A Study of Supply Chain Management on Supply Chain Performance in Automotive Industry

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***Abstract**:*

A supply chain performance (SCP) consists of the elements of the supply chain and the entities that influence the goods, information and management through the supply chain. Current issues that are impacting the supply chain performance in the manufacturing industry are distributor performance, logistics, growth and supply chain limitations, cost of inventory and quality of goods supplied. The objective of this study is to determine the relationship between supply chain management (supplier selection and logistic collaboration) on SCP. For the data collection, questionnaires have been used to distribute among the automotive industry. 95 questionnaires have been distributed randomly to the automotive companies. For the data analysis method, the statistical package of the social science model which is the IBM SPSS model has been used to calculate the data collection.

Keywords: Supplier selection, logistic collaboration, supply chain management, supply chain performance

1. Introduction

As mentioned by Fernando *et al.* (2018), it has been seen that the Malaysian government has set up a nationwide car program which is expected to be helpful in developing their local industries as well. However, it is of utmost importance to choose the right supplier for the automotive industry of Malaysia as the quality of raw materials is highly dependent on the supplier. Thus, overall quality of the cars thus produced by the automotive industry of Malaysia is partially dependent on the selection process of the suppliers. Because of rising levels of employment, a greater standard of living, more ability to spend, customer desire for luxury vehicles, and increased per capita automobile possession, Malaysia has emerged as one of the nations with the fastest rise in the middle-income population. In such a situation where demand for car is growing continuously, it is necessary to select the right supplier for the automotive industry in Malaysia.

Modern industry has been heading towards a more accurate division of labor as network technology and economic globalization have advanced rapidly. As a result, businesses concentrate on developing their core competencies while outsourcing non-core activities to other partners or suppliers with varying professional capabilities in order to improve their competitive advantage by utilizing these external and specialized sources of information and technology knowledge. Not only that, consumer behaviors are changing dramatically due to the rise of consumer ideology, thus product life cycles are shortening, and every business must offer a diverse range of custom-made products to meet instant consumer wants. These constraints push businesses to invest heavily in supply chain management (SCM) and form strategic relationships with their rivals.

When numerous businesses form their own supply chain, this is known as SCM. To improve supply chain competitiveness, these businesses must identify more efficient suppliers. Hence, to identify more collaborative suppliers who can form long-term partnerships among the numerous accessible providers is a fundamental challenge in establishing a supply chain and improving its efficiency. Numerous evaluation criteria and selection frameworks for supplier selection have been defined in earlier studies on supplier selection and evaluation. Dickson (1966), for example, conducted a poll of purchasers to see what characteristics they evaluated when granting contracts. Dickson concluded that quality, delivery, and performance history are the three most relevant characteristics out of the 23 studied. A significant parameter expected to impact supplier selection decisions in another study (Weber et al, 1991).

These variables were culled from 74 similar articles published since Dickson's famous study. They concluded that pricing was the most important criteria, followed by delivery and quality, after a thorough examination of vendor evaluation methodologies.

These empirical studies demonstrated that numerous selection variables such as price, quality, and delivery performance have similar relative value. Since the 1980s, the relevance of strategic vendor evaluation and numerous vendor criteria has grown as the emphasis on just-in-time manufacturing strategies has grown (Chen, 2011).

Currently, logistics and supply chain management (SCM) practitioners face a number of issues, including eliminating supply chain disruptions, enhancing the flow of commodities, and limiting bullwhip effects. Firms are building unique skills in digitalization or Industry 4.0, sustainability, servitization, and e-commerce, among other areas, to handle these expanding difficulties. The process by which practitioners use proposed theoretical models and developing technology to meet logistics and SCM difficulties, on the other hand, is a major aspect in intellectual discourse. Academic research has been chastised for its lack of relevance and connection to practise (Alvesson et al., 2017).

Logistics is one of the most significant aspects of the SCM concept. Because logisticians are naturally preoccupied with cross-functional issues, SCM has played a significant role in logistics research during the last two decades. We are aware of best practice firms in the field of logistics that have implemented collaboration based on the SCM philosophy and achieved exceptional outcomes. A number of factors must be addressed in order to provide a comprehensive explanation of logistics collaboration in supply chains. First and foremost, the content of the collaboration is explored, that is, what organizations actually accomplish when they collaborate and in what logistics areas this is done. The number of companies participating in the collaboration is also taken into account. Finally, the content of the actual collaboration is tied to the driving factors, impediments, and impacts discussed in the backdrop (Sandberg, 2005).

1.1 Research Background

Automotive industry, all those companies and activities involved in the manufacture of motor vehicles, including most components, such as engines and bodies, but excluding tires, batteries, and fuel (Rae, 2022). The Malaysian economy has benefited greatly from the automotive sector since the first local car, the "PROTON," was produced in 1983. Malaysia now has more than 20 production and assembly facilities where goods such as passenger cars, trucks, motorbikes, and scooters are produced. As mentioned by Fernando *et al.* (2021), a total of over 572,000 passenger vehicles and commercial vehicles were produced and assembled in autos in 2019. Malaysia is the third-largest country in Southeast Asia behind Thailand (around 2 million units) and Indonesia (approximately 1.29 million units). In order to assess the performance of the automotive industry of Malaysia, it is necessary to evaluate the performance of the supply chain of the industry. "Supply chain management" has developed into a crucial element of organizational competitiveness during the past two decades. It has been noted that attention from many forums is presently concentrated on performance assessment connected to the supply chain. "Supply chain performance" and efficient "supply chain management" are widely acknowledged as crucial elements in helping businesses obtain a competitive edge.

The modern business world is a web of interlinked enterprises and organizations that are active participants in a vast supply network (Li et al., 2018). In this dynamic environment, supply chain management and logistics have been subjected to significant fundamental structural changes and are vulnerable to several threats at all levels (Strange et al., 2017). The rising intensity of competition has made the situation a fundamental and vital aspect of any organization’s effectiveness and also efficient management of this process. In this aspect, supply chain management (SCM) is important for keeping the business competitive in the global market by successfully managing operations from the supplier to the end consumer. SCM is concerned with and manages the business from raw material procurement through production to distribution, customer support, and eventually product reprocessing and disposal. Every SC strives to enhance their performance in order to meet the customer's expectations (Reddy et al, 2019).

Supplier selection is critical in assisting a firm in achieving optimum environmental and economic advantages (Luthra et al, 2016).As a consequence of elevated globalization, company competitiveness is increasing and new approaches to prosper in the economic climate are required. During the 1980s and 1990s, scholars and business practitioners noticed a new tendency toward integration and collaboration rather than so-called arm’s length agreements between suppliers and customers (Sandberg, 2005). Throughout this view, the degree of supply chain collaboration has a strong link to the use of SCM practices to improve competitive capacities and company performances.

Therefore, collaboration is used as a method for organizations to collaborate in a recursive process in order to achieve common objectives (Liao et al., 2017). To accomplish collaboration, businesses must pick the best supplier by matching their interorganizational needs and capabilities. Buyers must use selection criteria to validate suppliers' competencies and, as a result, ensure effective long-term collaborations.

The selection of a logistic service requires relational and organizational elements that facilitate collaboration, such as information exchange, trust, commitment, top management engagement, and cultural features. As a result, we argue that good supplier selection of logistics service providers leads to logistical collaboration (Miriam et al. 2018). Thus in this research we mainly focus on supplier selection and logistic collaboration.

1.2 Problem Statement

Over the last decade of evolution of SCM, a steady stream of research dealing with supply chain performance measurement (SCPM) has been published. Performance measurement enables the supply chain to strategically manage and continuously control the achievement of objectives. It provides the necessary assistance for performance improvement in pursuit of supply chain excellence (Nedaa et al, 2012). Current issues that are impacting the supply chain performance in the manufacturing industry are distributor performance, logistics, growth and supply chain limitations , cost of inventory and quality of goods supplied (Huang et al., 2003, Singh et al.,2015). On the other hand, manufacturers have turned to the option of adopting innovative technologies, process re-engineering and strategies such as efficient supply chain management to achieve a sustainable competitive advantage.

Liang et al.(2006) highlighted that for an effective supply chain management, there is need for overall performance evaluation of the entire SC, therefore a combination of resources of the chain members in the most efficient way so as to generate competitive as well as cost effective products and services. As a result of this growing dependence, performance is becoming more and more dependent on the activities of suppliers. Reorganizing their supplier base and managing it as an extension of the company's manufacturing system is something that many companies are doing as they continue to look for ways to improve their overall performance (Vonderembse et al.,1999)

Coordination between a manufacturer and suppliers is often a challenging and critical step in the distribution chain in supply chains. Because suppliers are external organizations to the manufacturer, collaboration with them is difficult unless methods for cooperation and information sharing are included. Synchronization among a producer and its suppliers is critical since lack of coordination leads to excessive delays and, eventually, poor customer service (Lee et al., 2001). As a result, stockpiles of inbound parts from suppliers or finished goods at the manufacturer and distribution centers may build up. Thus, the total cost of all supply chains will rise. Manufacturers can help their suppliers by enhancing their knowledge, skills, and expertise, and in turn, benefit from increased delivery performance and fewer production disruptions due to low quality materials (Hartley et al., 1996).

Along with above issues supply chain performance attributes along with their indicator variables like responsiveness, flexibility and resources also merit research and analysis. A SCP consists of the elements of the supply chain and the entities that influence the goods, information and management through the supply chain. The phenomenal growth in international commerce seen in countries such as Singapore, Thailand, Malaysia, and Indonesia As a direct consequence of recent, there has been a rise in the need for logistics services that are both more efficient and effective. In spite of the extraordinary growth of the industry, particularly in Malaysia, very little research has been published in the field of logistics(Ali et al., 2008). As a result, there has been a very restricted diffusion of knowledge for the purposes of coordination, learning, progress, and other similar goals. These influences come through logistics collaboration and supplier selection management and thus affect the supply chain performance (Viswanadham et al.2013).

1.3 Research Question

What is the correlation between supply chain management (supplier selection and logistic collaboration) on supply chain performance

1.4 Research Objectives

To determine the correlation between supply chain management (supplier selection and logistic collaboration) on supply chain performance

2. Literature Review

The literature review section describes all relevant literature related to the research and critically discussed. This section can be structured based on the stated objectives and focus of the study or any logical order as deemed appropriate.

2.1 Supplier Selection

The process of selecting a supplier should be seen as a multi-objective choice that takes into account a variety of tangible and intangible variables in a hierarchical order.

The product or service that is being created, as well as the market that these products or services are aimed at, will determine whether or not the criteria that are being employed are applicable.

When choosing suppliers, caution must be taken because their effects on the organization's overall performance can be either extremely beneficial or extremely detrimental, depending on how they are managed. According to Heizer and Render (2006), the majority of quality problems in an organization are caused by defective material. Carefully selecting suppliers who are also competitive can go a long way toward minimizing adverse impacts and, in fact, enhancing positive impacts on the quality of output produced by an organization. These choices include finance, negotiations, distribution, procurements, and product quality assurance at the source. (Lucas et al,. 2015).

When choosing a supplier, pricing has typically been the primary consideration in the past. In most cases, the entity that is doing the purchase will choose the supplier that offers the lowest prices without taking into account any additional expenses that the cheaper supplier may contribute to the value chain. Because of this, the expenditures that are associated with unpredictable delivery, restricted quality of items delivered, and poor communication are typically not taken into consideration throughout the selection process. However, a large number of studies that have been carried out in the field of criteria identification have come to the conclusion that supplier selection is based on a variety of interactive criteria, and that multi-criteria decision-making techniques have become standard practice in the methodology of supplier selection. The fact that several variables must be taken into consideration throughout the decision-making process makes supplier selection selections significantly more difficult. (Nikhil Chandra Shil, 2010).

2.2 Logistic Collaboration

Collaboration in logistics include actions in logistics such as cooperative planning and information exchange. Strategic planning receives less attention in this context (Sandberg, 2007). In terms of logistics, these tasks include, providing customer support, anticipating and planning demand, transporting goods and processing orders, storing them, managing inventories, handling and packing materials, and communicating logistics (Hotrawaisaya et al., 2014).

"Lead time", "on-time delivery", and "service level" are three indicators of logistics performance. By facilitating information exchange between supply chain participants, evaluating logistics performance shifts the spotlight from financial and strategic performance to operational performance. Businesses must understand the strategic significance of the logistics system if they are to fulfill tasks successfully. Malaysia has developed into one of the top logistics hubs in the world over the years by using its strengths as a distribution and transportation hub. The degree to which logistics managers engage in the company's strategic formulation and planning may be used to gauge the strategic value of the logistics function.

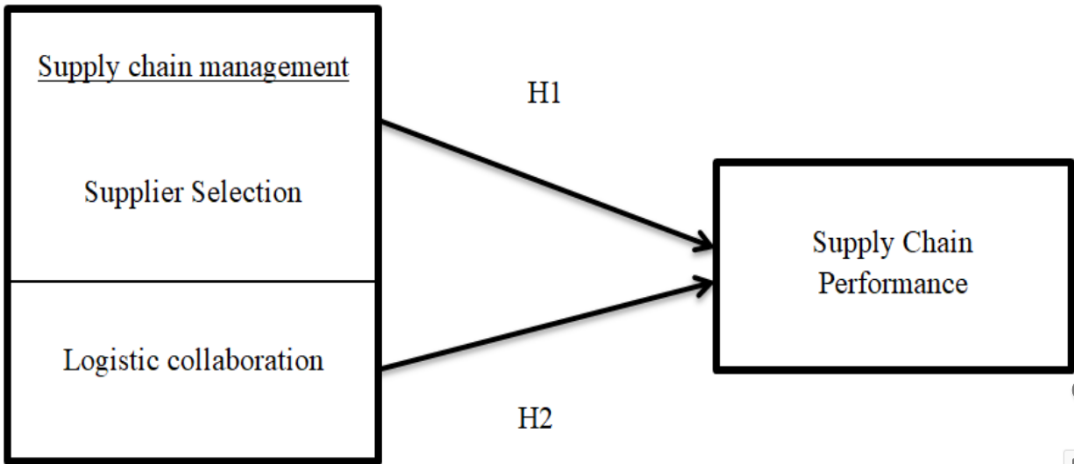
2.3 Supply Chain Performance

According to Green and Inman (2005), supply chain performance is the ability to deliver quality products and services in precise quantities and at precise times with the goal of minimizing the total cost of the products and services to the ultimate customers of the supply chain. The effectiveness of a supply chain may be evaluated, according to Najmi and Makui (2012), by analyzing its flexibility, dependability, responsiveness, quality, and asset management. In a similar manner, Bourlakis et al. (2014) take into consideration performance measures that are associated with flexibility, efficiency, responsiveness, and quality. The agility, flexibility, and alignment of the supply chain partners are what determines the performance of the supply chain, and there is a positive correlation between supply chain strategy and the overall performance of the supply chain (Lee, 2004). The success of a supply chain is notoriously difficult to quantify due to its inherent characteristics yet, it is possible to gauge it based on how satisfied immediate rather than final consumers are (Green et al. 2008).

According to Beamon (1996), the supply chain performance indicators that are most important to him are resource, output, and flexibility metrics. Resource assesses inventory levels, staff requirements, equipment use, energy usage, and cost. In most cases, the minimal need (in terms of quantity) or a composite efficiency measure is used to evaluate a resource's effectiveness. The term "flexibility," which is rarely used in supply chain analysis, can be used to quantify the capacity of a system to accept changes in volume and schedule brought on by suppliers, manufacturers, and customers (Waweru et al,. 2015). According to (Holweg, 2005), responsiveness is the ability to react purposefully and within an appropriate time-scale to customer demand or changes in the marketplace, to bring about or maintain competitive advantage.

2.4 Conceptual Framework

Figure 1: Conceptual framework of the research



2.5 Supplier Selection and Supply Chain Relationship

Suppliers have to be selected carefully, as they can have a very positive or a very adverse impact on the overall performance of the organization. It has been reported that a majority of quality problems of an organization are due to defective material (Heizer & Render, 2006) and carefully selected, competitive suppliers can go a long way in minimizing adverse impacts and in fact in enhancing positive impacts on the quality of output of an organization. One may make the case that improved ties with suppliers ought to result in enhanced performance throughout the supply chain. However, research has shown that this seemingly "obvious" relationship between supplier relations and supply chain performance is in fact, subtle and depends on what is being done under the umbrella of "supplier relations" and how it is being done. This is because the performance of the supply chain is directly influenced by the quality of the relationships that exist between the companies in the supply chain (Baker and Faulkner, 1991; Lambert and Knemeyer, 2004).

H1: The relationship between SS and SCP

2.6 Logistic Collaboration and Supply Chain Relationship

However, the link between SCP and logistics management is not always easy to understand, and many viewpoints exist regarding what each truly entails. There are occasions when SCP and logistics management are viewed in the same way, and as a result, the terms are frequently used interchangeably in published works. It has been shown that collaborative planning activities and information-sharing have a beneficial influence on supply chain performance. However, it is important to keep in mind the quality of the information that is exchanged as well as the amount of trust that exists between the companies (Monczka et al., 1998; Peterson et al., 2005).

H2: The relationship between LC and SCP

3. Research Methodology

The research methodology section describes all the necessary information that is required to obtain the results of the study. The research methodology consists of detailed information regarding workflow, strategy, and approach. The methodology adopted in carrying out the study should be well explained.

3.1 Research Design

The survey design is a quantitative study procedure where researchers conduct surveys on samples or research populations to explain the attitude, views, behavior and characteristics of the population. Therefore, the design of quantitative research and research instruments in the form of questionnaires in this study. Our questionnaire is designed and integrated based on the attributes identified in the literature review. The initial questionnaire was applied to the top management of the company. The questionnaire is divided into four different sections: demographic, supplier selection (SS), logistic collaboration(LC) analysis and supply chain performance(SCP).

3.2 Data Collection

The process of collecting information from all of the relevant sources is known as data collection. The purpose of data collection is to uncover solutions to the research topic, test the hypothesis, and assess the results.

Questionnaires are divided in 4 parts which is section A, B, C and D. Section A consists of demographics, section B supplier selection, section C logistic collaboration and section D supply chain performance.

3.3 Data Analysis

For the data analysis method, the statistical package of the social science model which is the IBM SPSS model is used to calculate the data collected from the survey. SPSS is a software program used by researchers in various disciplines for quantitative analysis of complex data. It enables users to quickly and efficiently acquire clean data from the widest range of sources using an expansive array of methods specific data collection procedures or methods required to be described clearly. By using IBM SPSS, reliability test, normality test, correlation test and also cronbach's alpha test is calculated.

4. Results and Discussion

The results and discussion section presents data and analysis of the study. This section can be organized based on the stated objectives, the chronological timeline, different case groupings, different experimental configurations, or any logical order as deemed appropriate. All the data that has been collected from the questionnaire are defining the objective of this study which is determining the relationship between supply chain management and supply chain performance.

4.1 Demographic

The following section is the findings of this research in terms of general profile of the respondents. In this section, there are four questions which are gender, age, working experience and also education qualification. There are 77 respondents who have taken part in this research.

4.1.1 Gender

The figure and table 2 shows the options of gender in this research. Majority respondent are male which is 41 people (53.2%) while 36 respondents are female with 46.8%.

4.1.2 Age

Based on the figure and table 2, it is shown that the majority of respondents are from 20 to 30 years old with the highest percentage which is 54.5%. Second highest is the age between 41 to 50 years old (27.3%). Followed by the age group between 31 to 40 with 13 respondents (16.9%) and 51 years old above only one respondent (1.3%).

4.1.3 Education qualification

The figure and table 3 shows the education qualification of this survey. Majority respondent has a degree qualification which is43 respondents equivalent to 55.8%. Next is STPM / diploma qualified where 20 respondents equivalent to 26%.Master qualified respondents are 12 people (15.6%). Followed by SPM and PHD each of the education qualifications has one respondent equivalent to 1.3%.

4.1.4 Working experience

The figure and table 4 shows the respondent's working experiences. Majority respondent working experiences are 1 to 10 years which is 46 respondents (59.7%). 15 respondents have 11 to 15 years of working experience equivalent to 19.5%. Next, 16 to 20 years of working experience has 13 respondents (16.9%) and 3 respondents with 21 years and above working experience with 3.9%.

4.2 Reliability test

Cronbach's alpha is a reliability coefficient that can show the positiveness of a set of items correlated to each other. Cronbach's alpha normally ranges in value between 0 and 1. The value closer to one is indicated as a higher internal consistency while the value closer to zero that indicated as a lower internal consistency (NSSE,2012).

Table below shows the reliability coefficient value.

Cronbach's alpha value	Reliability
> 0.90	Excellent
0.70 – 0.89	Good and acceptable
0.60 – 0.69	Acceptable
0.50 – 0.59	Poor
< 0.50	Unacceptable

Table 5: Cronbach's alpha value

Description of dimension	No of item	Cronbach's alpha	Deleted item
Cost	5	0.836	-
Quality	4	0.771	-
Lead time	5	0.880	-
On time delivery	5	0.908	-
Service level	5	0.876	-
Responsiveness	5	0.875	-
Flexibility	5	0.907	-
Resources	4	0.852	-

Table 6: Reliability test value

After the real study is being conducted, the table above shows that the overall Cronbach's alpha value is 0.863 with 38 questions. The entire variable is between 0.771 - 0.908 Cronbach's alpha so it means the reliability is good and excellent. Thus, the entire variable has high reliability.

4.3 Descriptive analysis for section B

Part B in this questionnaire survey contains 9 questions designed to obtain information on supplier selection. There are two elements that are being studied, which is the cost and quality. Likert scales are used to determine supplier selection elements values. This section analyzes the minimum value, maximum value, mean and also standard deviation.

4.3.1 Cost

Based on table 7, the highest mean score is 4.01 which is 'The supplier gives discount for bulk order' and the lowest mean score is 3.84 which is 'The supplier provides the product at a low price'. On average the mean score for cost is 3.94and the interpretation level is high.

4.3.2 Quality

Based on table 8, the highest mean score is 4.19 which is 'The product needs to be ISO certified' and the lowest mean score is 4.08 which is the 'Supplier need to provide sample before first ordering'. On average the mean score is 4.13 and it has the higher interpretation level.

4.4 Descriptive analysis for section C

Part C in this questionnaire survey contains 15 questions designed to obtain information on logistic collaboration. There are three elements that are being studied which are the lead time, on time delivery and also service level. Likert scales are used to determine logistic collaboration elements values and each element has five questions in it. This section analyzes the minimum value, maximum value, mean and also standard deviation.

4.4.1 Lead time

Based on table 9, the highest mean score is 4.13 which is 'The company can operate according to the plan for limited downtime' and the lowest mean score is 3.90 which is the 'The company's lead time is calculated accurately'. On average the mean score is 4.03 and it has the higher interpretation level.

4.4.2 On time delivery

Based on table 10, the highest mean score is 4.17 which is 'The company has good back-up plans for unexpected deliveries and the lowest mean score is 4.0 which is the 'The company is able to track the good deliveries in order to avoid any misconducting'. On average the mean score is 4.09 and it has the higher interpretation level.

4.4.3 Service level

Based on table 11, the lowest mean score is 4.01 which is 'The company has a high capacity to supply on time upon customer's request' and the highest mean score is 4.21 which is the 'The company is able to satisfy the customers regarding their products and services'. On average the mean score is 4.10 and it has a higher interpretation level.

4.5 Descriptive analysis for section D

Part D in this questionnaire survey contains 14 questions designed to obtain information on supply chain performance. There are three elements that are being studied which are responsiveness, flexibility and also resources. Likert scales are used to determine supply chain performance elements values and each element has four to five questions in it. This section analyzes the minimum value, maximum value, mean and also standard deviation.

4.5.1 Responsiveness

Based on table 12, the highest mean score is 4.17 which is 'The company is able to rapidly introduce large numbers of product improvements/ variation and the lowest mean score is 3.84 which is the 'The company is able to handle difficult nonstandard orders'. On average the mean score is 4.04 and it has a higher interpretation level.

4.5.2 Flexibility

Based on table 13, the highest mean score is 4.19 which is 'Ability to respond to and accommodate the periods of poor supplier performance' and the lowest mean score is 4.04 which is the 'Ability to respond to and accommodate the periods of poor manufacturing performance such as machine breakdown'. On average the mean score is 4.10 and it has the higher interpretation level.

4.5.3 Resources

Based on table 14, the highest mean score is 4.25 which is 'The company able to minimize the cost' and the lowest mean score is 4.08 which is the 'Efficient utilization of resources'. On average the mean score is 4.16 and it has the higher interpretation level.

4.6 Normality test

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Av COST	.152	77	.000	.951	77	.005
Av QUALITY	.193	77	.000	.920	77	.000
Av LEAD TIME	.171	77	.000	.924	77	.000
Av ON TIME DELIVERY	.188	77	.000	.884	77	.000
Av SERVICE LEVEL	.200	77	.000	.916	77	.000
Av RESPONSIVENESS	.161	77	.000	.934	77	.001
Av FLEXIBILITY	.162	77	.000	.911	77	.000
Av RESOURCE	.174	77	.000	.909	77	.000
a. Lilliefors Significance Correction						

Table 15: Normality test

Table above shows kolmogorov-smirnov analysis and shapiro-wilk analysis is used to test data normality. Because the sample size is over 50 the kolmogorov-smirnov test is used. The analysis results show the significance level for all the elements in supplier selection, logistic collaboration and supply chain performance. Majority of the element has value $p<0.05$, it shows that the data is not normal.

4.7 Spearmen correlation;s rho

Spearman correlation's rho is used in this study because the data set tested in the normality test is abnormal distribution. Coefficient of spearman correlation's rho varies between-1 and +1. The higher the value of the coefficient, the stronger the relationship between independent variable and dependent variable (Andy, 2009). The significance value must be $p<0.05$ for hypothesis to be accepted otherwise it will be not accepted.

Correlation range	Interpretation
Below 0.20	Very weak correlation
0.21-0.40	Weak correlation
0.41-0.60	Moderate correlation
0.61-0.80	Strong correlation
0.81-1.00	Very strong correlation

Table 16: Correlation range value

Correlations					
			Av SS	Av LC	Av SCP
Spearman's rho	Av SS	Correlation Coefficient:	1.000	.776**	.706**
		Sig. (2-tailed)	.	.000	.000
		N	77	77	77
	Av LC	Correlation Coefficient	.776**	1.000	.826**
		Sig. (2-tailed)	.000	.	.000
		N	77	77	77
	Av SCP	Correlation Coefficient	.706**	.826**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	77	77	77

Table 17: Correlation analysis

The table above shows the overall spearmen correlation's rho of this study. The spearman correlation's rho between supplier selection and supply chain relationship has value 0.706, it means strong correlation and the significant value is 0.00 and if the value $p<0.05$, it means that the hypothesis is accepted. The spearmen correlation's rho for logistic collaboration and supply chain relationship has value 0.826, it means very strong correlation and the significant value is 0.00 and if the value $p<0.05$, it means that the hypothesis is accepted.

4.8 Discussion

The relationship between supply chain management (supplier selection and logistic collaboration) and supply chain performance

Based on the study, the mean of supplier selection is 4.036. Majority respondent agreed that cost and quality of the supplier supplying the product is important to be taken note. From those indicators, quality has the highest mean which is 4.13 compared to cost which is 3.94. Question from cost which is 'the supplier gives free distribution/logistic costs' and question from quality which is 'the product need to be ISO certified' has recorded the highest agreeableness of respondents to it.

Therefore for logistic collaboration the mean is 4.073.There are three elements that indicate logistic collaboration which is lead time, on time delivery and also service level. From the indicator, service level has the highest mean of them which is 4.099 Most of the respondent showed their high agreeableness to the question 'The company's lead time is calculated accurately', 'The company able to track the good deliveries in order to avoid any misconducting', and 'The company is able to reach customer's demand'.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Av COST	77	2.40	5.00	3.9429	.62142
Av QUALITY	77	3.00	5.00	4.1299	.53743
Av LEAD TIME	77	3.00	5.00	4.0338	.62019
Av ON TIME DELIVERY	77	1.20	5.00	4.0857	.66049
Av SERVICE LEVEL	77	3.00	5.00	4.0987	.61953
Av RESPONSIVENESS	77	2.60	5.00	4.0390	.62664
Av FLEXIBILITY	77	3.00	5.00	4.1013	.62545
Av RESOURCE	77	3.00	5.00	4.1591	.61493
Valid N (listwise)	77				

Table 18: Descriptive statistics analysis

5.2.1.1 Hypothesis 1: The relationship between supplier selection and supply chain performance

H1 is about the relationship between supplier selection and supply chain performance and there are two elements used as indicator of supplier selection which is cost and quality. The result shows that H1a and H1b have the significant value $p<0.05$ which is 0.00, it means that the hypothesis has been accepted based on the data.

5.2.1.2 Hypothesis 2: The relationship between logistic collaboration and supply chain performance

H2 is about the relationship between logistic collaboration and supply chain performance and there are three elements used as indicator of supplier selection which is lead time, on time delivery and also the service level. The

result shows that H2a, H2b and H2c have the significant value p<0.05 which is 0.00, it means that the hypothesis has been accepted based on the data.

	Hypothesis	Significance value	Correlation coefficient	Hypothesis accepted / rejected
H1a	Cost is positively related to supply chain performance	0.000	0.687	Accepted
H1b	Quality is positively related to supply chain performance	0.000	0.627	Accepted
H2a	Lead time is positively related to supply chain performance	0.000	0.810	Accepted
H2b	On time delivery is positively related to supply chain performance	0.000	0.687	Accepted
H2c	Service level is positively related to supply chain performance	0.000	0.791	Accepted

Table 19: Hypothesis testing

5. Conclusion

The finding of this survey is to answer the research question and to achieve the research objectives. By carrying out the appropriate method on research survey data, it is found that supplier selection and logistic collaboration has a relationship with supply chain performance which means cost, quality, lead time, on time delivery and service level are related to supply chain performance (responsiveness, flexibility and resources).

The future studies are encouraged by using the mix of the method –qualitative and quantitative method. Quantitative method involves numerical data only but qualitative method deals with words which are more subjective. By using qualitative methods such as interviews, the respondents are given a chance to provide their own opinion towards the research. Thus, the combination of research methods may add valuable information as the qualitative gives researchers a deeper understanding and details while quantitative provides statistical evidence.

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Appendix A

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	36	46.8	46.8	46.8
	Male	41	53.2	53.2	100.0
	Total	77	100.0	100.0	

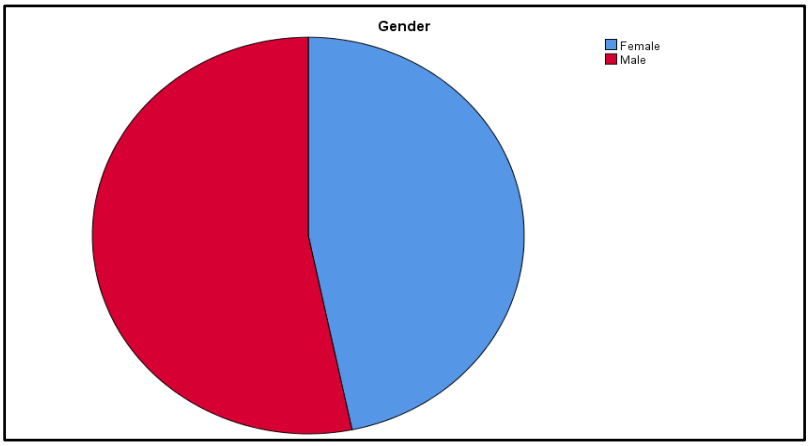

Table 2: shows gender in demographic

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 30	42	54.5	54.5	54.5
	31 - 40	13	16.9	16.9	71.4
	41 - 50	21	27.3	27.3	98.7
	51 and above	1	1.3	1.3	100.0
	Total	77	100.0	100.0	

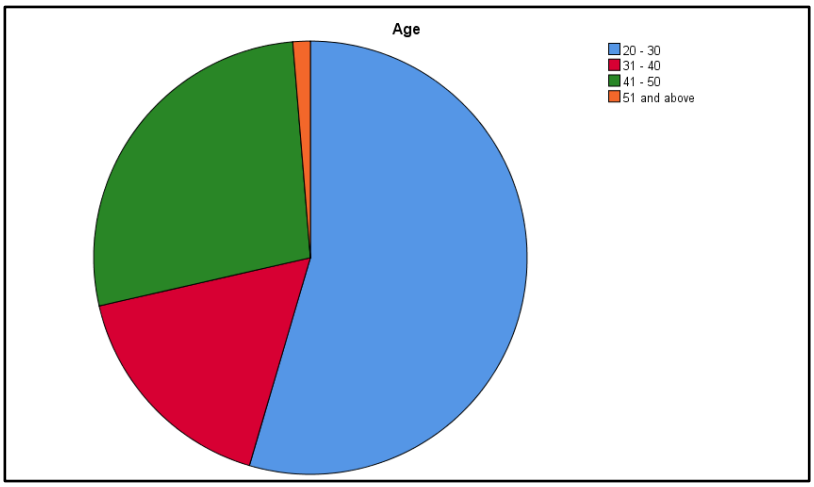

Table 3: shows age in demographic

Education qualification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DEGREE	43	55.8	55.8	55.8
	MASTER	12	15.6	15.6	71.4
	PHD	1	1.3	1.3	72.7
	SPM	1	1.3	1.3	74.0
	STPM / DIPLOMA	20	26.0	26.0	100.0
	Total	77	100.0	100.0	

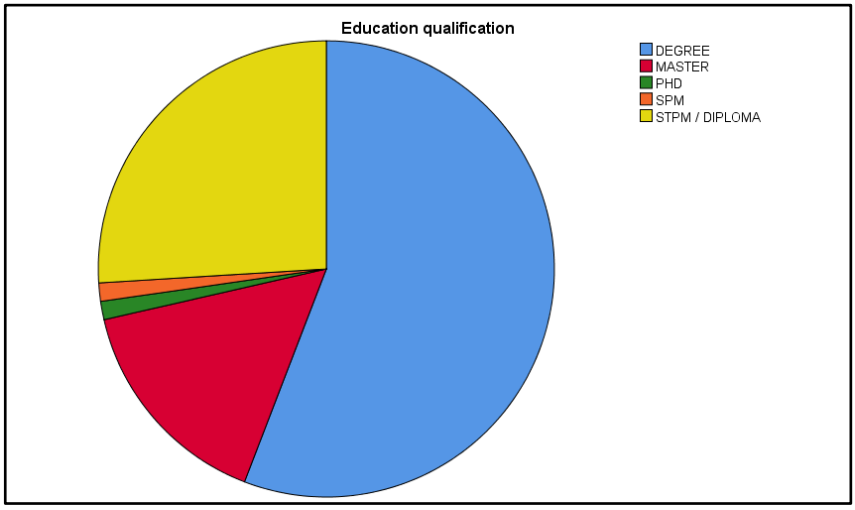

Table 4: shows education qualification in demographic

Working experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 10 years	46	59.7	59.7	59.7
	11 - 15 years	15	19.5	19.5	79.2
	16 - 20 years	13	16.9	16.9	96.1
	21 years and above	3	3.9	3.9	100.0
	Total	77	100.0	100.0	

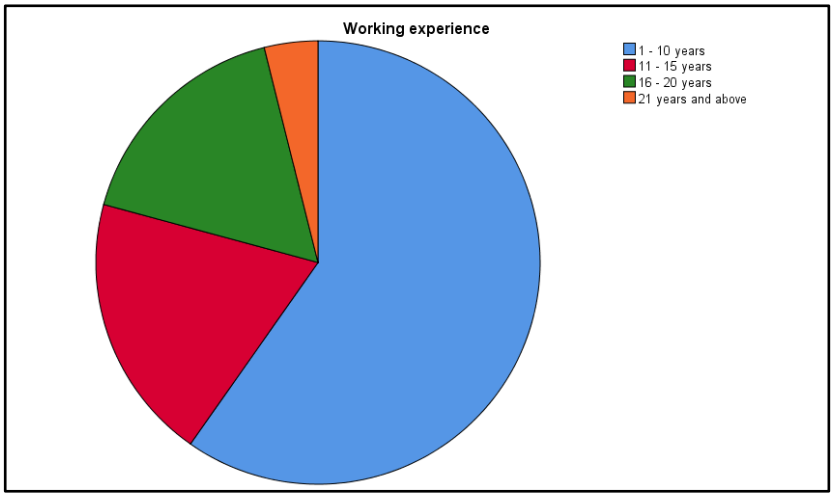

Table 5: shows working experience in demographic

Descriptive analysis

Basic analysis in research is descriptive statistics. Descriptive statistics are used to describe the characteristics of the sample in the form of minimum, maximum, mean and standard deviation. Descriptive statistics allow easier interpretation of the data.

Mean score range	Interpretation level
5.00-3.67	Higher
3.66-2.33	Moderate
2.32-1.00	Lower

Table 6: Level of interpretation (Chua,2006)

Descriptive Statistics of Cost					
	N	Minimum	Maximum	Mean	Std. Deviation
The supplier provide product in low price	77	2	5	3.84	.812
The supplier gives free distribution/logistic costs	77	1	5	3.90	.867
The supplier provide free after sales service	77	2	5	3.99	.819
The supplier gives discount for bulk order	77	2	5	4.01	.734
The supplier gives discount for early payment	77	2	5	3.97	.760
Valid N (listwise)	77				

Table 7: shows descriptive statistic for cost

Descriptive Statistics of Quality					
	N	Minimum	Maximum	Mean	Std. Deviation
The product supplied need to be met its minimum standard and requirement	77	3	5	4.09	.672
The product has long durability	77	3	5	4.16	.650
The product need to be ISO certified	77	3	5	4.19	.689
Supplier need to provide sample before first ordering	77	2	5	4.08	.774
Valid N (listwise)	77				

Table 8: shows descriptive statistic for quality

Descriptive Statistics of Lead Time					
	N	Minimum	Maximum	Mean	Std. Deviation
The company's lead time is calculated accurately.	77	3	5	3.90	.788
The company can operate according to the plan for limited downtime.	77	3	5	4.13	.767
The company can produce at a higher rate and be able to fulfill the requirements.	77	3	5	4.05	.686
The company has reduced lead time in order to improve productivity.	77	2	5	4.01	.786
The company's lead time plays a major role in the company's profit.	77	2	5	4.08	.739
Valid N (listwise)	77				

Table 9: shows descriptive statistic for lead time

Descriptive Statistics of On Time Delivery					
	N	Minimum	Maximum	Mean	Std. Deviation
The company can adapt the delivery schedule.	77	2	5	4.09	.747
The company depends on the stock to meet customer's requirements.	77	1	5	4.05	.826
The company is able to track the good deliveries in order to avoid any misconducting.	77	1	5	4.00	.795
The company follows the best practices for product delivery and has a good tracking system.	77	1	5	4.12	.743
The company has good back-up plans for unexpected deliveries.	77	1	5	4.17	.750
Valid N (listwise)	77				

Table 10: shows descriptive statistic for on time delivery

Descriptive Statistics of Service Level					
	N	Minimum	Maximum	Mean	Std. Deviation
The company is able to reach customer's demand.	77	1	5	4.04	.802
The company is able to satisfy the customers regarding their products and services.	77	3	5	4.21	.713
The company is able to evaluate the staff's interaction with customers.	77	2	5	4.06	.749
The company is capable of providing services with a limited time frame.	77	2	5	4.17	.750
The company has a high capacity to supply on time upon customer's request.	77	3	5	4.01	.769
Valid N (listwise)	77				

Table 11: shows descriptive statistic for service level

Descriptive Statistics of Responsiveness					
	N	Minimum	Maximum	Mean	Std. Deviation
The company is able to handle difficult nonstandard orders	77	2	5	3.84	.796
The company is able to meet special customer specification	77	3	5	4.12	.743
The company is able to produce products characterized by numerous features options, sizes and colors	77	1	5	4.01	.835
The company is able to rapidly adjust capacity so as to accelerate or decelerate production in response to changes in customer demand	77	2	5	4.05	.776
The company is able to rapidly introduce large numbers of product improvements/ variation	77	3	5	4.17	.677
Valid N (listwise)	77				

Table 12: shows descriptive statistic for responsiveness

Descriptive Statistics of Flexibility					
	N	Minimum	Maximum	Mean	Std. Deviation
Ability to respond to and accommodate demand variations, such as seasonality.	77	2	5	4.09	.764
Ability to respond to and accommodate the periods of poor manufacturing performance such as machine breakdown.	77	3	5	4.04	.733
Ability to respond to and accommodate the periods of poor supplier performance	77	3	5	4.19	.708
Ability to respond to and accommodate the periods of poor delivery performance	77	3	5	4.12	.688
Ability to respond to and accommodate new products, new markets or new competitors	77	2	5	4.06	.767
Valid N (listwise)	77				

Table 13: shows descriptive statistic for flexibility

Descriptive Statistics of Resources					
	N	Minimum	Maximum	Mean	Std. Deviation
The company able to minimize the cost	77	3	5	4.25	.710
The company could minimize the waste	77	2	5	4.13	.750
The company is environmental friendly	77	3	5	4.18	.702
Efficient utilization of resources	77	2	5	4.08	.791
Valid N (listwise)	77				

Table 14: shows descriptive statistic for resources

SPEARMEN CORRELATION

Correlations								
			avC	avQ	avLT	avOTD	avSL	avSCP
Spearman's rho	Av C	Correlation Coefficient	1.000	.575**	.717**	.565**	.661**	.687**
		Sig. (2-tailed)	.	.000	.000	.000	.000	.000
		N	77	77	77	77	77	77
	Av Q	Correlation Coefficient	.575**	1.000	.633**	.619**	.629**	.627**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.000
		N	77	77	77	77	77	77
	Av LT	Correlation Coefficient	.717**	.633**	1.000	.730**	.789**	.810**
		Sig. (2-tailed)	.000	.000	.	.000	.000	.000
		N	77	77	77	77	77	77
	Av OTD	Correlation Coefficient	.565**	.619**	.730**	1.000	.740**	.687**
		Sig. (2-tailed)	.000	.000	.000	.	.000	.000
		N	77	77	77	77	77	77
	Av SL	Correlation Coefficient	.661**	.629**	.789**	.740**	1.000	.791**
		Sig. (2-tailed)	.000	.000	.000	.000	.	.000
		N	77	77	77	77	77	77
	Av SCP	Correlation Coefficient	.687**	.627**	.810**	.687**	.791**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.
		N	77	77	77	77	77	77
**. Correlation is significant at the 0.01 level (2-tailed).								

Table 20: shows spearmen correlations