

## **SUPERVISOR'S APPROVAL**

'I hereby acknowledge that I have read this works and in my opinion this works is sufficient in terms of scope and quality for the submission and award of a Bachelor Degree of Management Technology (Innovation) with Honors'

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A STUDY ON LEAN SUPPLY CHAIN PRACTICES TOWARDS PERFORMANCE  
IMPROVEMENT IN ELECTRICAL AND ELECTRONIC INDUSTRY IN PENANG,  
MALAYSIA

CHAU PUI TENG

This Report Submitted In Partial Fulfilment of the Requirements for the Award Bachelor  
of Technology Management (Technology Innovation) With Honours

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Universiti Teknikal Malaysia Melaka

JUNE 2017

“I hereby declare that this thesis entitle “A Study on Lean Supply Chain Practices towards Performance Improvement in Electrical and Electronic Industry in Penang, Malaysia” is my own work except for the quotations summaries that have been duly acknowledged”

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## DEDICATION

I would like to appreciate the dedication of my beloved families who educated me and motivate me to learn until this level, the lecturers and friends who give me support and advice throughout the research. Without their blessings and encouragement, this research is impossible to complete in short period of time.

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This research will bring forward as requirement in completing my studies to graduate in Bachelor of Technology Management at Universiti Teknikal Malaysia Melaka (UTeM).

## ABSTRACT

The purpose of this study is to investigate the factors of lean supply chain practices towards performance improvement in electrical and electronics industry in Penang, Malaysia. Data was collected from the implemented lean supply chain of companies through questionnaire survey. The relationships between these factors of practices towards lean supply chain performance improvement were conducted by factor analysis and regression analysis. The respondents were requested to rate the extent of implications of lean supply chain practices and factors of lean supply chain practices implementation towards performance improvement. Data analysis was calculated and performed some statistical analysis. The results of this study highlight the lean supply chain practices of demand management, cost and waste reduction, process flow standardization, industry standardization, culture change and also cross enterprise collaboration as the factors affected towards lean supply chain performance improvement in flexibility performance, operational performance and business performance. The case studies have formed a theoretical framework that can conduct in electrical and electronics companies in Penang, Malaysia.

## ABSTRAK

*Tujuan kajian ini adalah untuk menyiasat faktor-faktor amalan “Lean supply chain” yang boleh mempengaruhi peningkatan prestasi dalam industri elektrik dan elektronik di Penang, Malaysia. Data dikumpulkan dari syarikat yang telah dilaksanakan “lean supply chain” dengan menggunakan soal selidik. Hubungan antara faktor-faktor amalan ke arah peningkatan prestasi “lean supply chain” telah dikendalikan dengan menggunakan analisis faktor dan analisis regresi. Responden diminta untuk menilai sejauh mana implikasi amalan “lean supply chain” dan semua faktor amalan “lean supply chain” yang dilaksanakan dapat mempengaruhi ke arah peningkatan prestasi. Analisis data telah dikirakan dan dilaksanakan beberapa analisis statistik. Hasil kajian ini menekankan amalan “lean supply chain” dalam pengurusan “demand”, pengurangan kos dan sisa, penyeragaman aliran proses, penyeragaman piawaian industry, perubahan budaya dan juga kerjasama perusahaan silang menjadi faktor-faktor yang akan menjejaskan ke arah peningkatan prestasi “lean supply chain” dalam prestasi fleksibiliti, prestasi operasi serta prestasi perniagaan. Kajian kes dapat membentuk kerangka teori yang boleh digunakan dalam industri elektrik dan elektronik di Penang, Malaysia.*

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**LIST OF ABBREVIATION**

<b>ABBREVIATION</b>	<b>MEANING</b>
TQM	Total Quality Management
BPM	Business Process Management
SCM	Supply Chain Management
LSC	Lean Supply Chain
FIZ	Free Trade Industrial Zone
SPSS	Statistical Product and Service Solution
ANOVA	Analysis of Variance

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**LIST OF SYMBOL**

$H_0$	=	Null (rejected)
$H_1$	=	H one (accepted)
%	=	Percentage
$\alpha$	=	Confidence Interval (Alpha)
r	=	Pearson Correlation Coefficient
p	=	Significant Value
R	=	Regression Coefficient Value
$R^2$	=	R Square of Variability
F	=	ANOVA Test Value
t	=	Total of respondents
$\beta$	=	Beta

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## CHAPTER 1

### INTRODUCTION

#### 1.0 Research Background

In 21<sup>st</sup> century of globalization world, mostly of manufacturing firms have been implemented lean manufacturing systems; however lean principles are less applied in supply chain management of electrical and electronic industry. Management of supply chain become more important in this era of modern and complex business environment from study of Li et al. (2006) and Tan et al. (2002). In this study, paradigm of firm-versus-firm competition has been changed to supply chain-versus-supply chain paradigm competition (Qrunfleh, 2013).

Supply chain is referred to the flow of goods and information through the supply chain. This supply chain must consists of high level of integration, increase communication of logistics-related, and high cooperation between firm's logistics activities and suppliers and consumers (Prajogo, 2012). Industries that have involved into supply chain to transfer materials from industries to raw material suppliers, parts suppliers, manufacturers, merchadisers and customers. Thus, supply chain industries not only manage internal flow of production, they also emphasize external flow as well (Ana Beatriz Lopes de Sousa Jabbour, 2013).

Supply chain is a relationship between industries and its suppliers; and concentrate to core compentencies and assign some important activities such as manufacturing, design and logistics. This assignment of activities need depends on closer supplier relationships and high customers strategies, indirectly affect several layers of suppliers in hierarchical supply chain networks (Shamah, 2013). Supply chain management is required the industries to improve performance in industries' internal and external operations of suppliers and chain members (Agus, 2012).

In this rapidly changed business environment, lean principles are well established with supply chain to maximize benefits of used and make continuous improvement in industries. Zero defects products produced, zero overproduction, reduce unnecessary processing capacities, no wasted inventories, reduce unnecessary motion and no wasted time to wait are seven wastes in lean principles and all these principles combined with supply chain can become ideal lean supply chain. This ideal lean supply chain can overcome all flexibility in demand and periodical events (Bezuidenhout, 2013).

According to study of Hines et al. (2004); Shah and Ward (2007); and Pettersen (2009), lean has been divided into two levels, which are principles and practices. These two levels need strongly interrelated to create integrated socio-technical system that can eliminate wastes by reducing and minimizing suppliers, customer and internal variability which referred to Shah and Ward (2007, p. 791). Hines et al. (2004) mentioned that lean system should be extended into value chain that integrate with suppliers and customers. This can give benefits to industries and indirectly beneficial of learning opportunities to their employees, suppliers, customers and even competitors (Saurin, 2016).

Electrical and electronics industry has been selected because this type of industry has shorter production cycle that can determine competitive advantage and is suitable for lean manufacturing application throughout value chain (Agus, 2012). In research study of Chandran (2010), there have over 50 percent of manufactured export in Malaysia within period of 1980 – 2005 are under electronics manufacturing industry. Besides that, electronics industries in Malaysia have moved into foreign direct investment and this can improve goodwill of electronic manufacturing through integrate into global supply chain (Pandiyan Kaliani Sundram, 2011). In addition, Malaysia manufacturing sectors continue to grow and found that the highest investment of governments in 118 projects is RM 9.8 billion which referred to electrical and electronics (E&E) industry in year of 2013 (Companies, 2014). In Penang state, electrical and electronics manufacturing firms has been developed for last 25 years (OECD, 2012).

## 1.1 Problem Statement

In technological advanced environment, many manufacturing industries have faced high pressure of delivering quality products by produce more value-added products, and upgrade their work skills to increase effectiveness and efficiency of works. The production of value-added products in effective ways needs to have cooperation of internal functions of industries and external operation of suppliers and supply chain members. Problem that manufacturing industries faced is they need to learn ways of conduct business with suppliers and customers to improve delivering quality products and work in effective and efficient ways (Agus, 2012).

In the management of daily operation, many industries found that supply chain management is important in effective performance measures; however, they cannot fulfil the performance measurement and metrics that can achieve a non-segregated supply chain management. In order to fulfil performance metrics, they need to manage customer orders faster and more efficient than competitors and indirectly need to involve the process of continuous improvement and competitive strategies (Arif-Uz-Zaman, 2014). In addition, they need to know overall performance supply chain in their own industry in study of Hanson et al. (2011). In another study of (MacCarthy, 2016) shown that example from Fritz (2014); Wang et al. (2015) of digital storage that has lost disk storage technologies due to insufficient demand give to supply chain management and affected disappear and decline of supply chain.

Supply chain management studied industrial parts and components that has been covered in management of hierarchical supply systems, but industries need more complex cooperation in production of innovative products, services or system solutions through unclear process of joint value creation discovered from study of Christopher (1998); Ford et al. (1998); Cooper et al. (1997); Sheth and Sharma (1997) and Moller and Torronen (2003). Therefore, study of Brennan and Turnbull (1999); Ford and McDowell (1999); Brassard & Ritter (2001) and Spekman et al. (2000) shown that industries will provide massive resources and they need to make sufficient adaptations in the development of cooperation with suppliers such as

productivity, TQM and BPM. Moreover, lean practices also need to apply in this complex and uncertainty of supply chain management (Shamah, 2013).

## **1.2 Research Questions**

This research is to study on practices in performance of lean supply chain improvement in electrical and electronic manufacturing industries in Penang, Malaysia. Research questions refer as below:

- 1) What are the implications for implementation of lean supply chain practices?
- 2) What are the factors of lean supply chain practices towards lean supply chain performance?
- 3) What is the most influential factors of practices towards lean supply chain performance?

## **1.3 Research Objectives**

This research purposely is to examine implications of lean supply chain practices that implement in electrical and electronic manufacturing industries in Penang, Malaysia. In addition, this research study also focus on the factors of lean supply chain practices in industries. This research also helps industries to know about which practice is the most influential towards lean supply chain performance.

Research objectives as below:

- 1) To examine implications of implementation for lean supply chain practices.
- 2) To determine factors of lean supply chain practices towards lean supply chain performance.
- 3) To identify the most influential factors of practices towards lean supply chain performance.

#### **1.4 Scope, Limitation and Assumptions of the Study**

This research was focused to examine the implications of current practices that implemented in lean supply chain performance in the field of manufacture of electronic and electrical industries. To smaller the scope of findings, the researcher conduct this cross sectional study in the electrical and electronics industries in state of Penang, Malaysia. The researcher will choose respondents in departments of supply chain. The researcher will select 120 employees as respondents of the study.

The limitation of this research includes certain lean supply chain practices that found in previous study of secondary data only. This research also limited to study lean supply chain performance in the field of electrical and electronic industries only. Last limitation is the researcher only chooses Free Trade Industrial Zone in state of Penang as findings of study survey.

There are three key assumptions of this study. First, this research assumed that the respondents are answered given questionnaire honestly and accurately. Second, this research assumed the respondents have adequate knowledge to be a part of respondents for data collection. Third, the researcher assumed the respondents have experienced in answering this research topic when respondents can provide justifiable answers.

#### **1.5 Importance of the Study**

This study examined the implications of implementation for lean supply chain practices in electrical and electronic industries. This research pursued to understand the factors of lean supply chain practices affect lean supply chain performance in industries in this era of globalization. In addition, this research also focused to identify the most influential of practices towards lean supply chain performance.

## 1.6 Summary

The rapidly changed business environment has led supply chain plays an important role in continuous improvement of industries. Supply chain referred to the chain that can manage to transfer materials and information from internal activities of industries to external operation with suppliers and chain members. Lean supply chain practices can well establish with supply chain through reducing seven wastes of lean principles and can deliver non-defect products to customers on time after apply lean supply chain in operation of industries. Lean supply chain also can benefits to all industries' employees, customers and competitors to gain maximum learning knowledge and opportunities.

This research explored the implications of lean supply chain implemented in electrical and electronic industries. Besides that, this research determines the factors of certain lean supply chain practices towards performance due to limitation of previous study from secondary data. Furthermore, this research also identifies the most influential factor of practices towards lean supply chain performance in electrical and electronic industries in state of Penang, Malaysia.