RELATIONSHIP AMONG LEAN MANUFACTURING PRACTICES, ISO 14001 AND ENVIRONMENTAL PERFORMANCE IN MALAYSIAN AUTOMOTIVE SUPPLIERS

SITI NORHAFIZAN BINTI HIBADULLAH

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF MANAGEMENT ACCOUNTING (MASTER BY RESEARCH)

FACULTY OF MANAGEMENT AND ECONOMICS
UNIVERSITI PENDIDIKAN SULTAN IDRIS

2015

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

ABSTRACT

Lean manufacturing practices (LMP) focus on the systematic elimination of waste and non-value added activity from the production process for improved EP. Meanwhile, ISO 14001 is an international standard that assist managers to reduce environmental impact and to expand business. The aim of this study is to examine the relationship between LMP, ISO 14001, and EP for Malaysian automotive suppliers. In this study, 275 sets of questionnaire were successfully collected that brought to 68.8% response rate. Structural equation modeling (SEM) technique was utilized to perform the statistical analysis of the data survey. Reliability analysis, exploratory factor analysis, and confirmatory factor analysis were carried out. The results showed that the impact of LMP implementation on EP increases with a mediating of ISO 14001 in Malaysian automotive suppliers. Thus, this research which has undergone detailed methodology and analysis and contributing to the limited existing literature in the relationship between LMP, ISO 14001, and EP in Malaysian automotive suppliers.

HUBUNGAN ANTARA AMALAN PEMBUATAN LEAN, ISO 14001 DAN PRESTASI ALAM SEKITAR DALAM KALANGAN PEMBEKAL AUTOMOTIF DI MALAYSIA

ABSTRAK

Amalan pembuatan lean (LMP) memberi tumpuan kepada penghapusan pembaziran dan aktiviti bukan nilai tambah daripada proses pengeluaran bagi meningkatkan EP. Manakala, ISO 14001 adalah piawaian antarabangsa yang membantu pengurus untuk mengurangkan kesan alam sekitar dan mengembangkan perniagaan. Tujuan kajian ini adalah untuk menentukan hubungan antara LMP, ISO 14001, dan EP untuk pembekal automotif di Malaysia. Dalam kajian ini, 275 set soal selidik telah berjaya dikumpul yang membawa kepada 68.80% kadar tindak balas. Teknik struktur persamaan model (SEM) telah digunakan untuk melaksanakan analisis statistik daripada kajian data. Analisis kebolehpercayaan, analisis faktor penerokaan, dan analisis faktor pengesahan telah dijalankan. Hasil kajian menunjukkan bahawa kesan pelaksanaan LMP ke atas EP meningkat dengan adanya perantara ISO 14001 dalam pembekal automotif di Malaysia. Oleh itu, kajian ini telah menjalani kaedah terperinci dan analisis dan menyumbang kepada kesusasteraan yang sedia ada terhad dalam hubungan antara LMP, ISO 14001, dan EP dalam pembekal automotif di Malaysia.

TABLE OF CONTENTS

CHAPTER 2 LITERATURE REVIEW

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AGFI	Adjusted Good Fit
AIMS	Automotive Institute of Malaysia
ASEAN	Association of Southeast Asian Nations
CF	Customer Focus
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DE	Direct Effect
EFA	Exploratory Factor Analysis
EI	Employee Involvement
EM	Environmental Management
EMA	Environmental Management Accounting
EMS	Environmental Management System
EP	Environmental Performance
ESA	External Social Aspects
GFI	Goodness of Fit
HR	Human Resource
IE	Indirect Effect
IMP	Industrial Master Plan
IP	Innovation Performance
ISO	International Organization for Standardization
JIT	Just-In-Time
KMO	Kaiser-Meyer-Olkin

LM	Lean Manufacturing
LMP	Lean Manufacturing Practices
MA	Management Accounting
MAI	Malaysia Automotive Institute
MC	Management Commitment
MIDA	Malaysian Industrial Development Authority
MITI	Ministry of International Trade and Industry
MPC	Malaysia Productivity Corporation
NAP	National Automotive Policy
OEM	Original Equipment Manufacturer
OP	Operational Performance
PDCA	Plan-Do-Check-Act
PERODUA	Perusahaan Otomobil Kedua
PROTON	Perusahaan Otomobil Nasional Berhad
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SIRIM	Standard and Industrial Research Institute of Malaysia
SM	Supplier Management
SMA	Statement Management Accounting
SME	Small and Medium Enterprises
SPC	Statistical Process Control
SPSS	Statistical Package for the Social Sciences
TA	Technical Aspects
TLI	Tucker Lewis Coefficient
TPM	Total Preventive Maintenance

TPS	Toyota Production System
TQM	Total Quality Maintenance
WCM	World Class Manufacturing

LIST OF APPENDICES

APPENDIX

F1-a First Page: Lean Manufacturing Practices and Environmental Performance in Malaysian Automotive Industry

F1-b First Page: ISO 14001 Performance Efforts and Environmental Performance in Malaysian Automotive Industry

F1-c First Page: The Integrated Between Lean Manufacturing Practices and ISO 14001 Efforts in Malaysian Automotive Industry

F1-d First Page: Critical Success Factors of Lean Manufacturing Practices for the Malaysian Automotive Manufacturers

F1-e Fourth International Conference on Social Development and Environmental Studies 2013

F1-f Bronze Award: Audit Quality Engineering Management Systems (AQEMS). Eco Design Decision Making Process (MTE 2013), 20th-23th February 2013, PWTC, Kuala Lumpur, Malaysia

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The Malaysian automotive sector is characterised by a domestically developed manufacturing structure geared towards the production of passenger vehicles. The sector has been heavily subsidised and protected to produce national champions and automobile components and parts suppliers (Zadry & Yusof, 2006). In addition, the term automotive sector encompasses the actors involved in production of passenger vehicles and commercial vehicles including trucks, pick-ups, buses, and other vehicles for commercial use (Nachiappan, Anatharaman, & Muthukumar, 2009).

Besides, in the Association of Southeast Asian Nations (ASEAN) region with a large population of more than 500 million, Malaysia offers vast opportunities for global automotive and component manufacturers to establish manufacturing and

distribution operations in the country (Malaysian Investment Development Authority [MIDA], 2012).

The rapid growth of the economic and the high purchasing power of its population have made Malaysia the largest passenger car market in ASEAN (Ali, Gafar, & Akbar, 2013). At the same time, the establishment of national car projects, Perusahaan Otomobil Nasional Berhad (PROTON) and Perusahaan Otomobil Kedua (PERODUA), has transformed Malaysia from a mere motor car assembler into a car manufacturer. The industry has boosted the development of engineering, auxiliary and supporting industries and contributed to skills development and the upgrading of technological and engineering capabilities. These factors have further enhanced the attractiveness of Malaysia as a base for global automotive manufacturers.

In 2009, the Malaysian government issued the National Automotive Policy (NAP) in an effort to enhance the competitiveness of domestic sector and to better position the sector within the regional and global trading environment. The NAP formulates the strategic direction for the automotive sector under the Third Industrial Master Plan (IMP3) 2006-2020. NAP objectives are to generate sustainable economic value. This policy maximizes the long term contribution of the automotive sector to the national economy and at the same time gives the benefit for Malaysian consumer. Therefore, this industry still needs the support of government policies in order to become more competitive internationally.

In its most recent form, the NAP outline policies aimed at liberalizing certain areas of the sector. More specifically, the primary objective is to assists identify, focusing on the core technological competencies of companies and characterize the main competitive advantages of the components industry (Habidin, 2012). Consequently, the government has outlined the objectives of the national automotive sector as follows in Table 1.1 below.

Table 1.1

Objectives of the National Automotive Policy

- Promote a competitive and sustainable domestic automotive industry;
- Make Malaysia the regional automotive hub in energy efficient vehicles;
- Promote increase in value-added activities in a sustainable manner;
- Promote increase in exports of vehicles and automotive components;
- Promote participation of Bumiputera companies in the total value chain of the domestic automotive industry; and
- Safeguard consumers'interestby offering safer and better quality products at competitive prices.

Source: Ministry of International Trade and Industry (MITI, 2014)

Based on that, NAP describes the automotive organizations needs to make any substantial changes in their management systems either in system maintenance, using the equipment, continuous improvement, and investment in technology and innovation (Nachiappan et al., 2009). Modern manufacturing requires that to be successful organizations must be supported by both effective and efficient maintenance. One approach to improving the performance of maintenance activities is to implement and develop a Lean Manufacturing Practices (LMP). The concept of LMP is a unified, comprehensive set of philosophies, rules, guidelines, tools, and techniques for improving and optimizing discrete processes. While lean was created in large volume,

repetitive manufacturing for the automotive industry sector, lean principles and benefits apply to all processes such as healthcare and services (Carlborg, Kindstrom, & Kowalkowski, 2013).

In automotive suppliers which are rapidly increasing, the ISO 14001 elements provide diverse organizations a framework for managing and continually improving their environmental programs. Many companies currently monitor pollution prevention, or toxic use reduction programs. By using ISO 14001, companies can now merge environmental programs into one coherent system to efficiently manage all environmental activities. In addition to that, improving the environmental performance (EP) of companies is one way of limiting environmental damage. An Environmental Management System (EMS), such as ISO 14001, provides a framework for organizations that wish to effectively manage their environmental affairs (Ghisellini & Thurston, 2005).

In short, by implementing LMP and ISO 14001 provides organizations with a competitive advantage to their customers that their environmental processes and impact is effectively managed, and continuous improvement practice is one of the key issues that can assist aligning organization to stay competitive.

1.2 Problem Statement

The development and the number of quality initiative programs in automotive industry have increased over the years. In order to improve the smoothness of business operation and organization performance, many organizations decided to move from the existing quality initiatives as a business strategy. Thus, the development of this LMP has spread to various industries, which was started by Toyota in the automotive sector to other sector such as education, healthcare, banking, and public organization. Automotive industry itself is moving toward preparing low cost production, low price, and elimination of waste and defects in many aspects of activities, and strong relationship with suppliers and finally producing high quality products and customers services better than competitors.

Malaysian automotive industry is one of the most important and strategic industries in the Manufacturing sector (Zadry & Yusof, 2006). Compared with other industries in the manufacturing sector, the Malaysian automotive industry has been identified to encourage the industrialization process achieves nation vision by 2020. The announcement of the NAP in 2006 and its review in 2009 was introduced to facilitate the required transformation and optimal integration of the local automotive industry into regional and global industry networks within the increasingly liberalised and competitive global environment. Meanwhile, a report on 19th November 2012 by Malaysia Automotive Institute (MAI, 2012) showed that automotive industry needs to strive hardest to be the World Class Manufacturing (WCM). In relation to that, by implementing LMP, local automotive companies get benefit with eliminated waste in operation activities such as to reduce defect, reduce lead time, and decrease variation

process, and also increase quality productand good service for customer responsiveness in order to achieve the excellent level in world class performance.

The purpose of the ISO 14001 standard is to drive environmental improvement worldwide through a systematic approach to environmental management. Although several studies of the standard (Nawrocka, 2007; Sambasivan & Fei, 2008) agree that ISO 14001 has met and in some instances has relationship with EP. The high cost of ISO 14001 became major problem in the redirection of resources away from investment in more environment friendly processes. This is supported by Inno (2005) pointed out that ISO 14001 implementation in organization was rather expensive because of the high cost of consultants and certification.

In this regard, there are some previous studies related to LMP and ISO 14001 efforts in Malaysia (Vereecke & Muylle, 2006; Aguado, Alvarez, & Domingo, 2012; Puvanasvaran, Perumal, Tian, Vasu, & Muhamad, 2012; Hajmohammad, Vachon, Klassen, & Gavronski, 2013). However, it less studies to find that the LMP and ISO 14001 efforts as an indicator to improve EP (Yang, Hong, & Sheu, 2011). Therefore, this study was undertaken to fulfil the existing gap by examining the relationship between LMP, ISO 14001 efforts, and EP in Malaysian automotive suppliers. This research assists the suppliers through a systematic model of LMP, ISO 14001 efforts, and EP to be more comprehensive and comparative in quality management, continuous improvement application, cost reducing activities, and EP especially for car manufacturer and suppliers in order to maintain competitive advantage.

1.3 Research Objectives

The aim of this research is to examine the relationship between LMP, ISO 14001 efforts, and EP measures for Malaysian automotive suppliers. The objective of the research is:

1. To identify and assess the LMP constructs, ISO 14001 efforts, and EP measures for Malaysian automotive suppliers; the relationship of LMP, ISO 14001, and EP measures for Malaysian automotive suppliers; and
2. To develop a research model and analyze the relationship of LMP, ISO 14001, and EP measures for Malaysian automotive suppliers.

1.4 Research Questions

Four research questions to be addressed during this research are:

1. Does LMP contribute to EP in the automotive suppliers?
2. Does ISO 14001 contribute to EP in the Malaysian automotive suppliers?
3. Does LMP contribute to ISO 14001 in the Malaysian automotive suppliers?
4. Does ISO 14001 as a mediator of the relationship between LMP and EP in the Malaysian automotive suppliers?

1.5 Scope and Assumption

In producing more efficient and streamlined research, the scope and assumption will be focuses on four main areas as follow:

i. This research focuses on strategic factors relationship between the LMP, ISO 14001 efforts, and EP measures for the automotive suppliers in Malaysia;

ii. Population and sample of survey respondents are only targeted to the automotive suppliers operating in Malaysia;

iii. Respondents in this study have broad expertise in LMP, ISO 14001 efforts, and performance measurement to answer all the questions in the questionnaire; and

iv. Respondents consisting of expert panels and managers with honesty and the high knowledge and experience in environmental, operational, and innovation to answer all the questions.

1.6 Operational Definition

In this study there is the use of some specific definition of a particular purpose. Definitions of term in this study are as follows: