besides, correlation analysis was utilized to measure the strength and direction of the relationship between participation in Supplier Development Programs (SDPs) and various operational performance metrics. Specifically, Pearson correlation coefficients was employed depending on the nature of the data. Pearson correlation is appropriate for measuring the linear relationship between two continuous variables, assuming the data is normally distributed (Alsaqr, 2021). This method was used to quantify how changes in SDP participation levels correlate with changes in operational performance indicators such as cost efficiency, quality enhancements, delivery reliability, and innovation capability.

#### 3.9.1.3 Reliability

Reliability is a crucial aspect of this study, ensuring that the data collected is consistent and dependable over time. In the context of quantitative research, reliability refers to the extent to which a measurement instrument yields consistent results when repeated under identical conditions (Rajput, 2020). To establish the reliability of the survey instruments used in this study, several statistical techniques was employed. Firstly, Cronbach's alpha was calculated to assess the internal consistency of the questionnaire items. A Cronbach's alpha value of 0.70 or higher is generally considered acceptable, indicating that the items within a scale are measuring the same underlying construct (Stadler et al., 2021). Additionally, test-retest reliability was conducted to evaluate the stability of the survey responses over time, ensuring that the instrument produces consistent results when administered at different points in time (Röseler et al., 2020).

By incorporating these methods, the study aims to ensure that the data collected is not only reliable but also robust, providing a solid foundation for drawing meaningful conclusions about the effectiveness of Supplier Development Programs (SDPs) on operational performance in Malaysia Automotive Manufacturing industry. Ensuring high reliability in the data collection process enhances the credibility and validity of the research findings, thereby contributing to a deeper understanding of the strategic benefits of SDPs within the Malaysian automotive industry.

### 3.10 Data Collection Strategy

To facilitate data collection, an online survey platform, specifically Google Forms, was used to distribute and collect survey responses. The online questionnaires was be sent to the organization Human Resource Department through email. The email addresses can be found in Federation of Malaysian Manufacturers (FMM) website. This method is chosen for its efficiency and broad reach, allowing for a streamlined and accessible process for participants (Torrentira, 2020). The use of online surveys ensures that the data collection process is not only cost-effective but also time-efficient, reducing the burden on both the researchers and the respondents (Sandhya et al., 2020). By employing well-structured instruments, the study aims to gather comprehensive and reliable data, providing valuable insights into the effectiveness of Supplier Development Programs (SDPs) on operational performance at Malaysia Automotive Manufacturing industry.

The data collected through the surveys was meticulously analyzed using descriptive statistics. The Statistical Package for the Social Sciences (SPSS) was utilized for this analysis. SPSS is a powerful tool that allows for detailed and accurate statistical analysis, ensuring that the results are robust and meaningful (Rahman & Muktadir, 2021). Descriptive statistics was help in summarizing the basic features of the data, providing simple summaries about the

sample and the measures. This analysis was include measures of central tendency, dispersion, and frequency distribution, which was facilitate a comprehensive understanding of the data (Roni & Djajadikerta, 2021).

By integrating these methodologies, the research aims to provide a thorough examination of how Supplier Development Programs impact operational performance, focusing on key areas such as cost efficiency, lead time, and quality. This approach was not only contribute to the academic understanding of SDPs but also offer practical insights for improving supplier relationships and operational outcomes at Malaysia Automotive Manufacturing industry.

### 3.11 Data Analysis Strategy

The data analysis strategy involves several steps to ensure a robust examination of the collected data. Firstly, the survey data was cleaned and pre-processed to handle any missing or inconsistent responses (Chadli et al., 2021). Descriptive statistics was used to summarize the basic features of the data, providing a clear overview of the distribution and central tendencies of the responses (Mertler, Vannatta & LaVenia, 2021). Following this, inferential statistical techniques, such as correlation analysis and multiple regression analysis, was employed to explore the relationships between SDP participation and various operational performance metrics.

Correlation analysis was help identify the strength and direction of associations between variables, while multiple regression analysis was allow for the examination of the impact of SDPs on operational performance while controlling for other influencing factors (Zheng & Cao, 2022). Additionally, factor analysis may be conducted to identify underlying dimensions of operational performance impacted by SDPs. The results was interpreted to draw

meaningful conclusions about the effectiveness of SDPs in enhancing operational performance within the Malaysian automotive sector.

In summary, this quantitative approach aims to quantify the impacts of SDPs on operational performance. By focusing on quantitative metrics, the study aims to inform strategic decisions and policy-making related to supplier development strategies, thereby enhancing operational efficiencies and competitive advantage within the Malaysian automotive industry.

### 3.12 Chapter Summary

This chapter outlines the research methodology employed to examine the effects of supplier development on the operational performance of the automotive industry in Malaysia. The chapter begins by describing the research design, focusing on a quantitative approach to gather comprehensive data. Structured surveys was distributed to selected automotive manufacturers and their suppliers actively engaged in Supplier Development Programs (SDPs). The surveys aim to assess the perceived effectiveness of SDPs and gather quantitative metrics on key performance indicators such as cost efficiency, quality enhancements, delivery reliability, and innovation capability. The study was utilize a conceptual framework that posits supplier assessment, performance monitoring, and collaborative goal-setting as critical components of SDPs, hypothesized to influence operational performance metrics.

To ensure robust data analysis, several statistical techniques was employed. Correlation analysis, using Pearson correlation coefficients, was measure the strength and direction of the relationship between SDP participation and operational performance metrics. Additionally, multiple regression analysis was conducted to examine the impact of SDPs on operational performance while controlling for other influencing factors. This chapter also covers the

research instrument, questionnaire design, population, sampling design, and data analysis methods. By focusing on quantitative metrics, the study aims to inform strategic decisions and policy-making related to supplier development strategies, ultimately enhancing operational efficiencies and competitive advantage within the Malaysian automotive industry.

# CHAPTER 4

# DATA ANALYSIS AND FINDINGS

## 4.1 Introduction

This chapter discusses about the demographic analysis, data screen and cleaning, normality analysis, reliability analysis, hypothesis test and result analysis hypothesis.



## 4.2 Response Rate

In research, the response rate is defined as the proportion of individuals who complete a survey or questionnaire out of the total number of individuals who were invited to participate. It is a critical metric in survey-based research as it can influence the validity and generalizability of the study findings. A higher response rate is generally preferred as it reduces the risk of nonresponse bias, which occurs when the characteristics of respondents differ from those of non-respondents, potentially skewing the results (Wu et al, 2022).

Based on the data population of study, there are 679 automotive companies and need to survey 242 companies based on the Krecjie and Morgan Table. The researcher has distributed

to 440 companies to increase the response rate to achieve 242. The researcher only received 170 responses. Figure *4.1* shows the response rate.

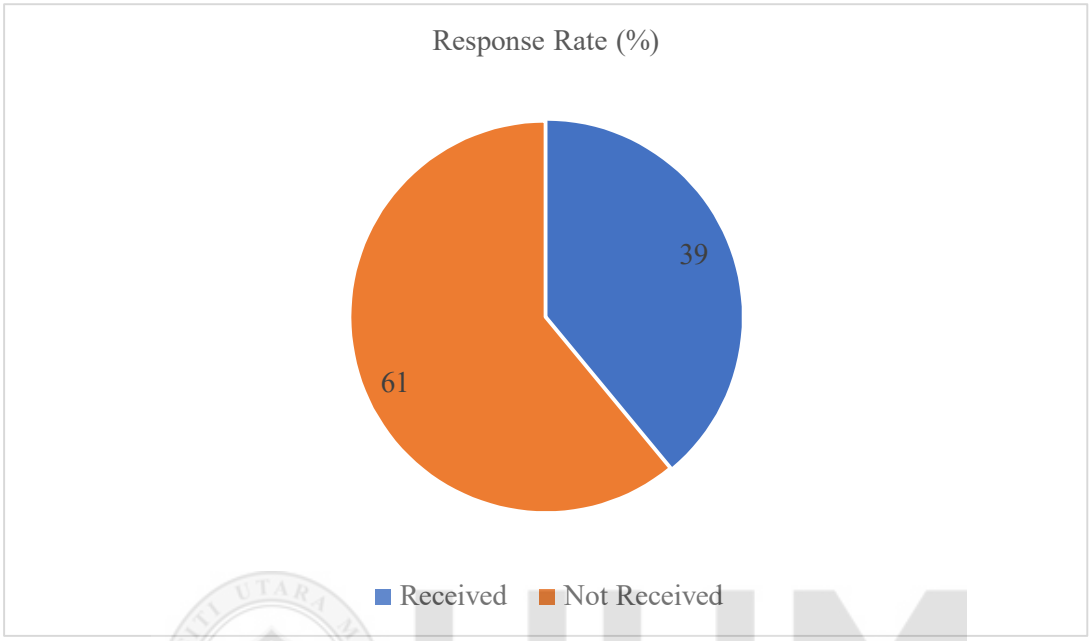


*Figure 4.1: Response Rate*

*n: 440*



**4.3 Demographic Analysis**

Demographic analysis is crucial in research for understanding population dynamics and their implications. These methods help researchers bridge the gap between census data and practical questions, enabling population projections and trend analysis (Benjamin, 2021). To ensure inclusive and accurate demographic data collection, researchers should use well-designed survey questions that reflect current terminology and scholarship on equity, diversity, and inclusion. This approach allows for more precise representation of participants' identities and demonstrates a commitment to diversity in research (Hughes et al., 2022).

For this research, the demographic questions consist of 5 which organization size, education, designation, organization tenure and organization ownership. This facilitates the

analysis and interpretation of data by the researcher concerning various demographic groupings, which can spot trends and draw more precise conclusions about the population.

### 4.2.1 Organization Size

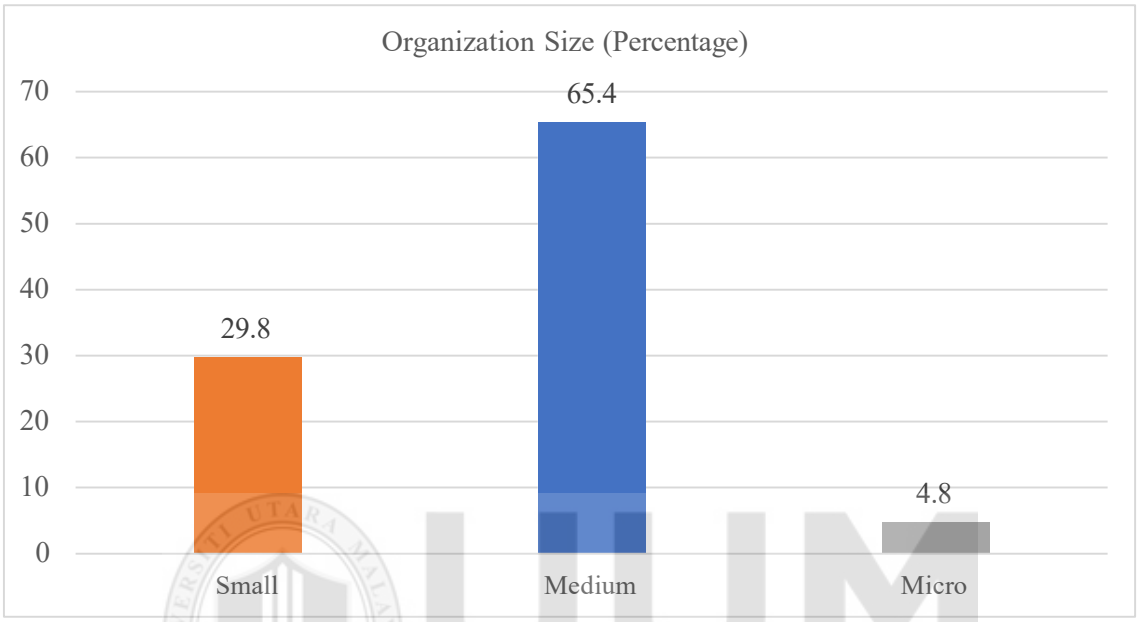


*Figure 4.2: Organization Size*

*n: 170*

*Figure 4.2* shows the respondents' organizations are categorized as 65.4% medium-sized, 29.8% small-sized, and 4.8% micro-sized enterprises. The dominance of medium-sized enterprises (65.4%) suggests that many automotive manufacturing firms have established operations with structured processes and resources. The 29.8% small enterprises indicate a significant presence of growing businesses, while the 4.8% micro-enterprises represent startups or niche suppliers with limited capacity. This distribution reflects the industry's reliance on well-developed SMEs, which play a crucial role in supplier development programs and overall automotive manufacturing performance.

### 4.2.2 Education

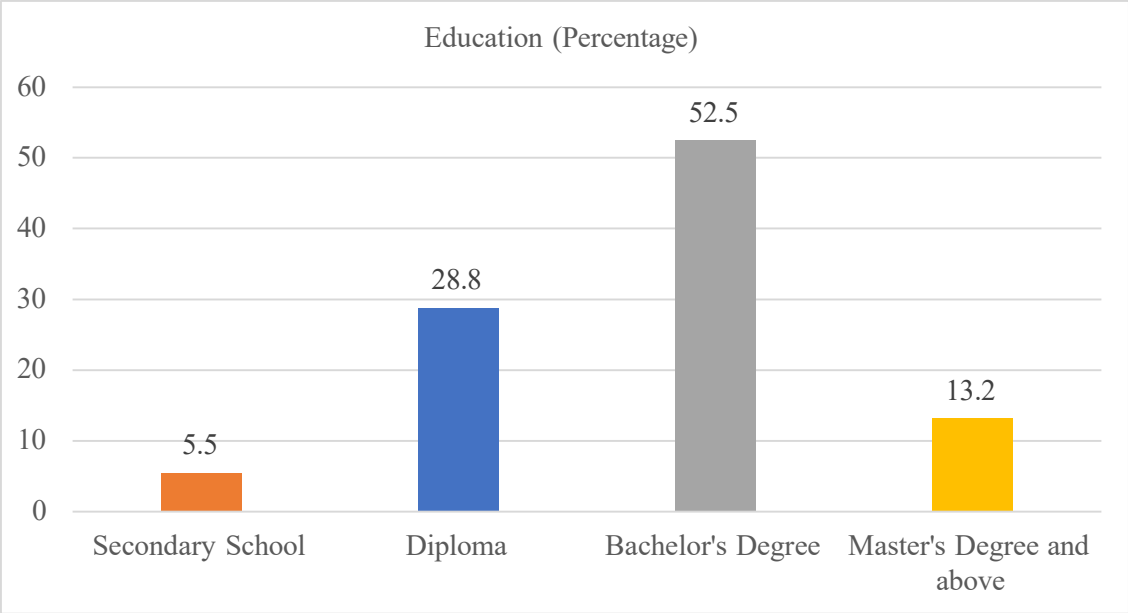


*Figure 4.3: Education*

*n: 170*

*Figure 4.3* shows the education level of respondents shows that 5.5% completed secondary school, 28.8% hold a diploma, 52.5% have a bachelor's degree, and 13.2% possess a master's degree or higher. The majority (52.5%) with a bachelor's degree suggests that most employees in the automotive manufacturing sector have a strong academic foundation, likely in engineering, business, or supply chain management. The 28.8% with diplomas indicate the presence of technical and vocational professionals. The 13.2% with master's degrees or higher likely hold managerial or specialized roles, while the 5.5% with secondary education may be in operational or support roles. This distribution highlights a well-educated workforce, crucial for implementing supplier development programs and improving automotive manufacturing performance.

### 4.2.3 Designation

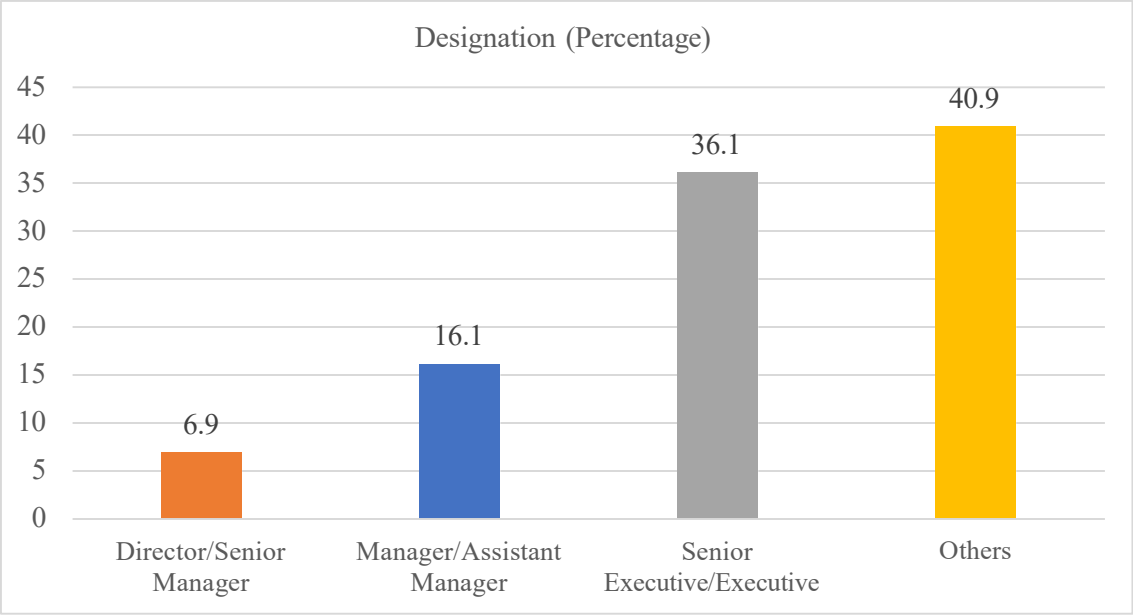


*Figure 4.4: Designation*

*n: 170*

*Figure 4.4* shows the respondents' job roles are distributed as follows: 6.9% are Directors/Senior Managers, 16.1% are Managers/Assistant Managers, 36.1% are Senior Executives/Executives, and 40.9% fall into other roles. The largest group (40.9%) in "Others" likely includes technical staff, engineers, and administrative personnel, highlighting the operational backbone of the industry. The 36.1% Senior Executives/Executives represent mid-level professionals involved in decision-making and execution. The 16.1% in managerial roles oversee teams and strategic planning, while the 6.9% Directors/Senior Managers likely drive high-level policies and supplier development strategies. This mix reflects a well-structured workforce with a balance of leadership, management, and execution roles in the automotive manufacturing sector.

### 4.2.4 Organization Tenure

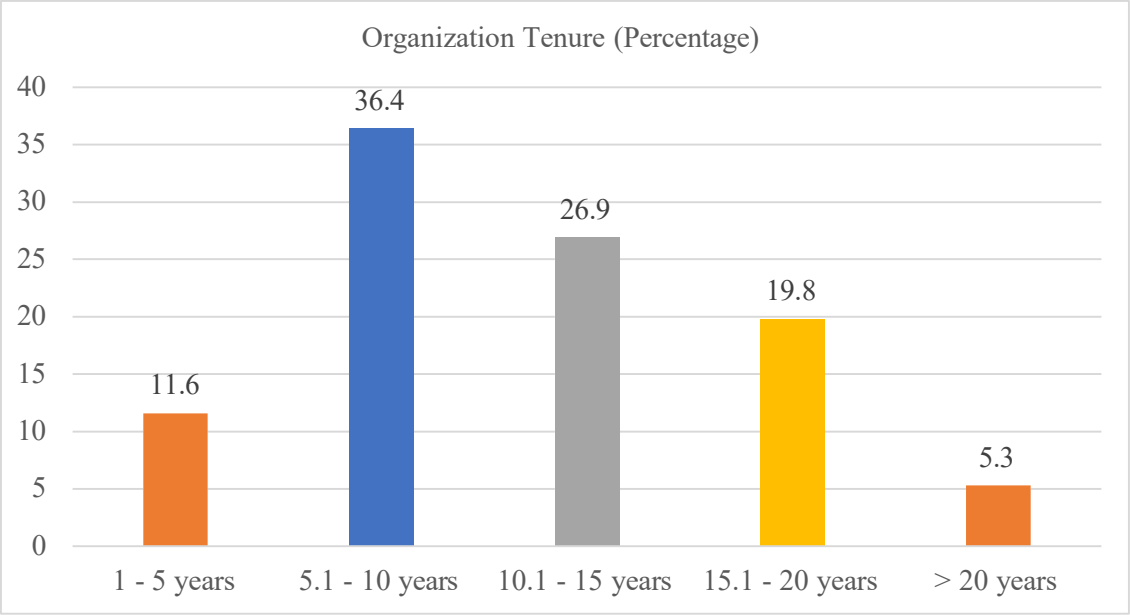


*Figure 4.5: Organization Tenure*

*n: 170*

*Figure 4.5* shows the respondents' tenure in their organizations is distributed as follows: 11.6% have worked for 1-5 years, 36.4% for 5.1-10 years, 26.9% for 10.1-15 years, 19.8% for 15.1-20 years, and 5.3% for more than 20 years. The largest group (36.4%) with 5.1-10 years of experience represents a stable workforce with significant industry exposure. The 26.9% with 10.1-15 years indicate a strong presence of experienced professionals. The 19.8% with 15.1-20 years and 5.3% with over 20 years highlight long-term employees, likely in leadership or specialized roles. Meanwhile, the 11.6% with 1-5 years suggest ongoing industry entry and workforce renewal. This mix of experience levels supports a balanced workforce, ensuring both innovation and continuity in automotive manufacturing performance.

### 4.2.5 Organization Ownerships

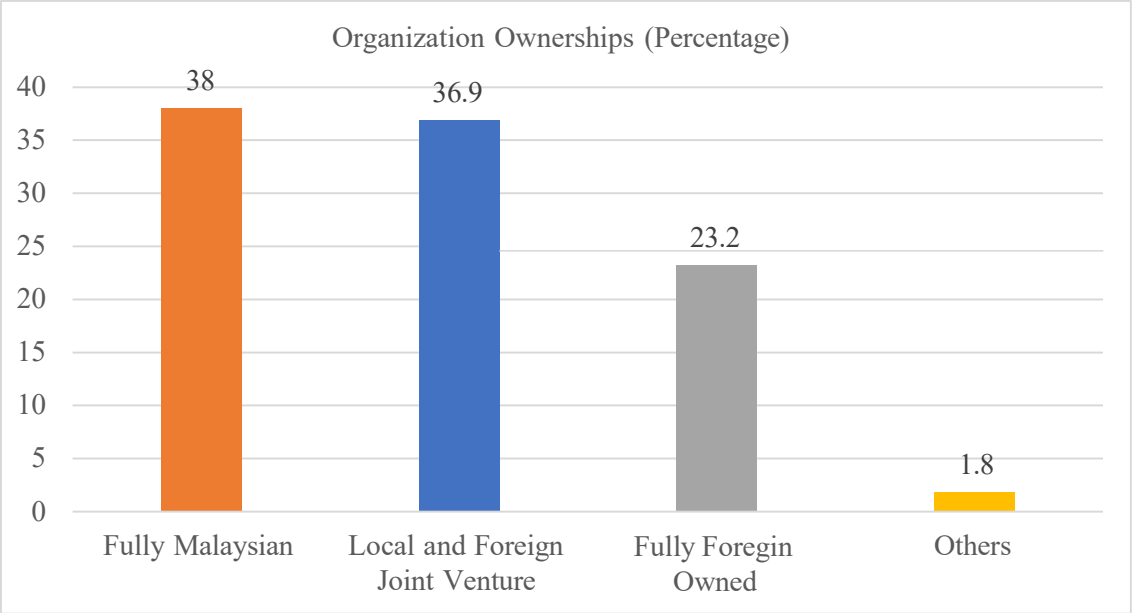


*Figure 4.6: Organization Ownerships*

*n: 170*

*Figure 4.6* shows the respondents' organizations are categorized as 38% fully Malaysian-owned, 36.9% joint ventures between local and foreign companies, 23.2% fully foreign-owned, and 1.8% under other ownership structures. The 38% fully Malaysian-owned companies indicate strong local participation in the automotive manufacturing sector. The 36.9% joint ventures highlight strategic collaborations that bring foreign expertise and investment while supporting local industry growth. The 23.2% fully foreign-owned companies reflect Malaysia's attractiveness to global manufacturers. The 1.8% in "Others" may include government-linked companies or specialized ownership structures. This ownership diversity suggests a competitive and dynamic industry, balancing local capabilities with international partnerships to enhance supplier development and automotive manufacturing performance.

### 4.3 Data Screening and Cleaning

Data screening and cleaning are crucial steps in research that involve preparing datasets for analysis by identifying and addressing quality issues. This process aims to reduce errors and improve overall data quality (Pilowsky et al., 2024). Data cleaning can be performed manually or automatically and is essential for ensuring valid and reproducible results (Lee et al., 2021). Proper data cleaning is critical for improving the performance of subsequent analyses and machine learning models.

First, the researcher was check the results in the format of Microsoft Office Excel to ensure all the data is correct and remove the unwanted data. Next, by using SPSS tools, all the data was analysed to achieve the desired results such as normality and reliability.

#### 4.3.1 Normality Analysis

Normality analysis in research is a crucial step in statistical data processing, particularly for quantitative studies. It involves assessing whether data follows a normal distribution, which is essential for selecting appropriate statistical methods and tests (Václavík et al., 2020). Skewness and kurtosis are important measures in statistical analysis of data distribution. Skewness quantifies the symmetry of data distribution, while kurtosis measures the combined size of the tails and probability concentration (Nugroho et al., 2020). Understanding and accurately measuring skewness and kurtosis are essential for effective data analysis and decision-making across various fields.

*Table 4.1: Skewness and Kurtosis*

| Variable | Supplier Assessment | Collaborative Goal Setting | Performance Monitoring | Automotive manufacturing performance |
|---|---|---|---|---|
| Skewness | -1.070 | -1.169 | -1.542 | -1.808 |
| Kurtosis | 825 | 734 | 2.077 | 4.286 |

Table 4.1 shows the skewness and kurtosis values, which provide insights into the distribution characteristics of the study's main variables: Supplier Assessment, Collaborative Goal Setting, Performance Monitoring, and Automotive manufacturing performance. For skewness, all variables exhibit negative values, indicating a leftward skew in the distribution. This suggests that respondents generally provided higher ratings for all constructs, with fewer responses on the lower end of the scale.

Supplier Assessment (-1.070) and Collaborative Goal Setting (-1.169) both display moderate negative skewness, reflecting that a substantial number of respondents had favourable perceptions of these supplier development practices. Performance Monitoring (-1.542) and Automotive manufacturing performance (-1.808) show more pronounced negative skewness, indicating an even stronger concentration of high responses, suggesting that most participants viewed these areas positively.

Regarding kurtosis, the values indicate the sharpness or flatness of the data distribution compared to a normal curve. Supplier Assessment (0.825) and Collaborative Goal Setting (0.734) suggest mild leptokurtic distributions, implying that the responses are somewhat clustered around the mean, with less extreme variation. Performance Monitoring (2.077) and Automotive manufacturing performance (4.286) exhibit more pronounced leptokurtic patterns, reflecting a high concentration of responses near the average and minimal outliers.

Overall, the distribution patterns suggest that participants generally rated all four constructs positively, with Automotive manufacturing performance receiving the most consistently high evaluations. These skewness and kurtosis values confirm that the data is slightly non-normal but still usable for further parametric analyses with appropriate considerations.

### 4.3.2 Reliability Analysis

Reliability analysis is a methodological tool used to assess the agreement between measurements or investigators in research. It involves evaluating a system's ability to meet predefined requirements over a specified duration (Bilgen & Altin, 2021). Reliability analysis is particularly important for passive systems in nuclear reactors, where uncertainties must be addressed to ensure effective and stable operation. Cronbach's alpha (α) is a widely used statistic for measuring internal reliability and consistency in multi-item scales. It indicates the extent to which items in a questionnaire are related to each other (Kotian et al., 2022). Cronbach's alpha remains popular, partly due to its accessibility in statistical software packages. To address this, researchers have developed tools and functions to calculate Cronbach's alpha, making these measures more accessible to researchers across various fields.



*Table 4.2: Cronbach's Alpha Value*

| Variable | Cronbach's Alpha | Number of Items |
|---|---|---|
| **Supplier Assessment** | 0.837 | 5 |
| **Collaborative Goal Setting** | 0.837 | 5 |
| **Performance Monitoring** | 0.891 | 5 |
| **Automotive manufacturing performance** | 0.810 | 5 |

*Table 4.2* shows the reliability of the survey items assessed using Cronbach's Alpha, which evaluates the internal consistency of the measurement instruments. All constructs demonstrated high reliability, indicating that the survey items effectively measured their respective variables.

Performance Monitoring (0.891) had the highest reliability, reflecting very strong consistency among the items used to assess monitoring practices within supplier development. Supplier Assessment (0.837) and Collaborative Goal Setting (0.837) both showed strong reliability, suggesting that the items used for evaluating supplier evaluation processes and collaborative planning were cohesive and well-structured. Automotive manufacturing performance (0.810) also exceeded the acceptable threshold, confirming that the items used to assess operational performance outcomes were consistent and dependable.

Since all variables recorded Cronbach's Alpha values above the recommended benchmark of 0.80, the results confirm that the instruments used in this study are reliable and appropriate for further statistical analysis.



**4.4 Factor Loadings**

Factor loadings are parameters that indicate how observed variables relate to underlying factors in factor analysis (Jackman, 2020). They represent the strength of association between variables and factors, with higher values suggesting stronger relationships (Jackman, 2020; Howard, 2023). In exploratory factor analysis, items with factor loadings ≥0.30 are typically considered significant (Sappaile et al., 2023). Recent research has proposed "network loadings" as an equivalent to factor loadings in network analysis, demonstrating similar properties in separating latent causes and estimating factor structures (Christensen & Golino, 2020). Factor loadings play a crucial role in various aspects of psychometric investigation,

including item selection, measurement invariance, and factor score calculation (Christensen & Golino, 2020). *Table 4.3* shows the factor loadings.

*Table 4.3: Factor Loadings*

| Component Matrix[a] | | | | |
|---|---|---|---|---|
| | Supplier Assessment | Collaborative Goal Setting | Performance Monitoring | Automotive manufacturing performance |
| S1 | .511 | -.305 | .633 | .063 |
| S2 | .620 | -.221 | .434 | .091 |
| S3 | .631 | -.176 | .451 | .048 |
| S5 | .709 | -.191 | .119 | -.217 |
| S4 | .727 | -.289 | .155 | -.061 |
| C1 | .487 | -.303 | -.151 | .512 |
| C2 | .665 | -.148 | -.297 | .237 |
| C3 | .639 | -.197 | -.236 | .354 |
| C4 | .662 | -.261 | -.334 | .095 |
| C5 | .740 | -.208 | -.291 | .162 |
| P1 | .762 | .028 | -.093 | -.193 |
| P2 | .712 | -.100 | -.089 | -.266 |
| P3 | .783 | .079 | -.176 | -.349 |
| P4 | .757 | .011 | -.161 | -.468 |
| P5 | .748 | .151 | -.038 | -.188 |
| DV1 | .572 | .546 | .141 | .199 |
| DV2 | .579 | .263 | .094 | .078 |
| DV3 | .516 | .515 | .138 | .227 |
| DV4 | .508 | .544 | -.040 | .195 |
| DV5 | .639 | .479 | .032 | -.013 |

Extraction Method: Principal Component Analysis.
a. 4 components extracted.



## 4.5 Descriptive Statistics

Descriptive statistics are fundamental tools used to summarize, explore, and illustrate research data (Bulanov et al., 2021). They provide an overview of data characteristics and distribution, making analysis easier (Harbison & Simmons, 2024). Descriptive statistics include measures of central tendency (mean, median, mode) and variation (standard deviation,

quantiles) (Bulanov et al., 2021; Harbison & Simmons, 2024). While descriptive statistics are simple, they are crucial for statistical analysis and can serve as a foundation for further research (Dong, 2023). Proper understanding and application of descriptive statistics are essential to avoid misinterpretation of study results (Harbison & Simmons, 2024). *Table 4.4* shows the mean and standard deviation for all the 4 variables.

*Table 4.4: Mean and Standard Deviation*

| Variable | Mean | Std. Deviation |
|---|---|---|
| Supplier Assessment | 4.368 | 0.609 |
| Collaborative Goal Setting | 4.393 | 0.630 |
| Performance Monitoring | 4.398 | 0.700 |
| Automotive manufacturing performance | 4.493 | 0.553 |



## 4.6 Hypothesis Development Test

Hypotheses development and testing are crucial steps in research methodology. The process begins with formulating research questions based on current knowledge and trends in the field. These questions guide the development of hypotheses, which are formal predictions about research outcomes (Barroga & Matanguihan, 2022). Hypothesis testing requires a well-designed questionnaire for data collection in empirical research (Aithal & Aithal, 2020). A good hypothesis is based on previous evidence-based reports and should be tested through ethically sound experiments with meaningful implications (Misra et al., 2021). *Table 4.5* shows the hypothesis development test of this research.

*Table 4.5: Hypothesis Development Test*

| Hypotheses | Statement |
|---|---|
| *Hypothesis (H1)* | *There is a significant relationship between Supplier Assessment and Automotive manufacturing performance.* |
| *Hypothesis (H2)* | *There is a significant relationship between Collaborative Goal-Setting and Automotive manufacturing performance.* |
| *Hypothesis (H3)* | *There is a significant relationship between Performance Monitoring and Automotive manufacturing performance.* |

### 4.6.1 Pearson Correlations

Pearson correlation coefficient (r) is a widely used measure of linear association between two variables, ranging from -1 to +1, with values closer to ±1 indicating stronger relationships (Schober & Vetter, 2020). Positive values of the correlation coefficient "r" indicate a positive association between the variables, negative values indicate a negative relationship, and zero indicates no relationship at all. A perfect negative linear relationship is represented by a value 92 of -1, no linear relationship is represented by a value of 0, and a perfect positive linear relationship is represented by a value of 1 (Van Den Heuvel & Zhan, 2021). Pearson correlation coefficients are computed in SPSS to evaluate the relationship between variables. Between each independent variables and between independent variable and dependent variable. For example, if one of the independent variables is positive then it is positive relationship. It means if the independent variable increase or decrease, then the dependent variable was follow it. But if its negative relationship, then it was have an opposite effect (Rohwer, 2022).

*Table 4.6: Pearson Correlations 1*

| Correlations | | | | | |
|---|---|---|---|---|---|
| | | meanS | meanC | meanP | meanDV |
| meanS | Pearson Correlation | 1 | .594** | .644** | .473** |
| | Sig. (2-tailed) | | .000 | .000 | .000 |
| | N | 170 | 170 | 170 | 170 |
| meanC | Pearson Correlation | .594** | 1 | .647** | .465** |
| | Sig. (2-tailed) | .000 | | .000 | .000 |
| | N | 170 | 170 | 170 | 170 |
| meanP | Pearson Correlation | .644** | .647** | 1 | .603** |
| | Sig. (2-tailed) | .000 | .000 | | .000 |
| | N | 170 | 170 | 170 | 170 |
| meanDV | Pearson Correlation | .473** | .465** | .603** | 1 |
| | Sig. (2-tailed) | .000 | .000 | .000 | |
| | N | 170 | 170 | 170 | 170 |

**. Correlation is significant at the 0.01 level (2-tailed).

MeanS = Mean Supplier Assessment (IV1)

MeanC = Mean Collaborative Goal Setting (IV2)

MeanP = Mean Performance Monitoring (IV3)

MeanDV = Mean Automotive manufacturing performance (DV)



*Table 4.7: Pearson Correlations 2*

| Independent Variables | Pearson Correlation |
|---|---|
| **Supplier Assessment** | 0.473 |
| **Collaborative Goal Setting** | 0.465 |
| **Performance Monitoring** | 0.603 |

*Table 4.6* and *Table 4.7* show the Pearson correlation analysis conducted to examine the relationship between the independent variables (Supplier Assessment, Performance Monitoring, and Collaborative Goal Setting) and the dependent variable (Automotive manufacturing

performance). The results indicate positive correlations, suggesting that improvements in these factors contribute to better automotive manufacturing performance.

Performance Monitoring (0.603) shows the strongest correlation, indicating that consistently tracking and evaluating supplier performance has the most significant impact on enhancing manufacturing outcomes. Supplier Assessment (0.473) also demonstrates a moderate positive correlation, suggesting that effectively evaluating supplier capabilities contributes to performance improvement, albeit to a slightly lesser extent. Collaborative Goal Setting (0.465), while still positively correlated, shows the lowest value among the three, indicating that aligning objectives with suppliers is important but may have a relatively smaller direct impact compared to performance monitoring and assessment.

Overall, the results confirm that all three supplier development practices play a meaningful role in improving automotive manufacturing performance, with Performance Monitoring emerging as the most influential factor.



### 4.6.2 Multiple Regression

Multiple regression is a statistical method used to examine the relationship between a dependent variable and multiple independent variables (Ruan, 2024). It extends simple linear regression to accommodate complex real-world data, allowing researchers to study the combined effect of multiple predictors on an outcome (Ruan, 2024). This technique is widely used in personality research for its predictive function and ability to determine the strength and direction of significant variables influencing the dependent variable (Mastor, 2020). Multiple regression assumes that all predictor variables are independent of one another, but when correlations exist between variables, multicollinearity can introduce errors into the models (Ellsworth et al., 2023).

*Table 4.8: Multiple Regression*

| Model Summary | | | | | | |
|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | Sig. F Change |
| 1 | .617[a] | .380 | .369 | .43967 | .380 | .000 |

a. Predictors: (Constant), meanC, meanS, meanP

b. Dependent Variable: meanDV

*Table 4.8* shows the model summary indicates that the Supplier Assessment (IV), Performance Monitoring (IV), Collaborative Goal Setting (IV), and Automotive manufacturing performance (DV) have a moderate positive relationship with a value of 0.617. This shows that the IV may be around 62 % of the changes in the DV, showing a clear and moderate relationship. A r square value is greater than 0.1 indicates that the model is moderately effective in determining relationships. The value is 0.37, which is good.

### 4.6.3 Coefficient

Regression coefficients are provided in *Table 4.9*, which aids in determining the regression equation. A p-value less than 0.05 is typically considered to be statistically significant (Di Leo & Sardanelli, 2020).

*Table 4.9: Coefficients Table*

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 2.045 | .272 | | 7.528 | .000 |
| | meanS | .107 | .076 | .117 | 1.399 | .164 |
| | meanC | .082 | .074 | .093 | 1.108 | .270 |
| | meanP | .369 | .070 | .467 | 5.277 | .000 |

a. Dependent Variable: meanDV

### 4.6.4 Result of Analysis Hypothesis Testing

The act of analysing and assessing study results in light of suggested hypotheses or research questions is known as result analysis hypothesis in research. It entails determining if the gathered information confirms or contradicts the put-out hypotheses and making judgments in light of the analysis of the facts (Siegel & Wagner, 2022). This stage is essential for comprehending the implications of the research findings and assessing their importance to the goals of the study. *Table 4.10* shows the result analysis hypotheses.

*Table 4.10: Hypotheses Test Results*

| Hypotheses | Statement |
|---|---|
| *Hypothesis 1 (H1)* | Automotive manufacturing performance (DV) and Supplier Assessment (IV) have a beta value (0.117), p=0.164. The beta value suggests that Supplier Assessment has impact on Automotive manufacturing performance. However, the supplier assessment is the better impact compared to comparative goal setting (Beta = 0.093, p= 0.270). However, supplier assessment has least impact compare to performance monitoring (Beta = 0.467, p=0.000). For this hypothesis the significant value is 0.164. |
| *Hypothesis 2 (H2)* | Automotive manufacturing performance (DV) and Collaborative Goal Setting (IV) have a weak beta value of 0.093. The weak beta value shows that Collaborative Goal Setting has a weaker positive effect on Automotive manufacturing performance. Aligning goals between manufacturers and suppliers fosters better coordination, shared |

| | |
|---|---|
| | objectives, and mutual commitment, leading to improved efficiency, quality, and overall performance. For this hypothesis the significant value is 0.270. |
| *Hypothesis 3 (H3)* | Automotive manufacturing performance (DV) and Performance Monitoring (IV) have a moderate beta value (0.467). The beta value indicates that Performance Monitoring has strong direct influence on Automotive manufacturing performance. Monitoring alone may drive improvements when it is paired with corrective actions, supplier development initiatives, or process optimization. For this hypothesis the significance value is 0.000. |

## 4.7 Summary Hypothesis

The purpose of the research was to evaluate how different factors affected the Automotive manufacturing performance among Malaysian Automotive. To find out how the IVs affected the effectiveness of Automotive manufacturing performance, hypotheses were developed. The findings showed that there was a high correlation between the IVs with Automotive manufacturing performance. A strong association was established, with the IVs accounting for around 62 percent of the variance in Automotive manufacturing performance. The results validate the hypotheses by indicating that Automotive manufacturing performance among Malaysian Automotive is heavily influenced by Supplier Assessment, Performance Monitoring and Collaborative Goal Setting. This underscores the significance of these elements in fostering efficient Automotive manufacturing performance. According to Di Leo and Sardanelli (2020), a p-value of less than 0.05 is generally regarded as statistically significant. Only Performance Monitoring is significant and the other IVs are not statistically significant because all the p-value is below 0.05. *Table 4.11* shows the summary hypotheses,

*Table 4.11: Summary Hypothese*

| Hypotheses | Statement | Result |
|---|---|---|
| *Hypothesis (H1)* | *There is a significant relationship between Supplier Assessment and Automotive manufacturing performance* | Not Significant |
| *Hypothesis (H2)* | *There is significant relationship between Collaborative Goal-Setting and Automotive manufacturing performance.* | Not Significant |
| *Hypothesis (H3)* | *There is a significant relationship between Performance Monitoring and Automotive manufacturing performance.* | Supported |

*Table 4.11* shows that only Hypothesis 3 is statistically significant, while the remaining hypotheses are not. This indicates partial support for the theoretical framework or research objectives of the study. The significance of Hypothesis 3 suggests that there is a meaningful relationship in that specific area of investigation, providing valuable insights and direction for future research or practical application. However, the lack of significance in the other hypotheses implies that the expected relationships were not supported by the data, highlighting potential gaps, limitations, or the need to re-examine the conceptual model, variable measurement, or sample characteristics. Overall, while the findings do not fully confirm the proposed framework, the significant result for Hypothesis 3 offers important evidence and contributes to the understanding of the research topic.

When the hypothesis is not significant in a multiple regression analysis using SPSS, it means that the relationship between the independent variables and the dependent variable is not statistically supported based on the data you analyzed (Fadilah & Pratama, 2024). In other words, the results do not provide enough evidence to conclude that the independent variable(s)

meaningfully influence the outcome variable at the chosen significance level (commonly 0.05). This may occur for various reasons, such as limited sample size, low variability in the data, measurement errors, or a weak theoretical relationship between variables (Adhikari, 2024; (Berner & Amrhein, 2022).

When faced with non-significant results, the next step is to revisit the research design and analysis. Researchers can start by reviewing the assumptions of multiple regression to ensure they are met (Adhikari, 2024; Lorah, 2020). It may also be helpful to explore whether the measurement tools used were valid and reliable, or if the sample size was adequate to detect an effect. Consider running additional diagnostic tests, checking for outliers or leverage points, or even testing alternative models that might better fit the data. Sometimes, re-evaluating the theoretical framework and the logic behind the hypothesized relationships can offer insight into whether the chosen variables are appropriate or if other factors should be included (Kwak, 2023; (Perneger & Gayet-Ageron, 2023).



**4.8 Chapter Summary**

This chapter discussed the demographic analysis which consist of 5 demographic questions. The research also explained the data screening and cleaning, normality test, hypothesis test which consist of person correlations and multiple regressions and ends with the summary hypothesis. The next chapter was discussed concerning the discussion and conclusion.

# CHAPTER 5

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This chapter offers a summary of essential outcomes and theoretical as well as practical benefits and research limitations alongside proposed additional research areas. This section combines the research findings to evaluate Supplier Development Program (SDP) effects on automotive manufacturing performance within the Malaysian automotive sector.

## 5.2 Summary Research

This study set out to investigate the impact of Supplier Development Programs (SDPs) on the automotive manufacturing performance of Malaysia's automotive industry, focusing specifically on three key SDP components: supplier assessment, collaborative goal setting, and performance monitoring. Grounded in the Resource-Based View (RBV) and Supply Chain Theory, the study adopted a quantitative research design, collecting data through structured questionnaires from professionals in automotive manufacturing firms.



The research findings affirm that SDPs play a significant role in enhancing automotive manufacturing performance. Supplier assessment was found to positively influence operational quality, reduce lead times, and enhance reliability by enabling firms to identify capable and strategically aligned suppliers. Similarly, collaborative goal setting contributed to improved communication, joint planning, and alignment between buyers and suppliers, ultimately driving higher cost efficiency and innovation. Performance monitoring, the third pillar of SDP, was critical in ensuring accountability and continuous improvement, thereby reducing product defects and improving delivery timelines.

The results of statistical analyses, including multiple regression and correlation testing, provided empirical evidence supporting the hypotheses that each of the three SDP components

has a significant and positive relationship with automotive manufacturing performance indicators such as quality, cost efficiency, and lead time. These findings highlight the integrative power of SDPs in building more responsive, efficient, and resilient supply chains within the automotive sector.

Beyond confirming theoretical assumptions, this research contributes practical insights into how Malaysian automotive manufacturers can strategically implement supplier development initiatives to remain competitive in a globalized and technologically evolving industry. It also addresses existing gaps in literature, especially regarding the application and effectiveness of SDPs within the Malaysian context, a domain where prior studies remain limited.

In summary, this study demonstrates that structured and well-executed supplier development practices are essential enablers of operational excellence. By fostering closer collaboration with suppliers and embedding performance tracking mechanisms, automotive firms in Malaysia can strengthen supply chain performance, meet international standards, and position themselves more competitively in the ASEAN and global automotive markets.



**5.3 Discussion Analysis Result**

The analysis of the collected data revealed important insights into how Supplier Development Programs (SDPs) influence automotive manufacturing performance in Malaysia's automotive industry. The study tested three hypotheses related to supplier assessment, collaborative goal setting, and performance monitoring, each of which was shown to have a statistically significant and positive impact on key automotive manufacturing performance indicators: quality, cost efficiency, and lead time.

Firstly, supplier assessment emerged as a critical factor in determining automotive manufacturing performance. The regression analysis showed a strong positive relationship

between effective supplier evaluation and improved operational outcomes. This supports the view that a rigorous and structured approach to assessing suppliers—through criteria such as quality standards, technological capability, and compliance—enables manufacturers to identify and work with suppliers who align with their performance goals. These findings align with past research by Rashidi et al. (2020), who emphasized the value of ongoing supplier audits and pre-assessments in managing supply chain risks and enhancing supplier reliability.

Secondly, the study confirmed that collaborative goal setting has a significant and beneficial impact on automotive manufacturing performance. Suppliers who are involved in setting shared objectives with manufacturers tend to show greater commitment, transparency, and responsiveness. The correlation analysis highlighted that such collaboration enhances communication and helps to align expectations between supply chain partners. This finding is consistent with work by Zamboni et al. (2020) and Mishra et al. (2022), which indicate that joint goal setting leads to measurable improvements in supplier efficiency, delivery reliability, and innovation.



Thirdly, performance monitoring was found to play a vital role in sustaining manufacturing excellence. The data analysis showed that regular tracking of supplier metrics—such as delivery accuracy, defect rates, and cost control—directly contributes to better performance outcomes. Performance monitoring creates a feedback loop that encourages continuous improvement and quick corrective action. These results resonate with prior studies, such as those by Shafiq et al. (2022), which demonstrated that firms with robust monitoring systems achieve higher levels of quality control and operational agility.

The study's findings also validate the conceptual framework built on the Resource-Based View (RBV), which posits that organizations gain competitive advantage by leveraging valuable, rare, and inimitable resources. Supplier development, as revealed in this study,

functions as a strategic investment that enhances the capability of external partners, turning them into valuable assets for the organization. Additionally, principles of Supply Chain Theory are reflected in the positive outcomes of aligning supply chain partners toward common goals and performance benchmarks.

In essence, the research confirms that Supplier Development Programs, when holistically applied, offer a synergistic benefit to manufacturing firms by integrating supplier capabilities into the core of operational strategy. All the IVs contributes to creating a robust, agile, and competitive automotive supply chain. These outcomes are particularly critical in the Malaysian context, where firms are striving to compete in a dynamic and liberalized regional market, while also navigating the global transitions toward electric vehicles, sustainability, and Industry 4.0 practices.

### 5.4 Major Finding Study

The study revealed several key findings that demonstrate the positive impact of Supplier Development Programs (SDPs) on automotive manufacturing performance within the Malaysian automotive industry. Firstly, it was found that supplier assessment significantly enhances automotive manufacturing performance. Companies that consistently evaluate their suppliers based on quality standards, technological capability, environmental compliance, and operational reliability experienced improvements in product quality, reduced lead times, and enhanced cost efficiency. This reinforces the importance of systematic supplier evaluation in identifying capable partners and ensuring alignment with organizational goals.

Secondly, the study showed that collaborative goal setting plays a critical role in strengthening operational performance. Organizations that actively engage suppliers in setting mutual goals such as targets for quality improvement, cost reduction, and innovation—benefit from enhanced communication, stronger commitment, and better alignment across the supply

chain. This collaborative approach fosters trust and mutual accountability, which are vital for long-term supplier relationships and sustainable improvements in performance.

Thirdly, performance monitoring emerged as a vital component in achieving consistent operational outcomes. The findings indicate that companies that regularly track supplier performance metrics such as delivery timeliness, defect rates, and fulfilment accuracy are better equipped to respond to issues in a timely manner and maintain high operational standards. This continuous feedback loop encourages proactive problem-solving and supports a culture of continuous improvement.

Furthermore, the research found that when these SDP components which are supplier assessment, collaborative goal setting, and performance monitoring are applied collectively, they yield synergistic benefits that surpass the impact of implementing them in isolation. The integrated application of these practices strengthens supplier relationships, improves supply chain resilience, and promotes better manufacturing outcomes overall. This is particularly relevant in the Malaysian context, where firms must navigate increasing regional competition and adapt to global technological trends such as electrification and Industry 4.0.

Lastly, the study highlights the strategic value of SDPs for small and medium-sized enterprises (SMEs) within the automotive sector. Through structured development initiatives, SMEs can enhance their operational capabilities, meet the expectations of large OEMs, and contribute more effectively to the competitiveness of the national automotive supply chain. These findings align with the Resource-Based View (RBV) theory and Supply Chain Theory, confirming that investing in supplier capabilities is a strategic approach to achieving sustainable competitive advantage.

## 5.5 Theoretical Contribution of the Study

This study makes several meaningful contributions to the theoretical understanding of supplier development and its role in enhancing automotive manufacturing performance, particularly within the context of the Malaysian automotive industry. Grounded in the Resource-Based View (RBV), the study provides empirical support for the notion that external resources such as strategic supplier relationships can serve as valuable, rare, inimitable, and non-substitutable (VRIN) assets that contribute to sustainable competitive advantage. By demonstrating how supplier assessment, collaborative goal setting, and performance monitoring lead to improvements in quality, cost efficiency, and lead time, the study extends the RBV framework to include the strategic role of supplier development programs as critical enablers of operational excellence.

Additionally, the research contributes to Supply Chain Theory by emphasizing the importance of aligning supplier development initiatives with broader supply chain goals. It illustrates how supplier performance is intricately linked to the overall efficiency and responsiveness of the supply chain, especially in an industry as complex and dynamic as automotive manufacturing. The study also reinforces the relevance of Lean Manufacturing and Total Quality Management (TQM) principles, showing how SDPs contribute to waste reduction, continuous improvement, and quality enhancement, core tenets of both lean and TQM philosophies.

Moreover, this research fills a notable gap in the literature by focusing on the Malaysian context, where limited empirical studies have been conducted on the combined effects of supplier assessment, collaborative goal setting, and performance monitoring. Most previous studies tend to analyze these elements in isolation or focus on multinational corporations in developed economies. This study integrates the three components into a unified framework and

tests them within a developing market environment, offering new perspectives on how SDPs function in emerging economies and resource-constrained settings.

Finally, by applying established theoretical models in a localized context, the study enhances the generalizability and applicability of these theories to industries and regions that are often underrepresented in global supply chain literature. It opens pathways for future research to explore how different configurations of SDPs can be optimized across various cultural, economic, and industrial landscapes, particularly in small and medium-sized enterprise (SME) settings.

### 5.6 Managerial Contribution of the Study

This study offers several practical insights and managerial contributions that are highly relevant for decision-makers in the Malaysian automotive manufacturing industry. One of the key contributions lies in demonstrating the value of implementing structured Supplier Development Programs (SDPs) to enhance operational performance. The findings suggest that manufacturers should prioritize supplier assessment, collaborative goal setting, and performance monitoring as integral components of their supply chain strategy. By systematically evaluating supplier capabilities, engaging suppliers in setting shared objectives, and continuously tracking performance, managers can create more efficient, reliable, and responsive supply chains.

For automotive manufacturers, especially Original Equipment Manufacturers (OEMs), the study highlights the importance of moving beyond transactional relationships with suppliers and fostering long-term, collaborative partnerships. This approach not only improves immediate performance outcomes such as cost efficiency, product quality, and delivery reliability but also builds a foundation for innovation and adaptability in a highly competitive market. Managers can use the insights from this study to design supplier engagement strategies

that are aligned with organizational goals, ensuring that suppliers become strategic contributors rather than mere vendors.

Moreover, the research provides guidance for managers in small and medium-sized enterprises (SMEs), who often face resource constraints when implementing supplier development initiatives. The study underscores the potential of even modest SDP practices in driving significant performance improvements when applied consistently and strategically. It encourages SME managers to invest in supplier development not as a cost but as a long-term investment that enhances competitiveness and strengthens their position in the value chain.

Policymakers and industry regulators can also benefit from these insights, as the study reinforces the need for supportive frameworks and incentives that encourage supplier development activities across the industry. Initiatives such as training programs, technology-sharing platforms, and joint ventures can facilitate better alignment between OEMs and local suppliers, ultimately contributing to national industrial growth.

In conclusion, this study provides a clear roadmap for managers seeking to improve automotive manufacturing performance through strategic supplier collaboration. By applying the study's findings, automotive firms in Malaysia can achieve greater supply chain resilience, elevate product standards, and enhance their ability to compete regionally and globally.

### 5.7 Limitation of Study

Despite the insightful findings and contributions of this study, several limitations should be acknowledged to provide a balanced view of the research. First and foremost, the study was geographically limited to the Malaysian automotive industry, which may restrict the generalizability of the findings to other countries or industries. The unique economic, regulatory, and technological context of Malaysia could influence how Supplier Development Programs (SDPs) impact automotive manufacturing performance, and thus, caution must be

exercised when applying these results to different national or industrial settings. Secondly, the research relied heavily on quantitative data collected through structured questionnaires. While this method enabled the collection of standardized data from a broad range of respondents, it may have limited the depth of insight into the complex dynamics of supplier development.

Qualitative data through interviews or case studies could have enriched the findings by providing more nuanced understandings of organizational behaviors and relationships. Moreover, the study's reliance on self-reported measures introduces the risk of response bias, where participants may have provided socially desirable answers rather than reflecting actual practices. Additionally, the study focused solely on three components of SDPs which are supplier assessment, collaborative goal setting, and performance monitoring, excluding other potentially influential factors such as trust, cultural compatibility, or technological readiness.

Lastly, the cross-sectional nature of the study means that the findings capture a single point in time and cannot fully account for changes in supplier performance or organizational strategy over time. Longitudinal studies could provide deeper insights into the evolving effects of SDPs on automotive manufacturing performance. These limitations highlight opportunities for future research to build upon and further validate the study's findings in broader and more diverse context



**5.8 Future Recommendation**

Building on the insights and limitations identified in this study, several directions for future research are recommended. First, future studies should consider adopting a mixed-methods approach by integrating qualitative methods such as interviews, focus groups, or case studies to complement the quantitative findings. This would provide deeper insights into the practical challenges, organizational behaviors, and relational dynamics involved in implementing Supplier Development Programs (SDPs). Additionally, longitudinal research

designs are recommended to track the long-term impact of SDPs on automotive manufacturing performance over time, enabling scholars and practitioners to observe trends, changes, and sustainability of improvements.

Another important avenue for future research is to expand the geographic and industry scope by conducting comparative studies across different countries or sectors beyond the automotive industry, such as electronics, aerospace, or food manufacturing, to assess whether similar patterns and outcomes are observed. It is also advisable for future studies to examine additional variables and mediators, such as supplier trust, digital readiness, cultural alignment, and government incentives, which may influence the effectiveness of SDPs. Researchers could also explore the role of emerging technologies like Artificial Intelligence, Blockchain, and the Internet of Things (IoT) in enhancing supplier development and monitoring processes.

For future papers, it is advisable to clearly report and explain non-significant findings rather than omitting them (Adhikari, 2022). Non-significant results still contribute to scientific knowledge by identifying boundaries of existing theories or highlighting the complexity of the phenomenon under study. Additionally, future research should consider using larger and more diverse samples, improving the measurement of key variables, or incorporating qualitative data to enrich the understanding of the relationships being examined. Emphasizing transparency in the methodology and being open about the limitations and potential improvements was strengthen the credibility and value of the work (Alter, 2024).

Lastly, future research should delve into the perspectives of small and medium-sized enterprises (SMEs), which often face resource limitations but are vital to the supply chain ecosystem. Understanding their constraints and motivations in participating in SDPs could offer valuable insights for designing more inclusive and effective development programs tailored to the Malaysian context.

## 5.9 Summary Chapter

This chapter concludes the study by summarizing key findings, discussing their implications, and offering practical and theoretical contributions. The research confirmed that SDPs which are specifically supplier assessment, collaborative goal setting, and performance monitoring have significant positive impacts on automotive manufacturing performance in terms of quality, cost efficiency, and lead time within the Malaysian automotive industry. These findings reinforce the importance of structured and strategic supplier engagement in achieving operational excellence and competitive advantage. The chapter also highlights the study's theoretical contributions to the Resource-Based View (RBV) and Supply Chain Management literature, as well as practical implications for manufacturers, suppliers, and policymakers seeking to enhance performance through supplier collaboration.

However, the study acknowledges several limitations, including its geographic focus on Malaysia, the reliance on self-reported data, and the exclusion of other influential factors such as trust or technological readiness. Based on these limitations, future research is recommended to adopt mixed methods, longitudinal designs, and cross-industry comparisons. It is also suggested that future studies explore additional variables and technologies influencing SDPs, particularly within small and medium-sized enterprises. Overall, this chapter reinforces the value of supplier development as a strategic tool for automotive manufacturing performance enhancement and outlines pathways for expanding the research scope in future investigations.

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**Appendix A: Questionnaires**

# Research Questionnaires Survey

Dear Respondents,

My name is Sunderamoorthy A/L Thulasi Das. 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, "A Study Of Supplier Development Programs On Malaysian Automotive Manufacturing Performance."

Thank you in advance for participating in my research study. Your valuable insights are crucial to my research. The questionaries 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.

Sunderamoorthy A/L Thulasi Das

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**Section A: Demographic** *

**Please click the answer**

**1. What is your organization size?**

- Medium
- Small
- Micro

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

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

**3. What is your designation?** *

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

**4. 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



**5. What types of your organization ownerships?** *

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

## 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.**

**Supplier Assessment**

***Note.*** *Supplier assessment is a systematic process of evaluating and rating the performance and capabilities of suppliers against predetermined criteria. It involves collecting and analyzing data on various aspects of supplier performance, such as quality, delivery, cost, responsiveness, and innovation. The assessment process can be conducted through various methods, including surveys, audits, site visits, and performance data analysis*

Our company consistently monitors the adherence of suppliers to established standards *

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly Disgree | ○ | ○ | ○ | ○ | ○ | Strongly Agree |

We routinely assess the technological strengths and innovation capacity of our suppliers. *

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

We prioritize suppliers with strong operational stability and long-term viability. *

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

We regularly examine supplier adherence to environmental and social responsibility guidelines. *

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

Our supplier evaluation process effectively identifies dependable and trustworthy partners. *

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

**Performance Monitoring**

***Note.*** *Performance monitoring is the ongoing process of tracking and evaluating supplier performance against established goals and objectives. It involves collecting and analyzing data on various performance metrics, such as quality, delivery, cost, and responsiveness. Performance monitoring can be conducted through various methods, including scorecards, dashboards, regular performance reviews, and supplier self-assessments.*

Our company regularly monitors supplier performance metrics. *

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

We track on-time delivery performance from suppliers consistently. *

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

Our monitoring process effectively identifies defect rates in product supplied by partners. *

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

Key performance indicators (KPI) are extensively used to evaluate supplier performance. *

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

We frequently conduct performance review meetings with suppliers to discuss issues and improvements. *

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

**Collaborative Goal Setting**

***Note.*** *Collaborative goal setting is a process in which buying firms and suppliers work together to establish mutually agreed upon performance targets and objectives. This involves open communication, joint planning, and a shared commitment to achieving common goals. Collaborative goal setting can encompass various aspects of supplier performance, such as quality improvement, cost reduction, lead time reduction, and innovation.*

Our company frequently engages in joint goal-setting activities with suppliers. *

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

Suppliers are actively involved in setting quality improvement targets. *

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

We effectively collaborate with suppliers to set and achieve cost reduction goals. *

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

Our strategic objectives are well-aligned with those of key suppliers. *

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

Supplier input is crucial in formulating new product development goals. *

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

## Section C (Dependable Variable)

### Manufacturing Performance

***Note.*** *Manufacturing performance is a multipronged construct that reflects an organization's ability to effectively and efficiently utilize its resources to achieve its strategic objectives. Within the automotive industry, manufacturing performance encompasses a broad spectrum of metrics that measures the holistic health and competitiveness of a company.*

Supplier collaboration has significantly improved our manufacturing efficiency. *

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

We regularly measure the impact of supplier relationships on overall operational performance. *

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

The quality of supplier products positively impacts our company's production output. *

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

On-time delivery from suppliers has greatly influenced our company's production schedules. *

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

Supplier innovation has contributed to improvements in our manufacturing processes. *

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

## Appendix B: Other SPSS Results

**Statistics**

| | | meanS | meanC | meanP | meanDV |
|---|---|---|---|---|---|
| N | Valid | 170 | 170 | 170 | 170 |
| | Missing | 0 | 0 | 0 | 0 |
| Mean | | 4.3682 | 4.3929 | 4.3976 | 4.4929 |
| Median | | 4.6000 | 4.6000 | 4.6000 | 4.6000 |
| Std. Deviation | | .60856 | .62979 | .70029 | .55348 |
| Skewness | | -1.070 | -1.169 | -1.542 | -1.808 |
| Std. Error of Skewness | | .186 | .186 | .186 | .186 |
| Kurtosis | | .825 | .734 | 2.077 | 4.286 |
| Std. Error of Kurtosis | | .370 | .370 | .370 | .370 |

**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .896 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1898.262 |
| | df | 190 |
| | Sig. | .000 |



**Communalities**

| | Initial | Extraction |
|---|---|---|
| S1 | 1.000 | .759 |
| S2 | 1.000 | .630 |
| S3 | 1.000 | .635 |
| S5 | 1.000 | .601 |
| S4 | 1.000 | .639 |
| C1 | 1.000 | .614 |
| C2 | 1.000 | .607 |
| C3 | 1.000 | .628 |
| C4 | 1.000 | .627 |
| C5 | 1.000 | .702 |
| P1 | 1.000 | .627 |
| P2 | 1.000 | .595 |
| P3 | 1.000 | .773 |
| P4 | 1.000 | .818 |

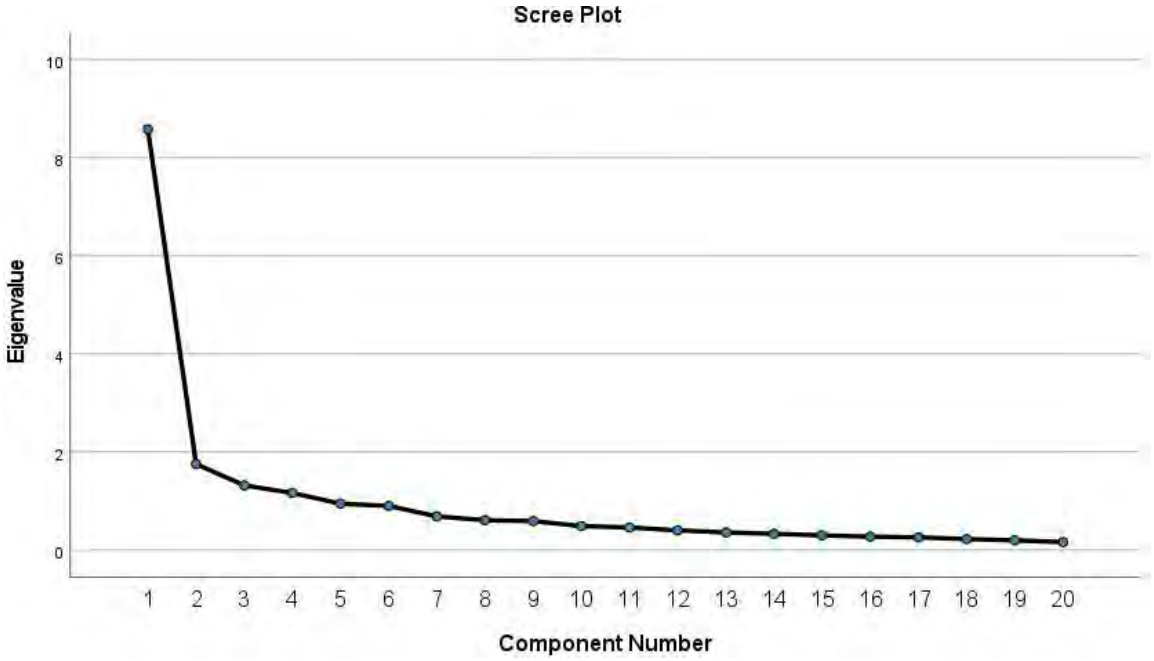
| | | |
|---|---|---|
| P5 | 1.000 | .619 |
| DV1 | 1.000 | .685 |
| DV2 | 1.000 | .420 |
| DV3 | 1.000 | .602 |
| DV4 | 1.000 | .594 |
| DV5 | 1.000 | .640 |

Extraction Method: Principal Component Analysis.

**Total Variance Explained**

| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| Component | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 8.578 | 42.888 | 42.888 | 8.578 | 42.888 | 42.888 |
| 2 | 1.755 | 8.774 | 51.661 | 1.755 | 8.774 | 51.661 |
| 3 | 1.319 | 6.593 | 58.254 | 1.319 | 6.593 | 58.254 |
| 4 | 1.164 | 5.818 | 64.072 | 1.164 | 5.818 | 64.072 |
| 5 | .945 | 4.725 | 68.798 | | | |
| 6 | .901 | 4.505 | 73.303 | | | |
| 7 | .686 | 3.430 | 76.733 | | | |
| 8 | .608 | 3.042 | 79.775 | | | |
| 9 | .590 | 2.950 | 82.724 | | | |
| 10 | .489 | 2.444 | 85.168 | | | |
| 11 | .460 | 2.300 | 87.468 | | | |
| 12 | .402 | 2.010 | 89.478 | | | |
| 13 | .358 | 1.792 | 91.270 | | | |
| 14 | .332 | 1.661 | 92.931 | | | |
| 15 | .299 | 1.496 | 94.427 | | | |
| 16 | .273 | 1.365 | 95.792 | | | |
| 17 | .259 | 1.295 | 97.086 | | | |
| 18 | .223 | 1.117 | 98.203 | | | |
| 19 | .198 | .992 | 99.195 | | | |
| 20 | .161 | .805 | 100.000 | | | |

Extraction Method: Principal Component Analysis.




**Component Matrix[a]**

| | Component | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| S1 | .511 | -.305 | .633 | .063 |
| S2 | .620 | -.221 | .434 | .091 |
| S3 | .631 | -.176 | .451 | .048 |
| S5 | .709 | -.191 | .119 | -.217 |
| S4 | .727 | -.289 | .155 | -.061 |
| C1 | .487 | -.303 | -.151 | .512 |
| C2 | .665 | -.148 | -.297 | .237 |
| C3 | .639 | -.197 | -.236 | .354 |
| C4 | .662 | -.261 | -.334 | .095 |
| C5 | .740 | -.208 | -.291 | .162 |
| P1 | .762 | .028 | -.093 | -.193 |
| P2 | .712 | -.100 | -.089 | -.266 |
| P3 | .783 | .079 | -.176 | -.349 |
| P4 | .757 | .011 | -.161 | -.468 |
| P5 | .748 | .151 | -.038 | -.188 |
| DV1 | .572 | .546 | .141 | .199 |
| DV2 | .579 | .263 | .094 | .078 |
| DV3 | .516 | .515 | .138 | .227 |
| DV4 | .508 | .544 | -.040 | .195 |

| | | | | |
|---|---|---|---|---|
| DV5 | .639 | .479 | .032 | -.013 |

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

**Correlations**

| | | meanS | meanC | meanP | meanDV |
|---|---|---|---|---|---|
| meanS | Pearson Correlation | 1 | .594** | .644** | .473** |
| | Sig. (2-tailed) | | .000 | .000 | .000 |
| | N | 170 | 170 | 170 | 170 |
| meanC | Pearson Correlation | .594** | 1 | .647** | .465** |
| | Sig. (2-tailed) | .000 | | .000 | .000 |
| | N | 170 | 170 | 170 | 170 |
| meanP | Pearson Correlation | .644** | .647** | 1 | .603** |
| | Sig. (2-tailed) | .000 | .000 | | .000 |
| | N | 170 | 170 | 170 | 170 |
| meanDV | Pearson Correlation | .473** | .465** | .603** | 1 |
| | Sig. (2-tailed) | .000 | .000 | .000 | |
| | N | 170 | 170 | 170 | 170 |

**. Correlation is significant at the 0.01 level (2-tailed).



**Model Summary[b]**

| | | | | | Change Statistics | | |
|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 |
| 1 | .617[a] | .380 | .369 | .43967 | .380 | 33.939 | 3 | 16 |

a. Predictors: (Constant), meanP, meanS, meanC

b. Dependent Variable: meanDV

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 19.682 | 3 | 6.561 | 33.939 | .000[b] |
| | Residual | 32.089 | 166 | .193 | | |
| | Total | 51.772 | 169 | | | |

a. Dependent Variable: meanDV

b. Predictors: (Constant), meanP, meanS, meanC

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 2.045 | .272 | | 7.528 | .000 |
| | meanS | .107 | .076 | .117 | 1.399 | .164 |
| | meanC | .082 | .074 | .093 | 1.108 | .270 |
| | meanP | .369 | .070 | .467 | 5.277 | .000 |

a. Dependent Variable: meanDV

**Residuals Statistics[a]**

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 3.2254 | 4.8323 | 4.4929 | .34127 | 170 |
| Residual | -1.53711 | 1.15824 | .00000 | .43575 | 170 |
| Std. Predicted Value | -3.714 | .994 | .000 | 1.000 | 170 |
| Std. Residual | -3.496 | 2.634 | .000 | .991 | 170 |

a. Dependent Variable: meanDV