FACTORS AFFECTING NEW PRODUCT DEVELOPMENT SUCCESS: A STUDY ON MANUFACTURING SECTOR IN MALAYSIA

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ABSTRACT

New product development has become significantly important for the manufacturing industries. It's the important factors to drive the success or failure of a company where growth and development of the company are solely depend on its ability to introduce the new product. Therefore, the new product development is the criteria that cannot be questioned by the company in maintaining a competitive advantages. The modern business environment nowadays are focused on the development and integration of the supply chain. Supply chain has become an important topic which emphasis on variables that might affect the company and the new product development. This study aims to determine the relationship between some of the supply chain variables that might affect the growth of new product development for the manufacturing industries. There are many important factors in the supply chain where it has contributed to the new product development success. For this study, the factors that been identified are the communication, logistics, supply chain strategy, product development strategy and the top management supports. A total of 238 respondents in various companies within the manufacturing industry in Malaysia's manufacturing sectors has participated in this study by completing the questionnaire survey. SPSS was use to analyze the data and hypothesis testing using several statistical analysis such as reliability analysis, correlation and regression analysis. From this analysis, the supply chain variables showed a significant relationship to the successful new product development in the view of Malaysian manufacturing sectors. It is hope that this study will be beneficial the others in understanding the key terms and can be implement into the new product development so that it is become more successful.

Keyword: Supply Chain, Communication, Logistic, Supply Chain and Product Development Strategy, New Product Development

ABSTRAK

Pembangunan produk baru secara ketaranya telah menjadi penting bagi industri pembuatan. Ia adalah faktor yang penting untuk memacu kejayaan atau kegagalan syarikat dimana pertumbuhan dan perkembangan sesuatu syarikat itu adalah bergantung kepada keupayaannya untuk memperkenalkan produk baru. Oleh itu, pembangunan produk baru adalah kriteria yang tidak boleh dipersoalkan oleh syarikat dalam mengekalkan kelebihan daya saing. Persekitaran perniagaan moden pada masa kini memberi tumpuan kepada pembangunan dan integrasi rantaian bekalan. Rantaian bekalan telah menjadi topik yang penting dimana penekanan kepada pembolehubah yang mungkin memberi kesan kepada syarikat dan pembangunan produk baru. Kajian ini bertujuan untuk mengenal pasti hubungan antara beberapa pembolehubah rantaian bekalan yang mungkin mempengaruhi pertumbuhan pembangunan produk baru untuk industri-industri pembuatan. Terdapat banyak faktor rantaian bekalan yang penting dimana ianya menjadi penyumbang kepada kejayaan pembangunan produk baru. Untuk kajian ini, faktor-faktor yang telah dikenal pasti adalah komunikasi, logistik, strategi rantaian bekalan, strategi pembangunan produk dan sokongan daripada pengurusan atasan. Seramai 238 responden dari beberapa syarikat di dalam industri pembuatan dalam sektor pembuatan Malaysia telah mengambil bahagian dalam kajian ini dengan melengkapkan borang soal selidik kajian. SPSS telah digunakan untuk menganalisis data dan pengujian hipotesis dimana ianya menggunakan beberapa analisis statistik seperti analisis kebolehpercayaan, korelasi dan analisis regresi. Daripada analisa tersebut, pembolehubah rantaian bekalan telah menunjukkan hubungan yang signifikan kepada kejayaan pembangunan produk baru mengikut pandangan sektor pembuatan di Malaysia. Adalah diharapkan supaya kajian ini dapat memberi manfaat kepada orang lain dalam memahami terma-terma dan melaksanakan ke dalam pembangunan produk baru agar ianya lebih berjaya.

Kata kunci: Rantaian Bekalan, Komunikasi, Logistik, Strategi Rantai Bekalan dan Pembangunan Produk, Pembangunan Produk Baru.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the modern business atmosphere, the world has become borderless and full with new successfully product. With the advances in engineering and internet technology, the company has distributed their development and production of their product towards offshore sites and with global outsourcing partners while still maintaining their quality, price and other product criteria through the tightly controlled process. As a consequence, the multinational company has executed their research and development in various aspects such as technology and manufacturing integration in order to maintain the product quality as same as the parent company in offshore and effective outsourcing of raw material, product and technological partners. Hence, the idea of effective and integrative applying of supply chain theories has emerged in the multinational company and this has been put as an important criteria of consideration in any development or development of product.

Supply chain is the key important of the company which is critical to company's ability to compete effectively with other. Supply chain is the whole process of raw materials movement and storage, inventory process and the finished goods from the origin which usually the manufacturer to the consumption which usually the customer (Qrunfleh and Tarafdar, 2013). In the competitive environment, the markets are more to internationalize with high level and dynamic customers. These customers' demands more varieties, high value added, better quality and efficient delivery of the product.

In order to respond to this advent of business challenge, the company or manufacturer set up to develop the business model which require lower cost, faster reaction to demand changes and the improvements to manufacturing and supply networks (Chopra and Meindl, 2001).

With the recent development and exploding of new product on the entire world, several important criteria can't be neglected by the local and multinational company. The criteria such as logistic, networking and communication, marketing, management, customer and strategic planning have been an essential criteria in development of the new product. These criteria are a part of the supply chain variable which has been affected the operation of the company, the manufacturing process, cost and the decision making in the company. Beside, these criteria also affect the success ability, and the product development progress for the local and multinational companies. Therefore, the importance of these supply chain factors and variables is one of the attention of the multinational company in order to growth and maintaining the competitiveness in the world.

The important of new product development are increasing years by years. The new product development either new process or manufacturing for the company or the new product in the markets is the way for companies to maintain their sustainability's in the markets and maintain their competitiveness in the local and global market. Nowadays, the economic globalization has pushed the companies into the global integration in production of goods as the way to enhance the international competitiveness (Passaris, 2006). Moreover, the companies are utilizing their skilled

engineering teams around the world to develop product in the collaborative manner. These all practiced has led to the concept of massive global product development which the companies now rapidly migrating from local product development into cross-functional collaboration in new product development (Eppinger and Chitkara, 2006). In this chapter, researcher will outline the background of the study, problem statement, research questions and objectives, scope and significance of study and finally, the definition of key terms.

1.2 Background of the Study

Beginning in 1990's, the term of supply chain has become famous and a part of the top management vocabulary. At this time, the multinational company also begins to spread their business all over the world. This is including their markets for their product, their research and development and the manufacturing facilities. The global spread of the business is good for profitably and business development as these opened the new market and chances. Nevertheless, it also has come with the new challenges which customer have increased the demand and eager to have new styles or feature for the product. This new dynamic environment of business changes the way of business all over the world. Therefore, the theory of supply chain has become important and play a critical part in the organizations.

Supply chain is the value of activities which involved the planning and controlling activities from suppliers to the customers for the materials, components and the final finished product. A Supply Chain consists of the systems of organization, people,

activities, resources and information that involved in creating a product or services from supplier to customer (Stevens, 1989). According to Evans and Collier (2007), supply chain is one of the part of the value chain which emphases on the physical movement of materials and goods with the financial flow supports. These all process are completed within the supply, the production and the distribution process.

The emerging of the global business environment has made the product demand is increasing. This supply and demand terms are rely heavily on the effectiveness of the logistic for the company. Logistic is defined as the implementing and controlling, planning for the material and finished goods flow from one point to the other point of use which is usually the customer. Logistic has become important especially for modern business. The focus of organization especially the retailing company, is on the agility in supplying the product. Therefore, to gain the logistics agility, the organization requires high quality, low cost and quick responds to demands and market interest. The benefits of these agile of logistic increase the product life cycle, product variety and more involvement or close-interaction with the externals of the company which is suppliers, rivals and more importantly, the customer.

The communication or networking is the criteria that played the important role in ensuring the development of any product. It has become one of the supply chain main objectives or important criteria that has been put into serious consideration. Communication is the tool or the method of exchanging the information or news in order to create or maintain the connection between humans. Communication is important in the manufacturing world as it can create understanding and transfer the

important data internally or externally. In the global economic growth, the company or manufacturer is relies on extensive information changes based on effective communication and networking. These ensure the new product development process is following the schedule, maintaining and ensure the quality of the product as well as to make sure the decision of any improvement and problem is effectively segregated internally or among the suppliers and manufacturer.

In the modern manufacturing world, the company adapts the advances of technology and information technology to become more competitive advantages and generate cost efficient-high profit product. Hence, the company need to integrate their companies, suppliers and their distributors together in a seamlessly integrated organization. However, without proper and efficient strategy, these integration might influence the process of product development and become catastrophe to company and project. Therefore, the needs of supply chain and product development strategy can be neglected at all. These strategies affect and influence the framework of company objectives, corporate strategic decision, the resources and the markets across from manufacturer networks to the customers.

Product development projects require continuous support and collaboration among a group or team from different functional specialties who have or create specific information about the markets and customers (Islam et al. (2009). At the same time, these collaboration also share the cost, resources and costing while development is in progress. This information, cost and others must be shared all across the company with the monitoring of the management and top management. Hence, the importance

of management and top management can't be neglected in the product development process. The management also prepares the idea and innovation, flexibility and other resources that are important during the integration of supply chain and new product development process.

Developing a new product is a priority for the organization as the key of successfulness and remain competitive in the markets. New product development is the process of creating an improved product, modified product, new brand product or to cover the original product through the company's research and development efforts (Brentani, 2001 and Kotler, 1991). Today's, the globalization has hit many of the manufacturers in the world which the development of the new product demand the high contribution and integration of all the manufacturer as these process is sophisticated and challenging. Eppingger and Chitkara (2006) defined the global product development as the activities or the process that spreading across multiple region of the entire world as the method to achieve high value-added to the cost. Global product development leads to maximum value-added to the cost by segregate the higher value activities and resources to lower value activities and resources. These abilities enhances the capability of developing the new product at the same time mitigate the risk within the operations in the entire region of the world.

1.3 Problem Statement

New product development is a complex task and challenging. The activities of new product development (NPD) process are sometimes spread across multiple regions of the entire world in order to achieve high value-added to the cost. This development process combines certain centralized function with engineering and other related product development function distributed to entire sites or region of the world. Despite the amount of ideas created is great for the people who are involved in the new development product, the risk of failure also significantly higher when compare for global product development with the local market (Passaris, 2006). According to Ogama and Piller (2006), the failing rate of new product development is as high as 50 percent, which 95 percent in the United States and 90 percent in the Europe.

In Malaysia, the manufacturing sector recorded an impressive growth performance rate. The manufacturing sector helps increase the Malaysian gross domestic product (GDP). According to the statistics released by the Economic Planning Unit, Malaysian Department of Statistics, the manufacturing industry contributed 23% to gross domestic product (GDP) in 2015. Back in 2010, the manufacturing industry accounted for RM 192.5 billion to the GDP of Malaysia. By 2015, the manufacturing industry accounted for RM 243.9 billion. It is expected that, with the implementation of the 11th Malaysian Economic Plan, the manufacturing industry will contribute up to RM 312.5 billion towards Malaysia's GDP in 2020. The increasing rate of GDP is

helped by the booming in the manufacturing industries as well as the rapid growth of product development.

The benefits of new product development are beginning to become clear. However, the list of factors that can affect the development process are slowly increasing year by year. To achieve maximum results and high value-added development process, the utilization of well integrated supply chain is needed by the company. Managing the supply chain activities such as scheduling, material sourcing, distribution and movement of goods has become an important criteria for the company especially in new product development. As a result, many companies has taken initiatives to conduct the research to increase their capabilities in supply chain management.

According to Feng and Wang (2013), supply chain involves with the critical success of every new product development. Supply chain researchers list out several variables or factors that influence according to new product development such as logistic, communication, strategy, marketing, purchasing and the customers. According to Morash et al. (1996), three factors that influenced new product development are production, logistic and the marketing. Logistics involvement in new product development can benefit in several ways. The logistic process can contribute the efficient distribution and time management in order to bring a new product to the market. With the emerging of new product development in the industry and manufacturing world, the efficient and well-managed logistics become the great influenced which it can associate with distribution and handling of the product, reduce

the cost and damage and at the same time give influenced towards successfulness of new product development (Mustilli and Izzo 2009).

A study from Roethlein and Ackerson (2004) stated that, the quality communications critically influenced the manufacturing supply chain and development of new product. These sharing information within the supply chain throughout quality communication not only shared the cost information, but also other important information such as the production, quality control, research and developments, material and technologies data. Gambetti and Giovanardi (2013) clearly stated the importance of communication throughout the business function and organization. Communication has been identified as a primary function to coordinate the mutual exchanges of information and product flows. Beside, communication also increases the competitive profile, production, planning and operations. Nevertheless, communication playing a primary role in management of supply chain in product development.

With the advent of higher and advance manufacturing technology along with the exploding markets of product either in local or global market, the need of efficient supply chain and product development strategies has been discussed and being researched by the many researchers. The strategy has enabled the managers to clearly understand the links among the products, the process to produce and deliver, and the supply chain activity management among the companies. Besides, the good and efficient strategy also supports the execution of corporate strategy with the resource alignment in responsiveness of the market demand (Stavrulaki and Davis, 2010).

During the product development process, all resources, department and specialty group are gathered together to manufacture the high technology, high value and more sophisticated product. The complexities of systems and product nowadays require integration from all diverse knowledge and personal skills where these cooperation are crucial for new product innovation (Islam et al. 2009). These new product development teams are led by the leader, which encourage the new data for the current and future new product development efforts. In addition, these leaders or top management plays the significant part in simulating an innovation in the companies and product development process. At the same time, these top management also has positive correlated with the successful product development (Richtner and Ahlstrom, 2010). Therefore, the understanding of the importance of top management towards new product development must be clearly identified to ensure the success of product development.

There's very little evidence that show the different supply chain involvement simultaneously. The factors such as logistic, communication, customer involvement, vendor integration, marketing and information technology are really influencing the process and the success of new product development either in local and global market. Hence, this study aims to analyze the factors or variables that are correlated and affected with the new product development success in a manufacturing company. However, this study will only focus on the logistic, communication, strategy and top management supports which are disclosed with the survey through the Malaysian manufacturing industry. Therefore, it is hoped from this study will help and identify the impact of the supply chain variables which is communication, logistic, strategy and top management supports towards new product development.

1.4 Research Objectives

The objective of this study are to analyze the impact of supply chain variables towards new product development success in Malaysian manufacturing industries specifically in Kedah and Pulau Pinang. The specific objectives for this study attempts to achieve are as follows:

i) To identify the relationship between supply chain variables towards new product development success

ii) To determine the impact of supply chain variables towards new product development success.

1.5 Research Questions

This study is attempting to explore the impact of the supply chain variables towards new product development success. In order to achieve the objectives, researcher focus on the following question:

i) Is there any relationship between supply chain and new product development success?

ii) Is there any relationship between communication and new product development success?

iii) Does the logistic have influence towards new product development success?

iv) Does top management support have influence towards new product development success?

v) Is there any relationship between supply chain and product development strategy toward the new product development success?

1.6 Significance of the Study

This paper is aimed to identify and analyze the relationship and the impact of supply chain variables which are communication, logistic, strategy and top management supports towards new product development success. The findings and results can benefit the researcher in term of understanding the key terms such as supply chain, communication, logistic, top management supports, supply chain and product development strategy, and also the process of new product development.

The findings from this research also can benefit the researcher and others in the validity of the supply chain variables towards the new product development success which has been analyzed from previous researcher. Hopefully, the results and findings from this research with the view of Malaysian manufacturing industry can be used by any company, government and academician for a better understanding on how to effectively design and managing supply chain to achieve better and successful new product development especially for Malaysian manufacturing companies.

1.7 Scope of the Study

This study is restricted to the supply chain variables which are the communication, logistic, strategy and top management supports onto new product development success. This research fundamentally intends to explore the impact of these supply chain variables towards new product development success among the Malaysian manufacturing companies. The result might demonstrate the impact that influenced the Malaysian manufacturing companies in term of new product development success. Therefore, the findings might not suitable to be used as references by other industries. Nevertheless, the findings also might not suit the theories from other researchers and academician that basically focused on the global manufacturing company in the world.

1.8 Definitions of Key Terms

This paper are focusing on the supply chain and supply chain variables that have influences to the new product development process. The main variables that being analyze is communication, logistic, supply chain and product development strategy, and top management supports.

1.8.1 Supply Chain

Supply chain is the value of activities which involved the planning and controlling activities from supplier to the customer for the materials, components and final finished products. The two flows that are concerned with the supply chain through the organization are the material and information. The synchronization of customer requirement with the flow of the material from the supplier are much needed as these is the way to eliminated the conflict and balanced with the customer service, low inventory investment and unit cost (Stevens, 1989).

1.8.2 Communication

Pearce (2007) gives the definition of communication as a method of exchanging the information or news among both parties and more. It is also the process of creating social worlds which is focusing on transmitting the information between the people.

1.8.3 Logistic

Logistic is defined as the executing and controlling plan activity for the material and finished goods. These activities are including of feed-forward flow of goods such as transportation and material handling, feed-back flow of information such as orders and transportation, information, management and control such as purchasing,

forecasting and inventory management. The logistics utilization is governed by a procedure and protocol to achieve high performances standard, contribute the value-added to the physical goods and give excellence impact for the company profitability (Slats, Bhola, Evers and Dijkhuizen, 1994).

1.8.4 Supply Chain and Product Development Strategy

Supply chain strategy is one of the approach towards the integration of suppliers, manufacturing, warehouses and stores where all the product that are manufactured can be delivered and distributed at the right quantities, location and time. This are to ensure that all the systems that being used can generate cost-efficiency and at the same time can satisfying all requirement level (Kuei, 2000). Product development strategy is defined by Firth and Narayanan (1996) as innovators, investor in technology, searching for the new opportunities, business as usual and middle of the road.

1.8.5 Top Management Supports

Top management are the group of people which establish the highest management executive authority in a company. Usually, these teams are includes a chief executive officer (CEO), chief operations officer (COO), chief financial officer (CFO), purchasing and production manager, warehouse and logistic manager, research and development manager (R&D) and etc. (Sandberg and Abrahamsson, 2009).

1.8.6 New Product Development

The new product are described as the newness to the organization and to the markets. Based on these dimension, there are six categories have been identified which are the cost reduction, repositioned product, additions to existing product lines, new product lines for firm to enter the markets and new to product world with the new markets (Illori et al., 2000; Pujari et al., 2003).

1.9 Summary

This objectives of this paper is to analyze the impact of supply chain towards new product development. Based on the above discussion, we choose the 5 main supply chain variables are based on the previous researcher studies. The supply chain variable that being studies are communication, logistic, supply chain and product development strategy and top management supports. From the research objectives and questions, this study will determine the relationship and impact of each these supply chain variable towards the new product development.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will review the concept of all variables and followed by a review of relevant literature on previous study for this concepts. All literature reviewed in this study are related to supply chain variables which are communication, logistic strategy and top management supports towards new product development. In today's global marketplace, organization face fierce competition from either multinational company or the local company. Hence, the organization need to develop successfully product with broader market which is mean the successful local and global product development. These successfulness of product are solely rely on well-integrated supply chain with the influences of efficient and coordinated communication, logistic and strategy.

2.2 Supply Chain

Maintaining competitive advantage is the ultimate focus for the organization in the globalization of economic nowadays. For multinational companies, the successful of their operation are now depends on their ability to balance the evolvement of process and product at the same time fulfill the demand of the flexibility and efficient delivery to the customer. Thus, these all lead for optimal supply chain operation as this is the critical criteria for company to compete globally (Stewart, 1997). In this modern competition, the competition is not just between the enterprises only, but the competition among enterprise and their supply chain capabilities.

The supply chain becoming critical aspect that need to be focus by the organization. According to Stevens (1989), supply chain is the value of activities which involved the planning and controlling activities from supplier to the customer for the materials, components and final finished products. Evans and Collier (2007) stated that, the supply chain is purposely to fully integrate all supply chain partners on information, physical material, product flows and financial activities. These activities is performed as the way to increase the profit, minimization of cost, increase cash flow and the most important is to provide the customer satisfaction through the concept of right product at right time and at the right price. Table 2.1 below show the others supply chain definitions.

Table 2.1:

The Supply Chain Definitions.

Source	Definitions

Beamon B. (1998)	A structures of manufacturing process where raw materials are transformed into finished goods than delivered to customers.
Bridgefield Group (2006)	A linked of resources and processes that starts with the raw material sourcing and grows through the delivery of finished goods to the end customer.
Pienaar W. (2009)	A description of the integration process which involved the organizations to convert raw materials into finished goods and to deliver them to the end customer.

Table 2.1 (Continued)

Little A. (1999)	The combination and coordinated flows of goods from origin to final destination, also the information flows that are linked with it.
Chow D. and Heaven T. (1999)	Group of manufacturers, suppliers, distributors, retailers and transportation, information and other logistic management service providers which are engaged in providing goods to consumers.
Ayers J. B. (2001)	Life cycle processes involving physical goods, information and financial flows which are intended to pleasure the customer with goods and services from various, connected suppliers.
Mentzer et al.	Set of entire directly involved in the supply and distribution flows of goods, services, finances and information from a

	source to a customer.

Source: Adapted from James, 2011

Since the introduction of the supply chain in the business and manufacturing world, the firm or company pay the significant attention to strategic, coordination and the integration of supply chain. These supply chain represents the flow in the company in particulars of materials, information and services throughout the organization starting from the suppliers to manufacturer and lastly to the customer. Beginning in 1990's, the globalization has made the impact to the company especially to develop the supply chain infrastructure with the emphasis on low cost development and high responsiveness. Therefore, the strategy has been deployed especially by the US companies by reducing the lead times, inventory and reducing risk though their quick responds program (Tyler, Heeley and Bhamra, 2006).

Supply chain integration within the organization are critically needed before expanding to others branch or firms. As the exploding of global economic competition, the manufacturers rely on the collaboration and integration with the supplier as the way to improve the product life time, quality and lead time (Tan, Lyman and Wisner, 2002). Therefore, to improve the supply chain performance, the organization need to make sure their primary business strategies is on performing the well-integrated supply chain between the organization and supplier (Lee, Kwon and Severance, 2007). Thus, these integration of business process among the manufacturers and suppliers across the supply chain is called supply chain management (Cooper, Lambert and Pagh, 1997).

Supply chain management is the tool that used to integrate the information, material and product flow between the manufacturers and supplier in different location or facilities (Lee, Padnababhan and Whang, 2004). These integration tools of supply chain is crucial in order to determine the successfully of product development especially when it involves many supplier in different facilities. According to Cooke (1997), supply chain management is define as successful coordination and integration of the goods transportation activities beginning of raw material until the end user which is usually the customer. These well-integration activities such as system management, procurement, sourcing, production schedule, processing order, inventory management, transportation, warehousing and customer services can benefit the organization and give competitive advantages. Table 2.2 show the differences between the traditional ways of managing supply chain versus supply chain management.

Table 2.2

The Differences between Traditional Management vs Supply Chain Management.

Element	**Traditional Management**	**Supply Chain Management**
Inventory management approach	Independent efforts	Joint reduction of channel inventories
Total cost approach	Minimize firm costs	Channel-wide cost efficiencies
Time horizon	Short term	Long term
Amount of information sharing and monitoring	Limited to needs of current transaction	As required for planning and monitoring processes
Amount of coordination of multiple levels in the	Single contact for the transaction between	Multiple contacts between levels in firms and levels of

channel	channel pairs	channel
Joint planning	Transaction-based	Ongoing
Compatibility of corporate philosophies	Not relevant	Compatibility at least for key relationships
Breath of supplier base	Large to increase competition and spread risks	Small to increase coordination
Channel leadership	Not needed	Needed for coordination focus

Table 2.2 (Continued)

Amount of sharing risks and reward	Each on its own	Risks and rewards shared over the long term
Speed of operation information and inventory levels.	Warehouse orientation interrupted by barriers to flows; localized to channel pairs	Distribution center orientation interconnecting flows; JIT, quick responses across the channel

Source: Cooper et al. 1993

The term supply chain management generally used to the company to enhance their capability, their product and service and as the key to enhance and increased their competitive advantages (Tan, Lyman and Wisner, 2002). The whole idea for supply chain management are focusing on total integration between manufacturer and supplier. Although there are many definition and description regarding the supply

chain management, the key concept of supply chain management for manufacturer are to improve the product development, quality, transportation and eliminating the waste. Morgan and Monczka (1995) states that, the supply chain management enable the manufacturer to exploit it supplier strength, technologies and these benefits them in collaboration to support the new product development.

In the new product development, supply chain is the critical item that need to be considered. This is supported by Feng and Wang (2013) which stated that the successful of the new product is rely on the supply chain involvement. The coordination of the supply chain and new product development can effect in the various way such as time to market and the development cost. In a dynamic environment, supply chain provide the company better understanding and learning capabilities with the environments. The company also able to integrate and absorb the knowledge within the supply chain effectively and these benefit for the firm product development (Feng and Wang, 2013).

2.3 Supply Chain Variables

Supply chain is a connected series of multiple activities within the organization in organizing, planning, developing and manufacturing in any service or product. Supply chain involves the organization, the suppliers and any other parties that might involves in manufacturing a product including the customer (Agarwal and Shankar, 2005). Hence the importance's of the effectives and integrative supply chain can be neglected especially in new product development. Generally, there are many variables

that affected directly or give direct influenced towards supply chain performance. The examples of these variables or criteria such as logistic, communication and information, networking, marketing, risk management and supplier performance.

Different researchers come with their own theories about the variables or supply chain performance indicators according to findings. The differences of supply chain performance variables view would lead to inconsistency in the performances measures which has been used across the supply chain members and influence the result of the supply chain performance (Gunasekaran, Patel and Tirtiroglu, 2001). Besides having the tremendous list of supply chain variables, the importance's of these variables cannot be neglected at all by companies to ensure the successfulness of their product especially in the developing the new product in the market. The key variables of supply chain and supply chain management have been identified by several researcher. All these supply chain variables are defined in Table 2.3 below:

Table 2.3

The Example of Supply Chain Variables

Supply Chain Variables	**References**	**Remarks**
Market Sensitiveness	Christopher (2000) Agarwal & Shankar (2002)	Ability of supply chain quickly respond to the market demand and makes supply chain agile.
Delivery Speed	Jayaram et al. (199) Christopher & Towill (2001)	Incorporate meeting long-term and short-term goals based in customer and market expectation.

	Power et al. (2001)	
Process Integration	Christophe (2000)	The collaborative working between buyers and suppliers, joint product development, common systems and shared information.
Centralized and collaborative planning	Christopher & Towill (2001)	Maximaize opportunities for all trading partners to secure full use of potential of each partner.
New product introduction	Jayaram et al. & Christopher & Towill (2001)	Help to acquire market share by being first in the market.

Table 2.3 (continued)

Data accuracy	Yu, Yan & Edwin Cheng (2001)	Synchronizes the demand side information with supply side information.
Use of IT tools	Yu, Yan & Edwin Cheng (2001)	Helps in effective information flow along the supply chain which further initiates process integration.

Source: Adapted from Agarwal & Shankar, 2005

Although there are greater list of variables that influence the supply chain decision, integration and execution in the manufacturing company, the review of this literature will focused on 3 main variable which are the communication, logistic and the

strategy. The relationship and impact of each variable towards supply chain will be further elaborate with detail and refer to previous research and result.

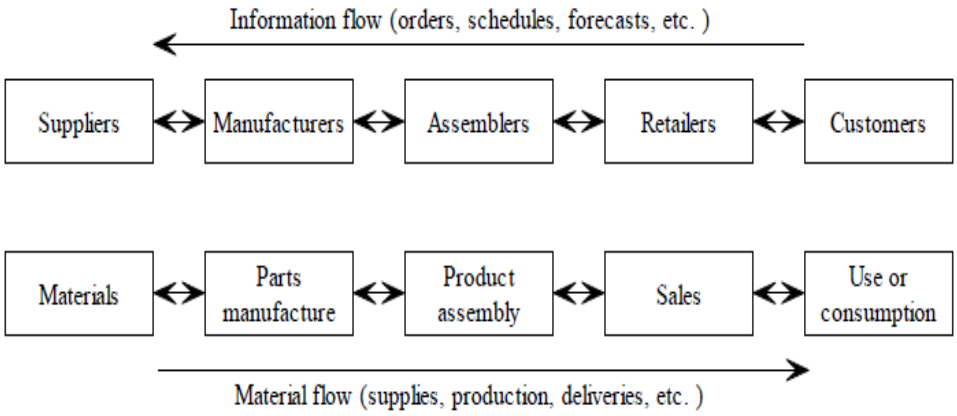
2.4 Communication

In the borderless manufacturing industries nowadays, the new product development is spreading entire world with various product feature according to the location of the market, market trend and customers request. Hence, the important of effective supply chain can't be neglected when the development is sometime is segregated according to the origin and the market location of the product. Thus, the communication play a significant role as to ensure the information is successfully segregated to entire supply chain link. Communication is method of exchanging the information or news among both parties and more. Pearce (2007) gives the definition of communication as the process of creating social worlds which is focusing on transmitting the information between the people.

Communication is primarily focus on the information sharing among the manufacturer, supplier and customers. This is support by the Gambetti and Giovanardi (2012) which states that communication is used to increase the competitive profile, production, planning and operational of the company. Nevertheless, communication playing a primary role in management of supply chain in product development. According to Spekman et al. (1998), communication is a part of information sharing. These are characterized by the high frequency and level of contact or engagement between manufacturer and partners as this is one of the supply

chain characteristic. Mohr and Spekman (1994) found that, the product changes early information, the future changes in official data and the batch sizes changes is the part of communication content. This participation are concerning on the extent of communication and the personal involvement in customer-supplier communication. The communication content and information sharing is important in achieving the efficient and successful the collaborative customer-supplier relationship at the same time, these are expected to influence the quality of information sharing (Jonsson and Gustavsson, 2008).

The view of supply chain is sometimes being considered as network of systems, operations, activities and relationship between all the members in the supply chain. The supply chain members are usually from suppliers, transporters, manufacturing team, distribution centers, retailers and others. Hence, the managing and synchronizing all these members is part of the communication system (Bob et al., 2005). Lee et al. (1993) mention that, the supply chain concept is about the managing of coordinated information. The coordinated information are include the information of the material flows, the plant operations and logistics throughout the principles, policies and performance along the new development life cycle. Figures 2.1 shows a configuration of supply chain in manufacturing industries which emphasize on the material flows and information flows during the manufacturing a products.



Figures 2.1

Configuration of a Supply Chain Manufacturing.

Source: Vrijhoef et al. 1999

2.4.1 Type of Communication

There is various type of communication in the organization. In achieving the efficient and integration of communication within organization, Hallahan et al. (2007) list out six identification of communication that are commonly found. Each of the type of communication are practiced by the organization which respected to particular organizational purpose. Table 2.4 show the type of communication in organization

Table 2.4

Type of Communication in Organization.

Type	Personnel	Purpose
Management communication	Managerial/administrative personal throughout organization.	Facilitate the operation of the organization. To promote the organization mission, vision and goals and provide information that

		are needed by operations, vendor and customer.
Marketing communication	Marketing and advertising staff	Promote the organization product and service. Attract and maintain customers including agent and distributors. Sometimes promoting fund raising for non-profit organization.
Public relations	Public relations, human resources or government relation staffs.	Establish and maintain relationship with customers or other benefices such as employees, volunteers, donator's community leaders and others.
Technical communication	Technical, engineer or training staffs.	Educate the employees, customers in improving the use of technology and reduce error when performing any task.

Table 2.4 (continued)

Political communication	Government affairs staff, politician and advocacy groups	Building political consent on any issues regarding on political and society. This including the policy makers and administrators in local or country.

Information/social marketing campaigns	Employees in non-governmental, non-profit staff and others that involve in social	Promote the risky behavior reduce and better social life to community.

Source: Hallahan et al. 2007

2.4.2 The Role of Communication

Organization nowadays focusing on the improvement over the communication. According to Hallahan et al. (2007), this is due to the 2 factors which is:

i) The main department such as management, advertising and public relation will lose their methodological apparatus.

ii) For other initiatives focuses toward fundamental processes when some others department or disciplines have lost their primary focus.

Kuhn (1963) stated that, the focus on the communication by the organization are purposely on improving the organization performance, increase the sale, boost the donation, and relationship building.

The recent exploding of the applying the supply chain theories in manufacturing has opened the various way in enhancing the supply chain effectiveness. One of the way to ensure the achievement of supply chain is managing the communication and information flow. The information flow is important in ensuring the sustainability and effectiveness of the supply chain. According to the Institute of management accountant (1999), the main reason in ensuring the links of supply chain is the

information and communication networks. By adapting the information and communication network, it can ensure the whole supply chain functioning among the supply chain links. This broad information and communication network can be used in generating an intelligence to the growing network of raw-material suppliers, warehouses, factories, distribution centers, delivery vehicles and a point of sales.

According to Wieland and Wallenburg (2013), communication support by relation-specific assets enables the members to find any solution quickly in order to minimize the disruption effect. At the same time, they also stated that the communication between supply chain members will add value for both visibility and speed. Gambetti and Giovanardi (2013) outlines the role of communication towards the competitive acting strategy and supply chain performance into two level. The level are listed as per below

i) Communication encouraged the supply chain identity and culture in the organization which the communication boost the link of service quality and customer relationship in the organization. In additional, communication improved the competences and skills of the employer in order to increase intellectual capital.

ii) Communication enhances the competitive profile of strategic supply chain processes in the organization by supporting the internal and external image building of the supply chain. Internally, communication affect the way of supply chain is managed, the delivery service, quality of performance and markets responsiveness. Externally,

communication enhance the stakeholders' awareness towards organizational supply chain achievements.

2.5 Logistic

The fierce competition in the global market with the high expectancy of customer affect the business world since 1990's. The dynamic environment requires organization or enterprise focusses on the relationship between customer and suppliers. Besides, the business enterprise put a huge investments on these (Yanling, Deli and Guoqing, 2010). The organization also focusses in improve the logistic capabilities as core competencies and as the advantages to become competitive. Logistic activities nowadays is seen as a value-added process and strategically important which has gained a pretty much attention in order to increase the company flexibility and efficiency.

Logistic is defined as the implementing and controlling plan activity for the material and finished goods. These activities are including of feed-forward flow of goods such as transportation and material handling, feed-back flow of information such as orders and transportation, information, management and control such as purchasing, forecasting and inventory management. Chen and Paulraj (2004) defined the logistic as the practice of planning, implementing and controlling the goods and flows including service and related information from the point of origin to the point of consumption. The logistics utilization is governed by a procedure and protocol to achieve high performances standard, contribute the value-added to the physical goods

and give excellence impact for the company profitability (Slats, Bhola, Evers and Dijkhuizen, 1994).

According to Wu, Ju and Xu (2010), Logistic is a service industry which integrated with several important key which is traffic and transportation, delivery and storage, information and packaging. Moreover, these resources is integrated together to achieve and support the economic development. La Londe (1983) stated that, logistic is the process to guarantee the sufficient quantity of goods are delivered and receive in the right place and time. Meanwhile, Caputo (1996) and Vollman et al. (1997) give the logistic definition as the reduction of organizational loose when the inventory or goods is need in close coordination and intensive communication or information exchange between all the supply chain partners.

During the product development process, the material flow is one of the critical items that need to be take into serious consideration. Umeda et al. (1997) stated that, the material flow including physical movement of material, either parts or product from suppliers to customers is divided into three level which are factory, line and cell levels. Logistics represent of the material flows at the factory level. This is because, logistics are execute and completed by using the any methods of transportation available in the world which are trucks, rail, boat or the plane. At the same time, logistics models are includes with the planning of orders, warehouse location, transportation and inventory. Therefore, the development of integrated supply chain is needed in order to understand all of the information flow during the logistics process.

Figure 2.2 show the logistics process which are involved in every level of development process.

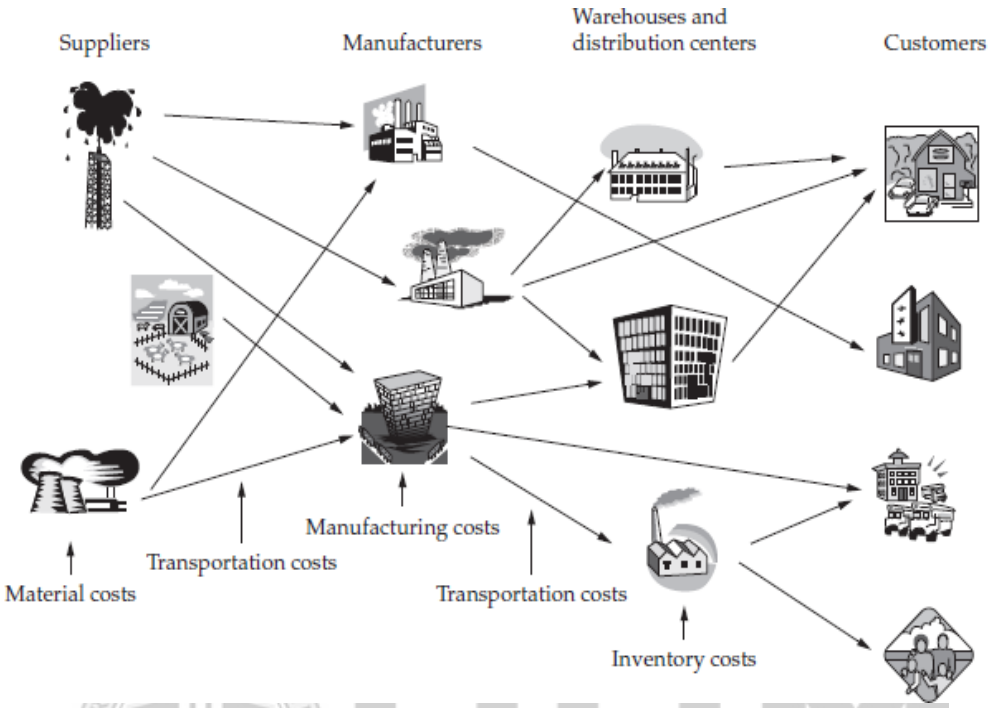


Figure 2.2

The Logistics Process.

Source: David et al. (2008)

Logistics provide support for the transportation application and service in the firm. At the same time logistic must work together with the planning, production and marketing for better integration and effectiveness. With the increasing of economic activity and global development of the product, logistic has become more important where the efficient logistic can become an impact to company profitability and global product development progress. Logistic and supply chain management plays the critical roles in the operations. It can provide effective operation with high efficiency as the global markets needs speed and flexibility (Bently, He and Boluarte, 2010).

According to Lalonde and Powers (1993), the logistic process can contribute the efficient distribution and time management in order to bring a new product to the market. As an example, for electronics product or fashion goods, when the product life cycle are coming short or decrease, the critical and effective logistic is very useful. Mario and Filomena (2009) also stated that the efficient and well-managed logistics give better influenced for the global product development. When the logistics is associated with the distribution and product handling, it will reduce the cost and damage and effect the successfulness of new product development.

2.6 Supply Chain Strategy

Modern business environment without limited market nowadays encouraged the company to explore, invest and develop cutting-edge supply chain strategies (Qrunfleh and Tarafdar, 2013). These event has created the environment where the companies shift their focus of competition from firm versus firm to supply chain versus supply chain (Li et al. 2006; Tan et al. 2002). Supply chain is the process of raw materials movement, inventory and finished goods from manufacturers to the customers. The important of supply chain has led the companies to engage in the supply chain management where it is considered as "strategic tools" to increase their competitive advantages (Qrunfleh and Tarafdar, 2013). Hence, this "strategic tools" is loaded into the concept of supply chain strategy.

Supply chain strategy is defined as the one of the approach towards the integration of suppliers, manufacturing, warehouses and stores where all the product that are manufactured can be delivered and distributed at the right quantities, location and

time. This are to ensure that all the systems that being used can generate cost-efficiency and at the same time can satisfying all requirement level (Simchi-Levi et al. 2008). According to Wisner (2003) and Green et al. (2008), supply chain strategy refers to the strategic goals and objectives of the firm supply chain. In addition, supply chain strategy require complete concentration on the business processes integration towards entire value chain in order to provide maximum value to the customers. Nevertheless, the primary objectives of supply chain strategy is to increase the firm's supply chain responsiveness towards the customers (Hines, 2004; Melnyk et al. 2010).

The supply chain strategy defines the objectives and goals of the firm with the alignment of the supply chain partners, structures, processes and the systems. In detail these are includes the following (Cetinkaya, 2011):

i) Regarding the supply chain partners.

The partner's selection, outsourcing models structure and associated with cost and gain sharing models.

ii) Regarding the supply chain structure.

The distribution of network structures in terms of vertical and horizontal stratification.

iii) Regarding the supply chain process.

The procurement, production and distribution processes with concern to costs, reliability, speed and flexibility.

iv) Regarding the supply chain systems.

The controlling, information, incentive, leadership and reporting systems.

According to Qrunfleh and Tarafdar (2013), to achieve efficient and responsiveness supply chain strategy, the firm are need to practices supply chain. Chen and Paulraj (2004) stated that the supply chain practices are fully accomplished when firm implement appropriate activities that support the primary strategy. These activities must be routines so that firm can coordinating their resources to execute their supply chain strategy. Therefore, when firm decide to design or create the supply chain strategy, it's also compulsory to the firm to develop and consider the activities that fit to the strategy (Qrunfleh and Tarafdar, 2013). Supply chain activities is the set of activities that accomplished the important tasks that support supply chain strategy. The task such as building the relationship with suppliers, eliminating waste, enabling customization and sharing information through entire supply chain members is important or key task that support these supply chain strategy (Li et al., 2005; Wong et al., 2005).

Numerous researcher stated the evidence of the important of supply chain activities towards supply chain strategy. Hsu et al. (2009) stated that supply chain activities play significant role in the company's ability to gain greater advantages from its supply chain strategy. Green et al. (2008) and Wisner (2003) also suggest that the company's supply chain strategy have to perfectly associate with its supply chain activities to accomplish the optimization of resources in entire supply chain and at the same time achieve the greater performance. Mentzer et al. (2008) emphasized that,

supply chain strategies are apprehensive with the cross-organizational activities and solely depend on the close communication with firm marketing and sales resources, processes and skills. Supply chain activities intervene the relationship between supply chain strategy and supply chain responsiveness and these all are related to company's excellent performance (Qrunfleh and Tarafdar (2013).

According to studies conducted by Qi et al. (2011) and Qi et al. (2009), there are relatively important relationship between companies supply chain strategy and companies performance. Besides, they also stated that supply chain strategy will support the company's business strategy and at the same time improve the company responsiveness and performance into the markets. The benefit of supply chain strategy towards product development also being proved by Graham et al. (1994). They found that, strategic supply chain can improve the quality of supplier operation and parts supplied by them. At the same time, strategic supply chain also resulted the improve product quality and better waste management. Graham et al. (1994) also add the benefits of strategic supply chain which it can reduce supply chain disruptions, lead time and speed up the decision process. These are important as these benefits enable the company to have better react to the product development in the markets.

2.7 Product Development Strategies

New product development play as a critical role in ensuring the substantial share on company's turnover (Debruyne et al. 2002). In today's business environment, the product that produced by the companies are become as their image or "public face" where customer judge them either great product or great company's (Holtzman, 2011). Throughout the globalization market, there are many competitors that offering the same product and services. As a result, a little advantages in the specification over the other competitors will influence and give influence on competitiveness and product survival. Therefore, introducing the new products in an efficient, effective and interesting ways will allow the company to take the benefit in the competition (Holtzman, 2011).

The strategic decision will characterized the market introduction for every new product (Debruyne et al. 2001). Hence, the need of product development strategy are very important as the successful of every product is depend on the strategy that being created and used by the company. Product development strategy is defined by Firth and Narayanan (1996) as innovators, investor in technology, searching for the new opportunities, business as usual and middle of the road. Based on these definition, Fifth and Narayanan comes out the most important aspect in the new product development. These three important aspect are new embodied technology, new market applications and innovation in the markets. Song and Montoya-Weiss (1998) stated that, the product development strategy are the development strategy that track the new market with the offering of new product and technology which at the same

time create “real new product”. These strategy involving with the new product on the current and new market is categorized as a moderate innovation.

Product development strategy has been viewed as the strategy that important in ensuring the progress of product development. Many researchers characterized the product development strategy into several classification. Debruyne et al. (2002), classified the new product development strategy into two types namely defensive and offensive. Offensive strategy is the strategy on aggressively explore the new market or expands the current market with the planning. At the same time, these environment will motivate the defensive strategist into action. The companies that engaged with the offensive strategy will encountered the high risk on investment in money, time, resources and skill but the potential of higher return also increased. This is opposite to the defensive strategy which usually planned on low risk and low return strategy (Liu et al., 2005)

Formulating the strategy for new product development is important. Johne and Snelson (1990) line up two approaches in formulating the product development strategies which are the traditional asset based and market based. Traditional asset based approaches are reducing product cost, modification of product, product life extension and new product introduction. All these approached are majorly on build on existence product with existing technology. While market based approaches are the activity that seek for wider, more profitable and new potential market opportunities outside the company business and capabilities.

According to Veryzer (1998), new product development strategy is consists of two important aspect which are:

i) Technological capability.

   Technological capability is the identification of product which it must be made by using the technology beyond the current technology use by the company

ii) Product capability.

   Product capability is the benefit of every product recognized and experienced by the customers or users.

These two importance aspect is followed by the companies in developing and create the new product development strategies as these might influence and affect their new product development performance (Veryzer, 1998).

2.8 Top Management Support

Top management played as significant role in encouraging and stimulating the innovation in the companies. Besides, top management also has been positively linked with the successful of new product development as they provide the necessary financial support and political resources (Richtner and Ahlstrom, 2006). Top management are the group of people that establish the highest management executive authority in a company. Usually, these teams are includes a chief executive officer (CEO), chief operations officer (COO), chief financial officer (CFO), purchasing manager, production manager, warehouse and logistic manager, research and development manager (R&D) and etc. (Sandberg and Abrahamsson, 2009).

Top management provides support for the changes, provides clear vision for product concept and at the same time allocate sufficient resources and allocation for the product development teams (Poolton et al. 1998; Clark and Fufimoto, 1990). In other findings, Brunner (2001) stated that, the top management support is the vital to the success of new product development. These are include of two main factors which are:

i) Sufficient resources which are form of people (teams), time and money for the innovation and successful new product development.

ii) The personal involvement in the new product development programs.

In addition, several researcher have linked the new product development successful with the involvement of top management support. As stated by Brown and Eisenhardt, (1995); Maidique and Zirger, (1985), the senior manager's support towards new product development teams is the one of the factor contribute to the successful program of new product development. There are also the link between top management commitments with the innovation in the new product development successfulness (Rothwell et al. 1974; Cooper, 1980). According to research by Gupta and Wilemon (1996), the senior management support towards various technical program is the one main factor in product development successful innovation

The top management supports is one of the vital success factors in new product development. Beside the product development success, the product development speed also support by the efficient top management. According to Reilly et al. (2003), the top management support are positively associated with the speed and more

correlated with the overall new project success. There are several researcher that support the important of top management supports towards new product development. Below are the summary of the previous literature by others researcher.

Table 2.5

Summary of Top Management Supports towards New Product Development.

Author	Finding
Swink (1999)	Top management support reduced new product development lead times in dynamics and indeterminate market especially in new product development rushing project.
Harbone and Johne (2002)	The successful new product development in indeterminate markets are influenced by empowerment approaches with top management involvement.
Mullins and Sutherland (1998)	The early involvement of top management functions is effective practice in uncertain markets and uncertain technology conditions. These involvements include the assessing, developing and supporting ideas for new products.
McDonough (2000)	Top management support such as commitment demonstrating, Obstacle overcome supports and get thing done will provide the encouraging to the new product development teams.

Table 2.5 (continued)

Guns	Top management is responsible in creating the simulations, cultivation and support the fast learning environment.

2.9 New Product Development

Developing a new successfully product give the competitive advantage to the company and manufacturer. In most industries, the successful development and commercialization of new products are important as to maintain the competitive advantage of the company's (Mu et al. 2007). Cooper (2001) stated that, the company's growth and development it's solely depend on its capability to introduce new products all the time. Hence, developing an innovative product that suited the customer expectation and satisfaction beside manufacturer it in mass global market become priority to the manufacturer.

Many company have taken initiative to step into the new product development as product development is the important factor to drive the company success or failure (Griffin, 1997). With the recent technology eruption in the product and manufacturing process, company encounter many challenges just to ensure the successful of new product development. Rapid technological changes, shorter product life cycle, complexity in systems, marketing and research and development (R&D) are the

example of challenges that face by the companies. The product that are manufactured is not just to seek the client's satisfaction but also bring the value as these are important key factor in the competitiveness manufacturing world (Islam et al. 2009).

The continuous development and market introduction for new products is an important criteria for company's performance (Cooper, 2001). In United States, the manufacturing industries spent almost $276 billion in 2002 on research and development (R&D) and new product development (National Science Board, 2004). According to Clark and Fujimoto (1990), Product development is defined as a process that used by company to transform data on market prospects and technical potentials into information assets for the commercial invention. The new product also are described as the newness to the organization and the markets. Based on these dimension, there are six categories have been identified which are the cost reduction, repositioned product, additions to existing product lines, new product lines for firm to enter the markets and new to product world with the new markets (Illori et al., 2000; Pujari et al., 2003).

A definition from Brentani (2000) and Kotler (1991) stated that, the new product concept is susceptible to numerous definition such as new product to cover original products, an improved and modification of products; and the new product developed by the companies through research and developments. Various identification has been described about the new product. According to Petrick and Echols (2004) and Stanton et al. (1994), new product has been categorizes into three which are

i) Innovative and satisfying the unsatisfied needs.

ii) Replacement product that are significantly different from the existing products which in term of function and benefits provided.

iii) Imitative products that are new to organization but not to the customers.

The new product development in the global scale market come with more challenging as there are many factor or risk are surrounding with the development. In the global market, the multinational manufacturer must deal with the customer demanding on regional or global. Furthermore, the firm also need to compete with other highly capable corporation and diverse set of suppliers (Ozer and Cabeci, 2010).The global product development can be define as the activities of global or the process that are spreading across multiple regions of the entire world in order to achieved high value-added to the cost. This development process combines certain centralized function with engineering and others related product development function distributed to entire sites or region of the world (Eppinger and Chitkara, 2006).

Trapathy and Eppinger (2011) defined the global product development as the arrangement of organization to identify the potential location and product development activities ownership. These activities also can be performed by developments center and outsourcing. Even though the global product development is a complex and sophisticated task and challenging, the firms still expanding in order to meet global market needs and at the same time firm can seek and improves efficiency (Kuemmerle, 1998). Furthermore, multinational firm also grown their business by acquisition of the companies which their operations already integrated. Besides, the multinational manufacturer today already work on corporation across the global

supply chain and these all leads to the growth of product development (Eppinger and Chitkara, 2006).

2.10 New Product Development Process

The major determinant of firm in order to sustain the competitive advantage is the capability of the firm to develop, and launch the new successful product (Song and Parry, 1997). New product development is likely not a simple task as it involve various process and people. Usually, the process of new product development involves with the several stages. Conventionally, the new product development process are through the 6 major stages which are idea generation, idea screening, project planning, product development, test marketing and lastly, commercialization (Mu et al. 2007). However, the basic stages that involves in the development process are as figure 2.3 below (Holtzman, 2011),

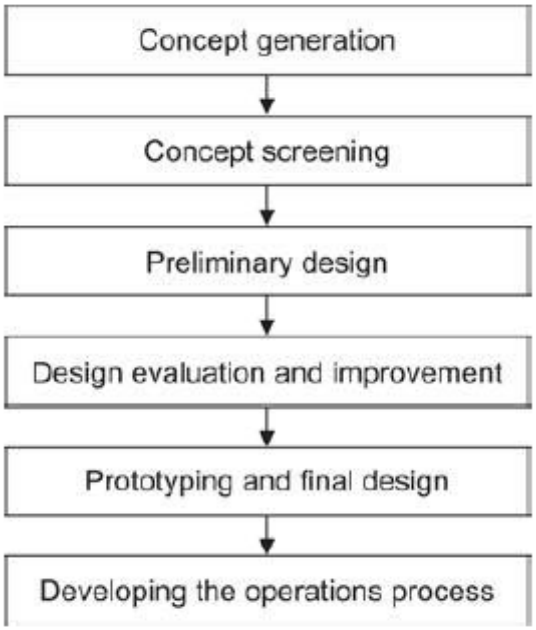


Figure 2.3

The development process

(Source: Holtzman, 2011)

Figure 2.3 outline the development process which show the series of stages start with the collecting the ideas and end with the development or generating the product concepts. As for the new product development, the whole process are started with the ideas or concept screening and finally the product are developed and ready to be ship to the customers.

According to Mu et al. (2007), the most popular new product development stages are consists of 3 stages model which are:

i) Idea generation and concept development (stage 1).

ii) Design and development (stage 2).

iii) Commercialization (stage 3).

To be specific, many researcher has outlines the new product development process or stages into several and much complicated stages. Cooper (2005) has developed "stage-gate" model which divide the wholes new product development process into five stages which are:

i) Scooping.

Determine the objectives of each project's technical and market merits.

ii) Building the business process.

Complete analysis of market, user needs, technical assessment, financial and business analysis.

iii) Development.

Implementation of the development plan and the physical development of the product.

iv) Testing and validation.

Entire project viability is fully tested and validated.

v) Launch.

Full commercialization of the product.

Crawford (2005) has implemented six stage model for new product development which are similar to the classic model. These six stage are 1) idea generation, 2) concept development, 3) program definition, 4) design and development, 5) validation and 6) commercialization and launch. From all the stages or process outlines by the researcher, It can be concluded that, all theories are clearly demonstrated that there is

no new product development stages that follow “one size fits all” model that can meets all the necessities of all context and need for product development (Mu et al. 2007).

2.11 New Product Development Success Factors

New products are definitely important for the success of the company’s. To survive in the competitive business atmosphere, companies need to developed and maintained their competitive advantage by develop and launch successful new product (Porter, 1985). There are many aspects that influence the success of every new product development identified by the previous researcher in their literature. However, before these factors being highlighted, the resources that dedicated to the new product development procedure must be identified. These resources are important as its part of the firm strategic actions or “strategy characteristics” in order to maintain a competitive advantage for the firm in the market (Henard and Syzmanski, 2001).

According to Daft (1983), resources of firms are comprise all the assets, capabilities, organizational procedures, firm characteristics which including the data, knowledge and others. These all are controlled by the firm which it can help and enable firm to cultivate and execute the strategies and at the same time improve their efficiencies and effectiveness. In addition, Kandemir et al. (2006) has classified the resources that devoted to new product development into three categories. These categories are:

i) Physical resources.

Such as plant, equipment, technology, geographic location, access to raw material.

ii) Human resources.

Such as training, experience, judgement, intelligent, insights of managerial and technical staff.

iii) Organizational factors.

Firm use to plan, control, coordinate physical and human resources, and put them in the productive use.

New product development is not an easy task. There are many new product introductions that are failing at a higher rate. The rate are as high as 50 percent which 95 percent in the United States of Amerika and 90 percent in the Europe (Ogama and Piller, 2006). New product development success may result from several reason that arise from the market, product, strategy, process characteristic and others (Hilletofth and Eriksson, 2011). According to Poolton and Bar (1999), if the firm can increase the efficiency at a new product launching, they might twice their bottom line which the area that have the greatest potential for improvement. In addition. Poolton and Barclay (1999) listed six variables that have constantly with the study of successful new product development. The six variable are:

i) Top management support for innovation.

ii) Long term strategy with innovation focus.

iii) Long term commitment to major projects.

iv) Flexibility and responsiveness to change.

v) Top management acceptance risk.

vi) Support for an entrepreneurial culture.

The competitive responses intensify, market prospective, product life cycle span and the opponent assertiveness are the four variables in the market characteristic that affect the accomplishment of any new product development (Cheng and Shu, 2008; Cooper et al., 2004). In addition, they also stated that the value benefit, price, technological superiority and innovativeness of the product also the common characteristic that influence the success of the product. Hilletofth and Eriksson (2011) also add the point that the customer perceived value in the variation to the customer perceived cost and product characteristics are the key significant for the success of the new product. Table 2.6 below are the summary of the new product development success factors that identified by the presented and others literature.

Table 2.6

Success Factors for New Product Development

Success Factor	**References**
Market characteristic -Competitive response intensity -Market potential -Product life cycle span -Competitor's assertiveness	Cheng and Shiu (2008), Cooper et al. (2004), Henard and Szymanski (2001), Jain (2001) and Kotler et al. (2009)
Product characteristics -Product advantage (unique/superior product)	Cheng and Shiu (2008), Coeper et al. (2004), Droge et al. (2008), hamm and Symonds (2006), Henard and Szymanski

-Products meets customer needs -Product price -Product technological sophistication -Product innovativeness	(2001), Jain (2001), Kotler et al. (2009) and Van Kleef et al. (2005)
Strategy Characteristics -Marketing strategy -Technological synergy -Order of entry (timing) -Dedicated human resources -Dedicated R&D resources -Fit with the organization culture -Brand power	Carillo and Franza (2006), Cheng and Shiu (2008), Cooper et al. (2004), Cooper and Kleinschmidt (1986), Dowling and Helm (2006), Gerwin and Barrowman (2002), Hamm and Symonds (2006), Henard and Szymanski (2001), Karlsson and Ahlstrom (1996), Kotler et al. (2009) and Lummus and Vokurka (1999)

Table 2.6 (continued)

Process Characteristics -Strategic and holistic view -Structure approach -Market/customer oriented -Team based (instead of group of expert) -Cross-functional (concurrent design) -Segmentation based -Market intelligence driven	Barczak et al. (2009), Carillo and Franze (2006), Cheng and Shiu (2008), Ciappei and Simoni (2005), Cooper (1990), Cooper and Kleinschmidt (1986), Cooper et al. (2004), Droge et al. (2008), Gupta and Wilemon (1990), Hamm and Symonds (2006), Henard and Syzmanski (2001), Hilletofth (2009), Holger (2002), Iansiti (1995), Jain (2001), Kess et al. (2010),

-Proficiency of the NDP activities -Technological proficiency -Reduced lead time (responsiveness) -Cooperation with suppliers and customers -Information technology support -senior management involvement	Kotler et al. (2009), Karkkainen et al. (2001), Lummus and Vokurka (1999), Schmidt et al. (2009), Park et al. (2010), Swink et al. (1996) and Van Kleef et al. (2005).

Source: Hilletofth and Eriksson, 2010

2.12 Theoretical Framework

Based on the above discussion about the impact of supply chain towards new product development, this study proposed the following research framework as shown in figure 2.4 below:

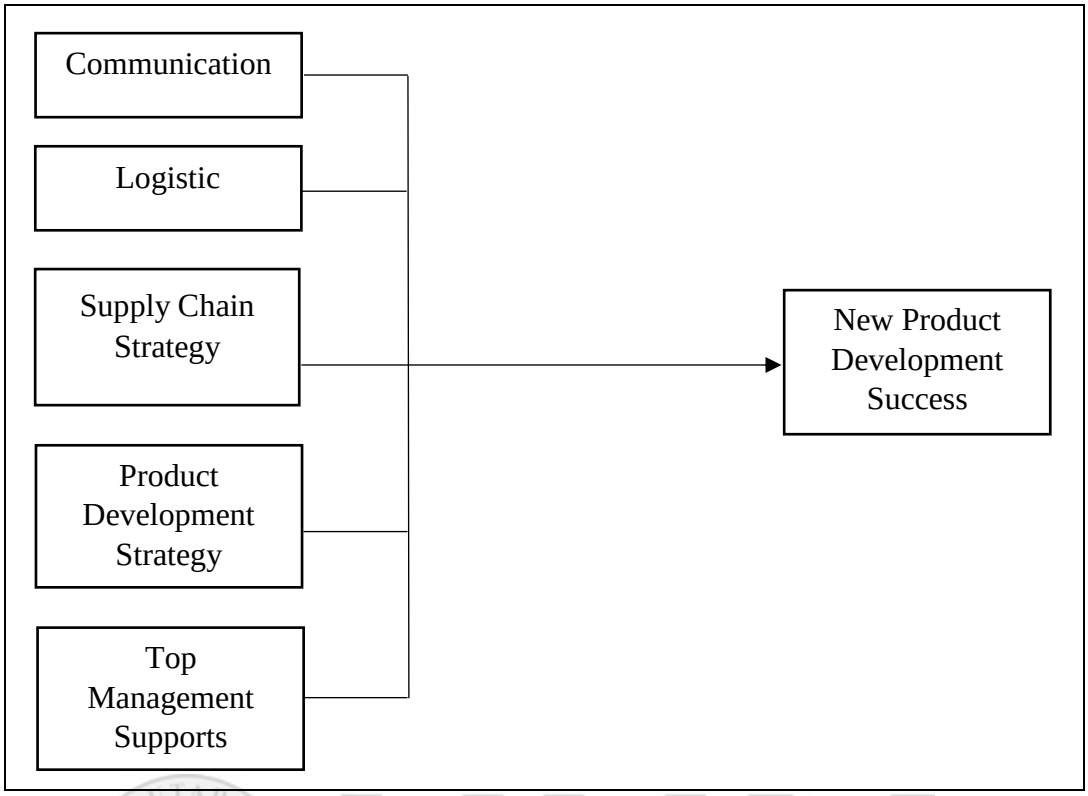


Figure 2.4

Research Framework of the Study.

Table 2.7

Independent Variables and Dependent Variable.

Independent Variables (IV)	**Dependent Variables (DV)**
Communication	New Product Development Success.
Logistic	
Supply Chain Strategy	

Product Development Strategy

Top Management Supports

The theoretical framework from this study gives an overview in analyzing the impact of supply chain towards new product development success. This study showed that there are five variables that are related in order to make the new product development successful. These five independent variables consist of communication, logistic, supply chain strategy, product development strategy and top management supports. Meanwhile the dependent variable is new product development success.

2.13 Hypothesis

This study designed to test five main hypothesis. The inputs to the model shown in figure 2.4 will be correlated with the output of the model considered in this paper, namely the impact of supply chain towards new product development success. These hypothesis are summarized in table 2.8 below:

Table 2.8

Hypothesis Related to the Analyzing the Impact of Supply Chain towards New Product Development Success.

Hypothesis
H1: There will be positive relationship in communication towards new product development success.
H2: There will be positive relationship in logistics towards new product development success.
H3: There will be positive relationship in supply chain strategy towards new product development success.
H4: There will be positive relationship in product development strategy towards new product development success.
H5: There will be positive relationship in top management supports towards new product development success.

2.14 Summary

This chapter described the diverse definition of supply chain, communication, logistic, supply chain and product development strategy, top management supports and new product development. The supply chain is the critical agenda in determining the successfulness of product development in the market especially in the context of new product development. The integration of supply chain between all the processes in the manufacturing is the key factor to give a firm or multinational company the competitive advantages. Besides, the communication, logistic, strategy and top management support factor also played a significant important in order to make sure the smoothness of product development. Since the globalization of the economy, these factors or variables play a critical factor as well as supply chain. Hence, the firm or multinational companies can't neglect either supply chain or the variables that contains in the supply chain in order to make sure the successfulness of their new product development either in local or the global markets.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter presents the research methodology that was adopted for this study. It will cover topics of research design, data collection procedures, sampling design, type of study, data analysis, research framework, conceptual definition and the conclusion. This research is conducted to analyze the impact of supply chain towards new product development success in Malaysian manufacturing industries. The respondent of this research will be the workers of the Malaysia manufacturing industry, specifically in Kedah and Pulau Pinang.

3.2 Research Design

Research design is a plan for researcher to develop the procedures for collecting the required information in order to complete the study. The purpose of this study is to analyze the impact of supply chain towards new product development success. Cross sectional analysis will be used and the data will be collected once for a time from the respondents which work in Malaysian manufacturing industries in Kedah and Pulau Pinang. The data collection will be using the questionnaire. The questionnaire method is chosen solely because this is one technique that popular in collecting the data. Researchers can easily collect the data and the questionnaire answers are simply coded as stated by Sekaran (2006). The Questionnaire is a better technique of

gathering the data when researchers know precisely what material that is needed and these survey methods provides efficiency in data gathering and give the advantages to researchers (Sekaran, 2000).

According to Bryman (1992), it's confirmed that the information from the questionnaire will let the researcher to establish whether there are relations among the several variables that are reflected in the questionnaires. Sekaran (2000) stated that, the survey information can be collected via several methods such personally directed questionnaires, mail and electronic questionnaire (E-mail). In addition, Sekaran also recommend the effective methods to improve the rates of reply to mail questionnaires such as distributing the trail mail enclosed with small incentives or reward with the questionnaire. Also, to increase the respond rates, the researcher can provide the self-addressed stamped return envelopes to the respondents.

By measured the positive and negative impact of data collection methods for a survey method, the researcher will personally administrated questionnaire and electronics questionnaire through email and cloud base survey will be used for this study. These electronic questionnaire are easy to manage, reach globally in fast, inexpensive methods and the respondents can complete the survey through a personal computer or the mobile smartphone. These methods might overwhelmed the restrictions of mail questionnaires such as inability of researchers to enquiry for more information (Emory and Cooper, 1991).

3.3 Data Collection Procedure

A questionnaire technique will be used to collect the data and feedback from the possible respondent. In this study, the questionnaire distributed among the workers who work in the Malaysian manufacturing companies. The questionnaire is divided into two segments. The first segment is purpose to collect personal details and experience data while the second segment will aim to evaluate the respondent experience and gather the information regarding on five variables which are communication, logistic, supply chain and product development strategy, top management supports and new product development success.

3.4 Sampling Design

3.4.1 Target Population

The aims of this study is to examine the impact of supply chain towards new product development success. In order to get a clear view and better understanding of the supply chain variables and new product development success, the population of interest for this paper is the manufacturing sector or industry in Malaysia specifically from Kedah and Pulau Pinang. The appropriate target population for this study are the workers from the manufacturing industries which including the technicians, engineers, executives, managers and others from Kedah and Pulau Pinang manufacturing firms. Therefore, the population of interest of this study is the total number of 449 manufacturing firms in Kedah and Pulau Pinang (Street Directories of Manufacturing Industries, 2014)

The firms in Kedah and Pulau Pinang are selected due to the element of time limitation and budget constraints. These manufacturing industries were selected because these industries were usually more engaged with the new product development.

3.4.2 Sampling Frame

This research is targeted to collect a sample size of 210 respondents by using random sampling and the sample need to be the workers from the Malaysian manufacturing industries specifically from Kedah and Pulau Pinang. Random sampling is used because to avoid the bias on the feedback. The sampling frame is the sample of 210 employees was based on the table of Sekaran (2006). However, in this study, the researcher distributed more than 200 sets of questionnaire in order to avoid any conflicts that might occurred such as unreturned, unanswered questionnaire and invalid answer.

3.4.3 Unit of Analysis

In this study, the researcher has use the unit of analysis based on the organization. This is because, the respondents were among the workers of Malaysian Manufacturing Industries in Kedah and Pulau Pinang which are based on the organization. However, the data that have been collected are from the individual

employees. Hence, the data will be aggregated as organization level in the analysis.

3.5 Type of study

In this study, the researcher use the quantitative method as the type of study. The quantitative method is chosen because the measurement of this study which it can provide or can generate numerical data and can be transformed into the usable statistics. The quantitative method also more reliable and have a clear objective. Besides, with the limitation of time for this research, the quantitative methods also affective which it's relatively consume less time than qualitative method.

3.6 Data Analysis

Statistical Package for the Social Sciences (SPSS) software version 22.0 will be used to analyze the data which are collected from the respondents in the Malaysian manufacturing sector. The data gathering will extracted from the questionnaire which are responded by the respondent. The collected data from the questionnaire will be analyzed by using several tools to develop analytical information. The analysis tools will be used in this research are reliability test, multiple regression and correlation tool. The expected result are hope will provide information that may enable the researcher to analyze each hypothesis systematically.

3.7 Research Framework

This research is conducted to analyze the impact of supply chain towards new product development success. From this research, this study are proposed the following research framework as shown in figure 3.1 below:

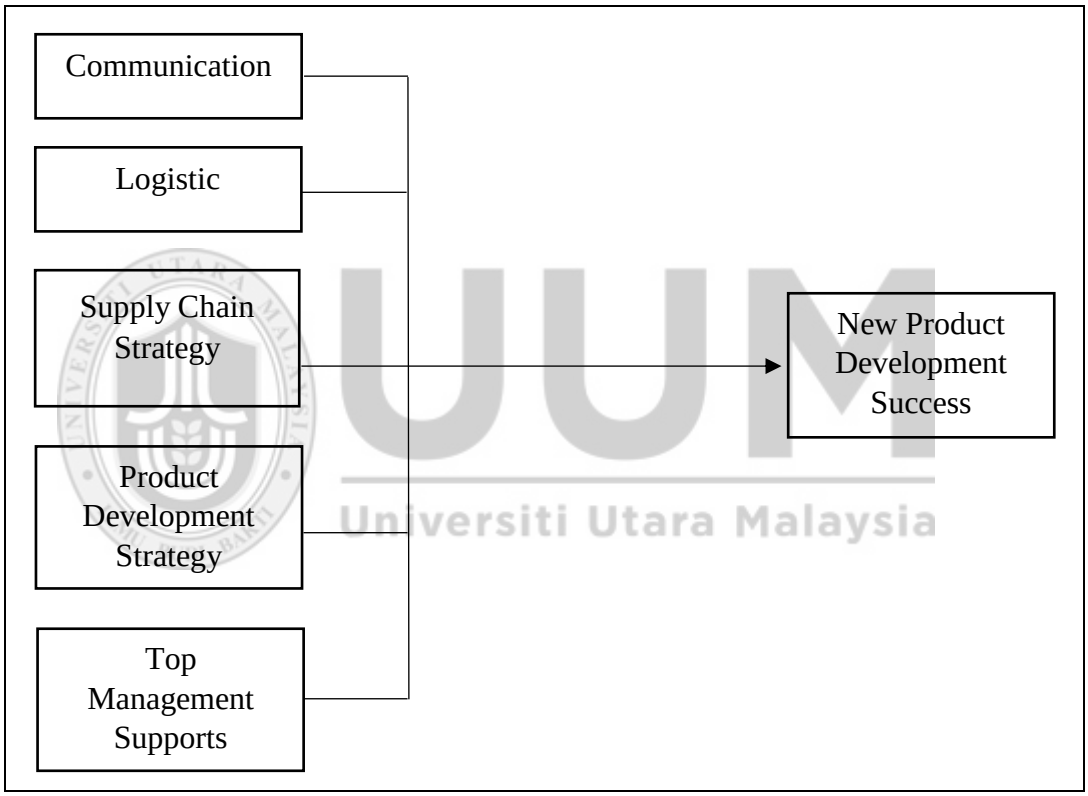


Figure 3.1

Research Framework of the Study

3.8 Conceptual Definition

3.8.1 Supply Chain

Supply chain is the value of activities which involved the planning and controlling activities from supplier to the customer for the materials, components and final finished products. The two flows that are concerned with the supply chain through the organization are the material and information. The synchronization of customer requirement with the flow of the material from the supplier are much needed as these is the way to eliminated the conflict and balanced with the customer service, low inventory investment and low unit cost (Stevens, 1989).

3.8.2 Communication

Pearce (2007) gives the definition of communication as a method of exchanging the information or news among both parties and more. It is also the process of creating social worlds which is focusing on transmitting the information between the people.

3.8.3 Logistic

Logistic is defined as the implementing and controlling plan activity for the material and finished goods. These activities are including of feed-forward flow of

goods such as transportation and material handling, feed-back flow of information such as orders and transportation, information, and management and control such as purchasing, forecasting and inventory management. The logistics utilization is governed by a procedure and protocol to achieve high performances standard, contribute the value-added to the physical goods and give excellence impact for the company profitability (Slats, Bhola, Evers and Dijkhuizen, 1994).

3.8.4 Supply Chain and Product Development Strategy

Supply chain strategy is one of the approach towards the integration of suppliers, manufacturing, warehouses and stores where all the product that are manufactured can be delivered and distributed at the right quantities, location and time. This are to ensure that all the systems that being used can generate cost-efficiency and at the same time can satisfying all requirement level (Simchi-Levi et al. 2008). Product development strategy is defined by Firth and Narayanan (1996) as innovators, investor in technology, searching for the new opportunities, business as usual and middle of the road.

3.8.5 Top Management Supports

Top management are the group of people that establish the highest management executive authority in a company. Usually, these teams are includes a chief executive officer (CEO), chief operations officer (COO), chief financial officer

(CFO), purchasing and production manager, warehouse and logistic manager, research and development manager (R&D) and etc. (Sandberg and Abrahamsson, 2009).

3.8.6 New Product Development

The new product are described as the newness to the organization and the newness to the markets. Based on these dimension, there are six categories have been identified which are the cost reduction, repositioned product, additions to existing product lines, new product lines for firm to enter the markets and new to product world with the new markets (Illori et al., 2000; Pujari et al., 2003).

3.9 Summary

Determining the method to collect the research data is the critical process in the research. Hence, these can give the clear view of the topic that's in researcher interest. In this study, the researcher use the random sampling as the sampling frame to collect the data from the respondents. The total respondents are 238 respondents. The respondents consists of the workers of the Malaysian manufacturing industries in Kedah and Pulau Pinang, and the questionnaire will be distributed among them. By using this questionnaire, researcher can gathered the data and have the clear view about the variables. The perception of Malaysian manufacturing industry workers combines with the past studies are used in order to generate better understanding on the topic and these results can help the researcher in this study.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter discusses the results of the data analysis and research findings. This chapter attempt to answer the research question, achieve the research objectives and test the hypotheses developed earlier. Statistical Package for Social Science (SPSS) version 22.0 was used to analyze the data. Starting with the overview of the data collected, followed by the statistical analysis such as reliability analysis, correlation and regression analysis.

4.2 Background of the Respondents.

There are 243 respondents for the distributed questionnaires. However, only 238 of the questionnaire are usable. Table 4.1 describes the characteristics of the companies and the respondents according to their demographic background. According to the table, there are 42.0% respondents are from the engineers while second highest are manager which contributes 23.5%. The rest are technician, 17.2%; others, 11.8%; general manager, 3.4% and CEO, 2.1%. For the department, the highest is production/manufacturing which contributes 31.5%. The rest are as follow; engineering, 23.9%; quality management, 12.6%; others, 12.2%; R&D, 9.7%; purchasing, 6.3% and planning control 3.8%.

For the respondent's experience, the highest data is the experiences for 7 to 10 years which is 20.6%. This are follow closely by 5 to 7 years of experiences which the value are 20.2%. Others than that are as follow; 3 to 5 years, 19.3%; more than 10 years, 16.0%; 1 to 3 years, 14.3% and less than 1 year is 9.7%. In the view of the education, majority 58.8% respondents are bachelor degree holder. Second are the diploma holder which contribute 25.6%. The rest are certificate, 8.8%; master or PhD, 5.5% and others is 1.3%. For the supply chain experiences, 55.5% of respondents are usually engaged with the supply chain while 44.5% not usually engaged with the supply chain. 71% of the respondents have experiences in new product development while 29.0% doesn't have experiences with the new product development.

Table 4.1 also shows the number of product launch for the respondent's company. From the data, 48.7% respondent's stated that their company launch 1 to 5 products. While 28.2% choose more than 10 products launch in the year and the rest stated that 5 to 10 products launch per year by their companies. Lastly, the research and development (R&D) expenditure for the companies are shows as follow. 32.4% stated that their companies spend almost 5 to 10% for R&D while second highest choose by the respondents is 25.2% for the expenditure more than 25%. The rest are, 16.0% for 10 to 25% R&D expenditure; 14.3% for 1 to 5% R&D expenditure and 12.2% respondents choose the expenditure of their companies are below 1%.

Table 4.1

Background of the Respondents

	Frequency (n)	Percentage (%)
Position		
CEO	5	2.1
GM	8	3.4
Manager	56	23.5
Engineer	100	42.0
Technician	41	17.2
Others	28	11.8
Department		
R&D	23	9.7
Engineering	57	23.9
Production/manufacturing	75	31.5
Quality Management	30	12.6
Purchasing	15	6.3
Planning Control	9	3.8
Other	29	12.2
Working Experiences		
Less than 1 Years	23	9.7
1 to 3 Years	34	14.3
3 to 5 Years	46	19.3
5 to 7 Years	48	20.2
7 to 10 Years	49	20.6
More than 10 Years	38	16.0
Education		
Certificate	21	8.8
Diploma	61	25.6
Bachelor Degree	140	58.8
Master/PhD	13	5.5
Others	3	1.3
Supply Chain Experiences		
Yes	132	55.5
No	106	44.5
New Product Development Experiences		
Yes	169	71.0
No	69	29.0

Table 4.1 (continued)

Product Launch		
1 to 5 Products	116	48.7
5 to 10 Products	55	23.1
More than 10 Products	97	28.2
R&D Expenditure		
Below 1%	29	12.2
1 to 5%	34	14.3
5 to 10%	77	32.4
10 to 25%	38	16.0
More than 25%	60	25.2

4.3 Reliability of the Data

The purpose of reliability analysis is to evaluate the dimensionality of the measurement scale. These reliability was measured in term of the item to total correlation and Cronbach's Alpha to evaluate the internal consistency of the measurement scale. Reliability is the correlation of an item, scale, or instrument with a hypothetical one which truly measure.

Reliability is expressed as a coefficient between 0 and 1.00. The higher the coefficient, the more reliable is the test. The common reliability coefficient is the Cronbach's Alpha which it can estimates the internal consistency by determining how all items on the test relate to other items and to the total test – internal coherence of data. Cronbach's Alpha implies to the positive relationship of one item to another. Acceptable Cronbach's Alpha is greater than 0.60. If it means, if the Alpha greater than or equal to 0.60, the items are considered one-dimensional and may be combined

in an index or scale. According to Sekaran (2006), the good Cronbach's Alpha value is 0.80 and above. If Alpha equals to zero when the true score is not measured at all, this are mean there is an error on the components while if the Alpha equals to 1.0 when all items measure only the true score and there is no error at the components.

The result of the reliability test for each variable of the questionnaire are summarized in the Table 4.2. It is found that the Cronbach's Alpha value for communication is 0.901, logistic (0.917), supply chain strategy (0.877), new product development strategy (0.926), top management supports (0.911) and new product development success is 0.929. All the Cronbach's Alpha value are greater than 0.60 which meant indicate the acceptable value.

Table 4.2

Reliability of the Instrument

Variable	**Number of Items**	**Cronbach's Alpha**
Communication	5	0.901
Logistic	5	0.917
Supply Chain Strategy	5	0.877
New Product Development Strategy	5	0.926
Top Management Supports	5	0.911
New Product Development Success	5	0.929

4.4 Descriptive Analysis

Descriptive analysis used to evaluate the level of important for every variables and its dimension. To determine the important level of these factors, this study computed the mean and uses the middle point to separate the level from low, moderate and high level. The mean score are divided to the three level as follows:

i) Low Importance = 1.00 to 2.25

ii) Moderate Importance = 2.26 to 3.75

iii) Very importance = 3.76 to 5.00

Table 4.3 below indicate the result of the descriptive analysis to measure the respondent's perception towards all variable. From the table, it can be concluded that all the variable were very important towards new product development.

Table 4.3

Descriptive Analysis of the Variables

Variable	**Mean**	**Sd**	**Level**
Communication	3.9185	0.82098	Very Important
Logistic	4.0210	0.78878	Very Important
Supply Chain Strategy	4.0185	0.72705	Very Important
Product Development Strategy	3.9664	0.79823	Very Important
Top Management Supports	4.0882	0.77739	Very Important
New Product Development Success	4.0849	0.80820	Very Important

4.5 Hypothesis Testing

This study encompassed of four main hypothesis. This segment is outlined the complete discussion of the results of empirical testing of the research hypothesis. The result of the final relationship variables, competing model and the testing of the influences of the variables are also presented in this section.

4.5.1 Relationship among Variables

Variable association refers to a wide variety of coefficients which measure the strength of a relationship. Correlation is a bivariate measure the strength of the relationship between two variables. It diverges from 0 (random relationship) to 1 (perfect liner relationship) or -1 (perfect negative linear relationship). It is reported in term of square (r2), and usually interpreted as percent of explained variance.

The correlation between two variables reflect the degree to which the variables are related to the analysis. The common measure of correlation used by the researcher is the Pearson Product Moment Correlation. In the data analysis, Pearson's correlation reflects the degree of linear relationship between two variables which are ranged from "+1" to "-1". In explaining the data information, a correlation of "+1" means a positive linear relationship between the variables and vice versa for the "-1" correlation.

Table 4.4 shows that communication, logistic, supply chain strategy, product development strategy and top management supports were significantly correlated to new product development success in the positive correlation. According to Cohen (1988), the Pearson's correlation represents the relationship among the variables. The value of Pearson Correlation in the table are 0.638, 0.745, 0.771, 0.851 and 0.829, and those variables are pointedly correlated with the new product development success.

Table 4.4

Correlations between Variables

		Communication	Logistic	Supply Chain Strategy	PD Strategy	Top Management	NPD Success
Communication	Pearson Correlation	1	.755**	.747**	.722**	.705**	.638**
	Sig. (1-tailed)		.000	.000	.000	.000	.000
	N	238	238	238	238	238	238
Logistic	Pearson Correlation	.755**	1	.805**	.758**	.753**	.745**
	Sig. (1-tailed)	.000		.000	.000	.000	.000
	N	238	238	238	238	238	238
Supply Chain Strategy	Pearson Correlation	.747**	.805**	1	.798**	.775**	.771**
	Sig. (1-tailed)	.000	.000		.000	.000	.000
	N	238	238	238	238	238	238
Product Development Strategy	Pearson Correlation	.722**	.758**	.798**	1	.825**	.851**
	Sig. (1-tailed)	.000	.000	.000		.000	.000
	N	238	238	238	238	238	238
Top Management	Pearson Correlation	.705**	.753**	.775**	.825**	1	.829**
	Sig. (1-tailed)	.000	.000	.000	.000		.000
	N	238	238	238	238	238	238
N.P.D Success	Pearson Correlation	.638**	.745**	.771**	.851**	.829**	1
	Sig. (1-tailed)	.000	.000	.000	.000	.000	
	N	238	238	238	238	238	238

**. Correlation is significant at the 0.01 level (1-tailed).

From the Table 4.4, showed that all the hypothesis of this study is accepted.

Table 4.5

Result of Hypothesis

No.	Hypothesis	Conclusion	Sig.
H01	There will be positive relationship in communication towards new product	Supported	0.000

	development success.		
H02	There will be positive relationship in logistics towards new product development success.	Supported	0.000
H03	There will be positive relationship in supply chain strategy towards new product development success.	Supported	0.000
H04	There will be positive relationship in product development strategy towards new product development success.	Supported	0.000
H05	There will be positive relationship in top management support towards new product development success.	Supported	0.000

Table 4.5 shows the hypothesis acceptance. Based on the p-value (sig), the value founded in the table 4.5 is less than 0.05. Therefore, the entire proposed hypothesis are supported.

4.6 Regression Test

4.6.1 Regression between Communication and New Product Development Success

Linear regression was used to investigate how communication could impact new product development success. The Table 4.6 shows that the R square value was 0.407.

This indicates that 40.7% of the variance in new product development success initiatives was explained by the access variable.

Table 4.6

Regression between Communication and New Product Development Success

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.638[a]	.407	.405	.62349

a. Predictors: (Constant), Communication

b. Dependent Variable: N.P.D Success

Therefore, the linear regression between communication and new product development success showed that the positive direct significant relationship for 40.7%. It also means that communication influence the new product development success in Malaysian manufacturing sectors is for 40.7%. Table 4.7 show the implication of the model between dependent variable and independent variable. The result are statistically significant.

Table 4.7

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.062	1	63.062	162.220	.000[a]

	Residual	91.744	236	.389		
	Total	154.806	237			

a. Predictors: (Constant), Communication

b. Dependent Variable: N.P.D Success

ANOVA between Communication and New Product Development Success

Table 4.8 determine the linear equation between communication and new product development success. Based on the Table 4.8, the identified equation in to access the relationship are:

New Product Development Success = 0.628*Communication + 1.623

Table 4.8

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.623	.197		8.217	.000
	Communication	.628	.049	.638	12.737	.000

a. Dependent Variable: N.P.D Success

Coefficients between Communication and New Product Development Success

4.6.2 Regression between Logistic and New Product Development Success

Linear regression was used to investigate how logistic could influence new product development success. The Table 4.9 shows that the R square value was 0.555. This indicates that 55.5% of the variance in new product development success initiatives was explained by the access variable.

Table 4.9

Regression between Logistic and New Product Development Success

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.745[a]	.555	.553	.54040

a. Predictors: (Constant), Logistic

b. Dependent Variable: N.P.D Success

The linear regression between logistic and new product development success showed that the positive direct significant relationship for 55.5%. It also means that logistic influence the new product development success in Malaysian manufacturing sectors for 55.5%. Table 4.10 show the implication of the model between dependent variable and independent variable. The result are statistically significant.

Table 4.10

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	85.886	1	85.886	294.095	.000[a]
	Residual	68.920	236	.292		
	Total	154.806	237			

a. Predictors: (Constant), Logistic

b. Dependent Variable: N.P.D Success

ANOVA between Logistic and New Product Development Success

Table 4.11 determine the linear equation between logistic and new product development success. Based on the Table 4.11, the identified equation in to access the relationship are:

New Product Development Success = 0.763*Logistic + 1.016

Table 4.11

Coefficients between Logistic and New Product Development Success

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.016	.182		5.572	.000
	Logistic	.763	.045	.745	17.149	.000

a. Dependent Variable: N.P.D Success

4.6.3 Regression between Supply Chain Strategy and New Product Development Success

Linear regression was used to investigate how supply chain strategy could influence new product development success. The Table 4.12 shows that the R square value was 0.595. This indicates that 59.5% of the variance in new product development success initiatives was explained by the access variable.

Table 4.12

Regression between Supply Chain Strategy and New Product Development Success

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.771[a]	.595	.593	.51567

a. Predictors: (Constant), Supply Chain Strategy

b. Dependent Variable: N.P.D Success

The linear regression between supply chain strategy and new product development success showed that the positive direct significant relationship for 59.5%. It also means that supply chain strategy influence the new product development success in Malaysian manufacturing sectors for 59.5%. Table 4.13 below, show the implication of the model between dependent variable and independent variable. The result are statistically significant.

Table 4.13

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	92.050	1	92.050	346.163	.000[a]
	Residual	62.756	236	.266		
	Total	154.806	237			

a. Predictors: (Constant), Supply Chain Strategy

b. Dependent Variable: N.P.D Success

ANOVA between Supply Chain Strategy and New Product Development Success

Table 4.14 determine the linear equation between supply chain strategy and new product development success. Based on the Table 4.14, the identified equation in to access the relationship are:

New Product Development Success = 0.857*Supply Chain Strategy + 0.640

Table 4.14

Coefficients between Supply Chain Strategy and New Product Development Success

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.640	.188		3.403	.001
	SupplyChain	.857	.046	.771	18.605	.000

a. Dependent Variable: N.P.D Success

4.6.4 Regression between Product Development Strategy and New Product Development Success

Linear regression was used to investigate how product development strategy could influence new product development success. The Table 4.15 shows that the R square value was 0.724. This indicates that 72.4% of the variance in new product development success initiatives was explained by the access variable.

Table 4.15

Regression between Product Development Strategy and New Product Development Success

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851[a]	.724	.723	.42565

a. Predictors: (Constant), Product Development Strategy

b. Dependent Variable: N.P.D Success

The linear regression between product development strategy and new product development success showed that the positive direct significant relationship for 72.4%. It also means that product development strategy influence the new product development success in Malaysian manufacturing sectors for 72.4%. Table 4.16 below, show the implication of the model between dependent variable and independent variable. The result are statistically significant.

Table 4.16

ANOVA between Product Development Strategy and New Product Development Success

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	112.048	1	112.048	618.455	.000[a]
	Residual	42.757	236	.181		
	Total	154.806	237			

a. Predictors: (Constant), Product Development Strategy

b. Dependent Variable: N.P.D Success

Table 4.17 determine the linear equation between product development strategy and new product development success. Based on the Table 4.17, the identified equation in to access the relationship are:

New Product Development Success = 0.861*Product Development Strategy + 0.668

Table 4.17

Coefficients between Product Development Strategy and New Product Development

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.668	.140		4.769	.000
	Product Dev	.861	.035	.851	24.869	.000

a. Dependent Variable: P.D Success

Success

4.6.5 Regression between Top Management Supports and New Product Development Success

Linear regression was used to investigate how top management supports could influence new product development success. The Table 4.18 shows that the R square value was 0.687. This indicates that 68.7% of the variance in new product development success initiatives was explained by the access variable.

Table 4.18

Regression between Top Management Support and New Product Development Success

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.829[a]	.687	.686	.45313

a. Predictors: (Constant), Top Management Support

b. Dependent Variable: N.P.D Success

The linear regression between new top management support and new product development success showed that the positive direct significant relationship for 68.7%. It also means that top management supports influence the new product development success in Malaysian manufacturing sectors for 68.7%. Table 4.19 below, show the implication of the model between dependent variable and independent variable. The result are statistically significant.

Table 4.19

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.348	1	106.348	517.941	.000[a]
	Residual	48.458	236	.205		
	Total	154.806	237			

a. Predictors: (Constant), Top Management Support

b. Dependent Variable: N.P.D Success

ANOVA between Top Management Supports and New Product Development Success

Table 4.20 determine the linear equation between new product development strategy and new product development success. Based on the Table 4.20, the identified equation in to access the relationship are:

New Product Development Success = 0.862*Top Management Supports + 0.562

Table 4.17

Coefficients between Top Management Supports and New Product Development Success

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.562	.158		3.567	.000
	Top Management Supports	.862	.038	.829	22.758	.000

a. Dependent Variable: N.P.D Success

4.7 Summary

This chapter outlines the analysis from the data of 238 respondents. The set of items that match up to each theoretical concept was initially subjected to the result of Cronbach's Alpha. In addition, there are also an item of a total correlation and regression test. All the measurement appeared to be one dimensional, internally consistent, reliable and valid for analysis of the mode. Furthermore, the relationship between five independent variables which are communication, logistic, supply chain strategy, product development strategy and top management supports towards dependent variable which is new product development success also has been determined. Pearson Correlation analysis has shown that each variables has positive and significant relationship with the new product development success. Hence, this has providing the initial proved and supported to the previously developed research hypothesis.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter discuss briefly on the findings in the Chapter 4. The discussion included the findings from the frequency, reliability and descriptive analysis, followed by others analysis from the Chapter four. At the same time, this chapter outline the recommendation for further research in this area.

5.2 Summary of the Findings

There were 238 respondents in this study which encompassed from various departments and position in the manufacturing industries in Malaysia specifically from Kedah and Pulau Pinang. All of them have obtained the secondary education level which begins from certificate until master/PhD level. Hence, from this background, the respondents are able to answer the questionnaire properly as the questionnaire is almost fully related to the new product development process. The independent variables of this study were communication, logistic, supply chain and product development strategy and top management supports. Furthermore, this study aimed to measure the relationship of these independent variable towards dependent variable which is the new product development success.

The descriptive analysis shows that, all the independent variable which are communication, logistic, supply chain and product development strategy, and top management supports are the vital factor in determining the new product development success. The result of correlation, the linear regression and multiple regression in assessing the variables or the empirical relationship between independence variable contribute positively related to new product development success. The result of positive combinations for all independent variables to dependent variable also shown the relationships are fully supported.

Table 5.1

Result of Hypothesis

No.	**Hypothesis**	**Methods of Analysis**	**Summary**
H01	There will be positive relationship in communication towards new product development success.	Pearson Correlation	Supported
H02	There will be positive relationship in logistics towards new product development success.	Pearson Correlation	Supported
H03	There will be positive relationship in supply chain strategy towards new product development success.	Pearson Correlation	Supported
H04	There will be positive relationship in product development strategy towards new product development success.	Pearson Correlation	Supported
H05	There will be positive relationship in top management support towards new product development success.	Pearson Correlation	Supported

Based on the table 5.1, the researcher found that all the hypothesis are accepted and significant. The most influential critical factors on successful new product

development were product development strategy, follow by top management supports, supply chain strategy, logistic and lastly communication.

5.3 Recommendation

The research and result from this paper confirmed the relationship between all the variable which are communication, logistic, supply chain strategy, product development strategy and top management supports towards new product development in the view of the Malaysian manufacturing sector. These variables which contains in the supply chain and supply chain management are important in ensuring the success of every new product development project. However, there is lots of supply chain variable that might be used as variable to determine the successfulness of new development project.

For further learning and future research, other researcher might explore the other factors contains in the supply chain or supply chain management such as marketing, networking, supplier involvement, technology or others. Moreover, future researcher might look further into an advance level of product development that available in Malaysia either by local or international companies. In the era of globalization economy, the further studies might look into the external factors that might contribute towards the new product development process and progress, and new product introduction.

The future researcher also may use this research as a guideline to go further deeply analysis on the specific Malaysian industries such as in electrics and electronics, automotive, robotics or other industries. With the specific industries and the large number of samples, the result might be more accurate and can be used specifically by the respective industries in Malaysia as a general guideline. Lastly, it is also the need to consider the qualitative methods of study for this issue. Qualitative method which attempts to get the non-numerical description and could provide better results and feedback from the respondents through a series of interview and deep observation.

5.4 Summary

New product development is the process by the companies in using its resources, manpower and capabilities to develop, created and produce the new product or improving their existing product in the market. This product development can be seen as the process of survival and maintaining the competitive advantages for the firm in the nowadays challenging markets. Therefore, the importance of new product development can't be neglected by the firm. There are several aspects that influence the progress and new product development successfulness. In order to eliminate the problem, companies must identify and take a serious consideration on these factors.

In this study, several factors or variable that might affect the process of new product development are studied and being tested. By using the questionnaire and data analysis using the statistical analysis, this study has successfully answered all the research questions and has tested all the hypothesis that being constructed before. The

findings give the empirical evidence that new product development success is influenced by the several factors which are communications, logistics, supply chain strategy, product development strategy and top management supports.

Malaysian manufacturing industries are the second largest contributor towards the Malaysian GDP. Hence, the new technology with latest research and continuous study are highly needed in ensuring these industries are constantly evolved and maintained competitive. New product development is one of the critical activities in ensuring the development of the country and at the same time contributed to the Malaysian GDP. Therefore, this research can give the impact towards the manufacturing industries in Malaysia as a guide and references for the firms in exploring and understanding the key terms or critical aspect in developing a new product and improve their supply chain.

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