# THE CATEGORIES OF SUPPLY CHAIN RISK CONTRIBUTING TOWARDS PERFORMANCE OF THE AEROSPACE MANUFACTURING PROCESS: A CASE STUDY OF COMPOSITES TECHNOLOGY RESEARCH MALAYSIA SDN BHD (CTRM)

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I/We hereby declare that I have read this report and in my/our opinion this report is sufficient in terms of scope and quality for the award of Bachelor Degree of Technopreneurship with Honours.

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This report submitted in partial fulfillment of the requirement for the Bachelor Degree of Technopreneurship (Honours)

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## DECLARATION

"I declare that this thesis entitled The Categories of Supply Chain Risk Contributing towards Performance of The Aerospace Manufacturing Process: A Case Study of Composites Technology Research Malaysia Sdn Bhd (CTRM) is the result of my own work except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree."

Signature : .....

Name : Ulfah Nasihah binti Mohamed @ Jamal

Date : .....

**DEDICATION**

This is for you, Ayah (Haji Mohamed @ Jamal bin Diman)
and Ibu (Hajah Hamidah binti Paijo). Thanks for always being there for me.

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# ABSTRACT

Supply chain risk management is crucial in a wide network of firms. The risks of supply chain can cause by disruptions, bankruptcies, breakdowns, macroeconomic and political changes and disasters that lead to the higher risks and making risk management become much difficult. This research is to determine the supply chain risk in that could exist the aerospace manufacturing company which focused on the supply risks, demand risks and operational risks to improve the performance of manufacturing process. There were three objectives in this research; (1) to identify categories of supply chain risks in the aerospace manufacturing company; (2) to examine the relationship between categories of supply chain risks that affecting performance of manufacturing process in the aerospace manufacturing company and (3) to determine the most critical categories of supply chain risk that affecting the aerospace manufacturing process. The researcher used quantitative research methods to gather the required data needed, through survey questionnaires distributed to the management staff in the aerospace manufacturing company, Composites Technology Research Malaysia Sdn Bhd (CTRM) whom currently attached with the Business Supply Chain Division. Therefore, the framework of this research was to identify the main categories of supply chain risk that exist in the aerospace manufacturing company which focused on study at CTRM. This study will benefit the company in terms of reducing the potential risk that may arise from the supply chain activities which might improve the performance of their manufacturing process.

Keyword: Supply Chain Risks, Supply Risk, Demand Risk, Operational Risk and Performance of Manufacturing Process

# ABSTRAK

Pengurusan risiko rantaian bekalan sangat penting di satu rangkaian firma yang luas. Risiko rantaian bekalan boleh menyebabkan gangguan, kebankrapan, kerosakan, perubahan politik dan ekonomi makro dan bencana yang membawa kepada risiko yang lebih tinggi dan menjadikan pengurusan risiko semakin sukar. Penyelidikan ini adalah untuk menentukan risiko rantaian bekalan di syarikat pembuatan aeroangkasa berfokuskan risiko bekalan, risiko permintaan dan risiko operasi untuk meningkatkan prestasi proses pembuatan. Terdapat tiga objektif dalam penyelidikan ini; (1) mengenal pasti kategori risiko-risiko rantaian bekalan di syarikat pembuatan aeroangkasa; (2) memeriksa hubungan antara kategori risiko-risiko rantaian bekalan yang mempengaruhi prestasi proses pembuatan di syarikat pembuatan aeroangkasa dan (3 ) menentukan kategori risiko rantaian yang paling kritikal yang akan menjejaskan prestasi proses pembuatan di syarikat aeroangkasa. Penyelidik menggunakan kaedah penyelidikan kuantitatif untuk mengumpul data yang diperlukan, melalui soal selidik yang diagihkan kepada kakitangan pengurusan di syarikat pembuatan aeroangkasa, Composites Technology Research Malaysia Sdn Bhd (CTRM) yang ditugaskan di Bahagian Rantaian Bekalan Perniagaan. Oleh itu, rangka kerja penyelidikan ini adalah untuk mengesan risiko utama rantaian bekalan yang boleh wujud di syarikat pembuatan aeroangkasa, CTRM. Kajian ini akan memberi faedah kepada syarikat bagi mengurangkan risiko yang bakal wujud daripada aktiviti rantaian bekalan yang akan membantu meningkatkan prestasi proses pembuatan mereka.

Kata kunci: Risiko Rantaian Bekalan, Risiko Bekalan, Risiko Permintaan, Risiko Operasi dan Prestasi Proses Pembuatan

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# CHAPTER I

# INTRODUCTION

## 1.1 Introduction

Individual corporations and firms nowadays have been aware of the need for contingency planning and risk management for a long time. Based on the demanding customers and competitive pressures, there are several concerns in operating globally, including economic, political, logistical, competitive, cultural and infrastructure (Manuj and Mentzer, 2008). Risk sometimes is interpreted as unreliable and uncertain resources creating supply chain interruption; whereas uncertainty can be explained as matching risk between supply and demand in supply chain processes (Tan and Musa, 2011).

As noted by Dittmann (2014), companies with global supply chains face additional risks, including, but not limited to, longer lead times, supply disruptions caused by global customs, foreign regulations and port congestion, political and/or economic instability in a source country and changes in economics such as exchange rates. Therefore, risk in a global supply chain context is defined as the distribution of performance outcomes of interest expressed in terms of losses, probability, speed of event, speed of losses, the time for detection of the events and frequency (Manuj and Mentzer, 2008).

Thus, individual corporation and firms need to plan their supply chain risk management based on the demand of the customers and competitive pressures. Due to uncertainties in business globally, proper risk management planning is vitally important to ensure future business success. Therefore, failure to identify risk factors in business environment might affect future company's performance and reputation.

### 1.1.1 Background of the Study

The supply chain was a process involving several organizations, people, technologies, activities, information and resources which transforms natural resources, raw materials and components into a finished product and delivers it to the end customer. As noted by Beamon (1998), a supply chain may be defined as an integrated process where in a number of various business entities (for example: suppliers, manufacturers, distributors and retailers) work together in an effort to: (1) acquire raw materials, (2) convert these raw materials into specified final products and (3) deliver these final products to retailers.

In order for the companies to identify uncertainties and potential risks in global supply chains, they need to assess thoroughly the business risk factors which may exist in various categories. Hence, proper planning is crucial to eliminate such potential risk from occur or at least minimise it at very minimum level. Supply chain risk is a complex phenomenon that can be divided into sources and types of risk (Svensson, 2002).

In Malaysia, it is focus of a wide range of industrial and related activities ranging from supply of materials to production, sales, services and other auto related operations. The supply chain risk management in manufacturing industries focuses on five categories of risks: supply, demand, operational, financial and security risks. It is important to understand the sources of risk to establish responsibility for management of risks (Manuj and Mentzer, 2008).

## 1.2 Problem Statement

Failures in supply chain management in the aerospace manufacturing company had a negative impact to the production line that could lead to total shut down of the operations. Problem of supply chain management was not only affects the ability to meet customers order but disruptions may affect profitability, company's brand reputation, stock price, working capital requirements and cash flow cycle. Additionally, this problem can also disrupt economic well-being of other parties involved in the supply chain management.

Improper risk management planning and lacking of right strategies to eliminate potential risk might affect company's productivity. For instance, as a result of delay in delivery lead time of raw materials due to weak supply chain management, the company might not fully utilise its human resources and production capacity at very optimum level. In this case, even though the company does not run at maximum capacity, it still needs to bear full salary for operators and utility costs. This might as well affect productivity and profitability of the company.

Quality of product was crucial in aerospace manufacturing company in order to ensure customers satisfaction for future business sustainability. Disruption at any level of supply chain management might affect quality of product. Thus, the company needs to ensure that the raw material suppliers are committed in supplying high quality of raw materials continuously through maintaining a good business relationship and not only rely on a single supplier.

Therefore, the researcher wants to examine the extent of supply chain risk management in the aerospace manufacturing company, particularly in supply chain risk management processes based on the supply risks, demand risks and operational risks for improve the performance of manufacturing process.

## 1.3 Research Questions

The research questions are as follows:

i) What are the categories of supply chain risks in the aerospace manufacturing company?
ii) What is the relationship between categories of supply chain risks that affecting performance of the manufacturing process in the aerospace manufacturing company?
iii) Which are the most critical categories of supply chain risk that affecting the aerospace manufacturing company?

## 1.4 Research Objectives

The research objectives are as follows:

i) To identify categories of supply chain risks in the aerospace manufacturing company.
ii) To examine the relationship between categories of supply chain risks that affecting performances of manufacturing process in the aerospace manufacturing company.
iii) To determine the most critical categories of supply chain risk that affecting the aerospace manufacturing company.

## 1.5 Scope

The scope of this research was to determine the supply chain risk management in aerospace manufacturing company based on the categories of risks that affecting the performance of manufacturing process. The research was aimed the management staff (for example, executive staff and higher level post) as the

respondents. There were many manufacturing industry which can drive up the population, however, the researcher chooses the aerospace manufacturing company at Melaka focusing on Composites Technology Research Malaysia Sdn Bhd (CTRM). Thus, the researcher assumes that all respondents in aerospace industry can provide reliable results.

## 1.6 Limitations

Limitations of the study are as follows:

i) *Time.* Given the amount of time allocated to research is very limited with only two semesters or the equivalent of one year, actually is not sufficient to review in supply chain risk management in aerospace industry.

ii) *Finance.* The financial factors limit the researcher to conduct the research in areas that are broader in scope.

iii) *Understanding of the respondents against questionnaire.* Comprehension of respondents towards the questionnaire is an important. This situation will affect the respondent's answers. Respondents will give a proper answer if the respondent understands the requirements of the questionnaire but conditions that would otherwise occur if the respondent does not understand the questions.

iv) *Honesty of respondents.* Accuracy of this research depends on the honesty and sincerity of the respondents in answering the questionnaires that will be distributed to them without any prejudice or favour.

v) *Private and confidential data.* The researcher might face difficulties in obtaining certain information from the company which is required for this research due to private and confidential data.

## 1.7 Importance of the Research

This research was to identify the categories of supply chain risks that affect aerospace manufacturing company and the implementation of the supply chain risk strategy in aerospace manufacturing company. At the same time, the purposed of this research was to identify the supply chain risk management processes that can reduce the risks to improve the performance of manufacturing process in aerospace manufacturing company. By achieving all of these three objectives, the researcher will be able to understand the implementation of the supply chain risk management in the manufacturing process.

This research focuses on the supply chain risks management processes based on the categories of risks. The researcher hopes that this research will give some contributions to the manufacturers in applying effective strategy to minimize potential risk in their supply chain management.

## 1.8 Summary

This chapter consists of the directions of this research. The introduction explains briefly the definition of the global supply chain risk management and supply chain risk management processes based on the categories of risks: supply risk, demand risk and operational risk. Besides that, this chapter explained the research objectives as well as the research questions.

The significance of this research is to explain the process of supply chain risk management in aerospace manufacturing company especially at Melaka. Besides, it also discovers how the supply chain risk management processes can reduce the risks to improve the performance of manufacturing process.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

In this chapter, the researcher will determine how the categories of risk influence to the manufacturer process by aerospace manufacturing company. The researcher will describe with details for the each independent variable and dependent variable. Besides that, the researcher also will explain the theoretical framework for this research.

## 2.2 Supply Chain Management

The supply chain management concept is to broaden from the point of view of operations from a single business unit or a company to the whole supply chain. As noted by Sanders (2012), supply chain management is the design and management of flows of products, information and funds throughout the supply chain. Basically, it involves the coordination and management of all the activities of supply chain. This is supported by Heikkila (2002), supply chain management is a set of practices aimed at managing and coordinating the supply chain from raw material suppliers to the ultimate customer. In a nutshell, Min and Zhou (2002) conclude that a concept of supply chain management is evolved around a customer-focused corporate vision,

which drives changes throughout a firm's internal and external linkages and then captures the synergy of inter-function, inter-organizational integration and coordination. Thus, it is a complex business concept that is far reaching in the nature and type of decisions involve.

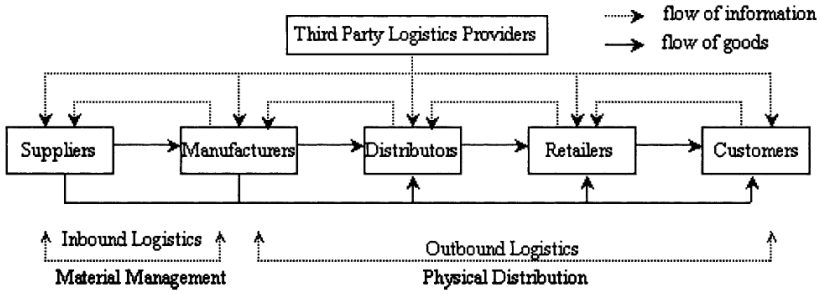


Figure 2.1: The Supply Chain Process
(Source: Min and Zhou, 2002)

Besides that, a supply chain is consists of two main business processes as shown by Figure 2.1, which are material management (inbound logistics) and physical distribution (outbound logistics).

According to Min and Zhou (2002), material management is concerned with the acquisition and storage of raw material, parts and supplies. Material management include inbound logistics supports the complete cycle of material flow from the purchase and internal control of production materials to the planning and control of work-in-process, to the warehousing, shipping and distribution of finished products. Otherwise, Min and Zhou (2002) advocate that physical distribution encompasses all outbound logistics activities related to providing customer service. All of the activities consists order receipt and processing, inventory deployment, storage and handling, outbound transportation, consolidation, pricing, promotional support, returned product handling and life-cycle support. In addition, in a supply chain there are a variety of stakeholders, comprising suppliers, manufacturers, distributors, third-party logistics providers, retailers and customers .Therefore, the researcher can conclude that by combining the activities of material management and physical distribution, a supply chain does not only represent a linear chain of one-on-one business relationships, but it involves of multiple business networks and relationships.