The Effect of Integration Practices of Total Quality Management and Supply Chain Management on Operational Performance: The Roles of Technological Capabilities and Lean Manufacturing Practices

by

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Thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy in Management

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UNIVERSITY MALAYSIA PERLIS
2017

UNIVERSITI MALAYSIA PERLIS

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Academic Session : 2017

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ACKNOWLEDGMENT

In the name of ALLAH, the most gracious, the most merciful. Praise be to ALLAH, the creator and custodian of the universe. Salawat and Salam to our Prophet Muhammad, peace and blessings of ALLAH are upon him and to his family members, companions and followers. First and foremost, I would like to express my heartfelt thanks and gratitude to Allah S.W.T for His blessing and allowing me to complete this research.

It is indeed a moment of immense pleasure and satisfaction for me to express my heartfelt gratitude and indebtedness towards my supervisors Dr. Mohammad Harith Bin Amlus and Prof. Muhammad Shahar Bin Jusoh for their invaluable contribution in the execution of this research. I will always be indebted to them for their invaluable guidance and untiring attention, which they bestowed on me right from the inception till the successful completion of this research. I truly respect them for their patience and support through the highs and lows of this research. Without their inputs, this research would have remained a distant dream.

I would also like to thank my thesis panel members, Prof Dato' Wira Dr Salleh Hj Din, Prof. Dr. Rushami Zien B. Yusoff, Assoc. Prof. Dr. Idris Bin Mohd Noor and Dr. Norshahrizan Binti Nordin, who provided me with valuable insights and comments on the improvement of this work. I am also grateful to the senior faculty in the department.

Finally, I am indebted to my Mum and Dad for their endless love, sacrifices and constant belief in me. I dedicate this thesis to my parent, my brothers and sisters, friends and colleagues for supporting me with their hearts, thank you for you motivation.

TABLE OF CONTENTS

CHAPTER 2 LITERATURE REVIEW

CHAPTER 4 ANALYSIS AND FINDINGS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

TQM	Total Quality Management
SCM	Supply Chain Management
OP	Operational Performance
TCs	Technological Capabilities
LMPs	Lean Manufacturing Practices
LM	Lean Manufacturing
OM	Operations Management
CI	Continuous Improvement
PLSs	Partial Least Squares
SEM	Structural Equation Modeling
R&D	Research & Development
JIT	Just In Time
QI	Quality Inspection
QC	Quality Control
QA	Quality Assurance
RBV	Resource-Based View
SCI	Supply Chain Integration
AT	Agency Theory
STSs	Social Technical Systems
TPS	Toyota Production System
IT	Information Technology

JMIs	Jordanian Manufacturing Industries
GDP	Gross Domestic Product
QIZs	Qualifying Industrial Zones
WTO	World Trade Organization
ISO	International Organization for standardization
QFD	Quality Function Deployment
LSP	Leadership and Strategic Planning
EIC	Employee Involvement and Commitment
ITS	Information Technology System
SR	Supplier Relationship
CII	Continuous Improvement and Innovation
CF	Customer Focus

Kesan Integrasi Pengurusan Kualiti Keseluruhan dan Amalan Pengurusan Rantaian Bekalan terhadap Prestasi Operasi: Peranan Kemampuan Teknologi dan Amalan Pengilangan Lean

ABSTRAK

Objektif utama kajian ini adalah untuk mengkaji pengintegrasian keseluruhan pengurusan kualiti dan amalan pengurusan rantaian bekalan sebagai pendekatan baru, dan untuk mengkaji peranan pengantara amalan pengilangan lean dan peranan yang sederhana daripada keupayaan teknologi dalam kesan kepimpinan dan perancangan strategik (LSP), penglibatan dan komitmen pekerja (EIC), sistem teknologi maklumat (ITS), hubungan pembekal (SR), penambahbaikan dan inovasi (CII) berterusan, tumpuan pelanggan (CF) sebagai amalan yang berdaya maju selepas integrasi ke atas prestasi operasi (OP) daripada industri perkilangan di Jordan (JMIs). Data dikumpulkan dari JMIs yang disenaraikan di bursa saham Amman yang mengamalkan pengurusan kualiti keseluruhan, sistem pengurusan rantaian bekalan dan amalan pengilangan lean menggunakan reka bentuk kajian rentas keratan. Kajian ini memilih 55 firma secara rawak, dan soal selidik diedarkan dan dikumpulkan menerusi kaedah yang diberikan secara peribadi. Pemodelan Persamaan Struktur Secara Minimum Separa (PLS-SEM) digunakan untuk menguji hipotesis kajian. Kajian ini mendapati bahawa LSP, EIC, SR, CII, ITS dan CF adalah amalan integrasiyang penting dalam pengurusan kualiti keseluruhan dan pengurusan rantaian bekalan untuk OP daripada JMIs. Penemuan ini mendedahkan bahawa amalan perkilangan lean JMIs bergantung kepada tahap LSP, EIC, ITS, SR, dan CF daripada firma. Diharapkan CII akan meningkatkan keupayaan firma untuk perkilangan lean, tetapi penemuan kajian ini tidak menyokong harapan ini CII mempengaruhi OP secara negatif. Menariknya, hasilnya terus menunjukkan bahawa dengan praktik perkilangan lean, LSP, EIC, ITS, SR, CII dan CF mempengaruhi OP. Tambahan pula, keupayaan teknologi tidak mempunyai pengaruh yang sederhana dalam laluan antara LSP dan OP, EIC dan OP, ITS dan OP, SR dan OP, CII dan OP dan CF dan OP. Hasil kajian ini memberikan pandangan penting kepada, pembuat dasar dan penyelidik untuk lebih memahami kesan integrasi keseluruhan pengurusan kualiti dan amalan pengurusan rantaian bekalan terhadap prestasi operasi. JMIs harus memberi penekanan kepada LSP, EIC, SR, CII, ITS dan CF; Walau bagaimanapun, adalah penting untuk diperhatikan bahawa tumpuan kelebihan pada CII boleh mengakibatkan kebolehlaksanaan yang lebih rendah daripada perkilangan lean. Para pembuat dasar harus menggalakkan JMIs untuk memperbaiki kualiti dan sistem-sistem bekalan rangkaian mereka yang dapat meningkatkan kualiti produk dan perkhidmatan mereka dengan kos yang lebih rendah. Akhirnya, batasan kajian semasa dan jalan untuk penyelidikan masa depan dibincangkan.

Kata Kunci: Amalan integrasi, Amalan Pengurusan Kualiti Keseluruhan, Pengurusan Amalan Rantaian Bekalan, Amalan Perkilangan Kurang, Peranan Keupayaan Teknologi, Prestasi Operasi.

The Effect of Integration Practices of Total Quality Management and Supply Chain Management on Operational Performance: The Roles of Technological Capabilities and Lean Manufacturing Practices

ABSTRACT

The main objectives of this study are to examine the integration of total quality management and supply chain management practices as a new approach, and to examine the mediating role of lean manufacturing practices and the moderating role of technological capabilities in the effects of leadership and strategic planning (LSP), employees involvement and commitment (EIC), information technology system (ITS), supplier relationship (SR), continues improvement and innovation (CII), customer focus (CF) as a viable practices after integration on operational performance (OP) of manufacturing industries in Jordan (JMIs). Data were collected from the JMIs that listed in Amman stock exchange which practicing total quality management, supply chain management systems and lean manufacturing practices using a cross-sectional study design. This study chose 55 firms randomly, and questionnaires were distributed and collected through the personally-administered method. Partial Least Squares Structural Equation Modelling (PLS-SEM) was used to test the study hypotheses. This study finds that LSP, EIC, SR, CII, ITS and CF are important integration practices of total quality management and supply chain management for the OP of JMIs. The findings reveal that lean manufacturing practices of JMIs depends on the degree of LSP, EIC, ITS, SR, and CF of the firm. It is expected CII would improve a firm's practicability to lean manufacturing, but the finding of this study does not support this expectation CII negatively influences OP. Interestingly, the results further show that with better lean manufacturing practices, LSP, EIC, ITS, SR, CII and CF influence OP. Furthermore, technological capabilities does not have a significant moderating influence on the paths between LSP and OP, EIC and OP, ITS and OP, SR and OP, CII and OP and CF and OP. The results of this study provide important insights to policy-makers and researchers to further understand the effect of the integration of total quality management and supply chain management practices on operational performance. JMIs should emphasize on LSP, EIC, SR, CII, ITS and CF; however, it is important to note that over-concentration on CII may result in lower practicability of lean manufacturing. Policy-makers should encourage JMIs to improve their quality and supply chain systems which may improve their product and service quality with lower cost. Lastly, limitations of the current study and avenues for future research are discussed.

Keywords: Integration Practices, Total Quality Management, Supply Chain Management, Lean Manufacturing Practices, Technological Capabilities, Operational Performance.

CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter begins by discussing the background of the study. This is followed by detailing the research problems and objectives and formulating the research questions. It highlights the significance and scope of the study and provides definitions of terms. The chapter concludes by describing how the thesis is organised.

Rapid growth in global business has forced firms to search for competitive advantage. This could be in the form of obtaining qualified manpower, secure raw materials, and lower production costs. These changes allow firms to develop their supply chain which creates opportunities. Producing these necessary changes requires new business models (Huo, Zhao & Lai, 2014). To produce value, optimise profitability, and improve operational performance (OP) it is fundamental to effectively integrate the firm's internal functions with the external operations of the suppliers (Greene, 2015).

One of the most important internal functions within the firm is total quality management (TQM) which plays an important role in the process of developing various management practices (Agus, 2011). TQM has been held up as a method for improving efficacy, competitiveness, and the ability of a firm to change, adapt and to meet their customers' needs (Fernandes, Sampaio & Carvalho, 2014). TQM has also been identified as an enduring method for yielding improvement (Oza & Shiroya, 2015) producing positive employee and customer attitudes (Munizu, 2013) and enhancing operational performance

through continuous improvement in the manufacturer's activities (Oyedele, Jaiyeoba, Kadiri, Folagbade, Tijani & Salami, 2015).

Supply Chain Management (SCM) is an external operation with the suppliers, by which firms improve value thus becoming more specialised (Souza & Brito, 2011). As a result, it is critical for firms to manage their supply network to improve their operational performance (Robinson & Malhotra, 2005). Moreover, firms join with members of the same chain to improve their competitive advantage which reflects positively on the operational performance of all chain members (Agus, 2011).

In light of that, some previous studies have investigated the impact of TQM and SCM approach on performance measures (Oza & Shiroya, 2015; Oyedele et al., 2015). Others have looked into synergies among the existing approaches, and their collective effects on performance measures (Souza & Brito, 2011; Kheni & Ackon, 2015). In addition, there is a considerable amount of research suggesting that synergy among operational approaches exists, which can lead to higher operational performance (Ramos, Asan & Majetic, 2007; Agus, 2011; Fernandes et al., 2014; Huo et al., 2014).

Recently, Technological Capabilities (TCs) development started to attract greater attention as the success factor for achieving superior performance of a firm (Aeron & Jain, 2015). Commonly, technological capabilities tend to be strategic activities of a firm to address the internal and external environmental change (Figueiredo, 2009). According to some researchers, a firm cannot avoid technological capabilities if it wants to adopt a new operational approach, retain its competitive advantage, and enter a new market (Wang & Zhou, 2013; Ortega, 2010; Aeron & Jain, 2015).

Essential practices have been implemented to improve value by reducing costs and increasing productivity, quality, and efficiency (Fullerton, McWatters & Fawson, 2003).

These practices describe Lean Manufacturing Practices (LMPs) which use a step-by-step approach to eliminate operational waste to better meet the demand for products and services (Habidin & Yusof, 2013). Lean manufacturing practices, although widely discussed, still cause considerable confusion among both academics and practitioners (Saleeshya, Raghuram & Vamsi, 2012). In this sense, technological capabilities and lean manufacturing practices are two of the most critical capabilities and practices to take into account when adapting new operational approach (Srivastava, Gnyawali & Hatfield, 2015). As a consequence, this study provides a critical analysis of TQM practices, SCM practices, technological capabilities, and lean manufacturing practices for a high-level of operational performance in manufacturing industries.

1.2 Background of the Study

Economic globalisation brings challenges and opportunities for manufacturing companies that are faced with an increasingly competitive environment. To be successful, companies must develop versatile plans that are relevant in both domestic and international markets (Al-Assaf & Al-Malki, 2014).

Since the business environment is continuously changing which causes manufacturing firms to grow their regional reach, the manufacturing firms can tap new resources of labourers and raw materials while decreasing costs, new operational approaches have to be implemented (Brandenburg, Govindan, Sarkis & Seuring, 2014). When manufacturers expand their regional reach, this includes working with new suppliers and partners who specialise in particular components of the final product for a top-notch product or service for customers (Fernandes et al., 2014). To produce value and optimise

profitability, firms must create partnerships with the supply chain organisations that allow for cooperation, communication, and integration among partners (Huo et al., 2014).

In the Jordanian buyer's market, global competition has rendered firms unable to respond quickly to the customers' demand through traditional operational mechanisms (Al-Haddad, Alzurqan & Al-Sufy, 2011). To address this, new operational mechanism based on TQM and SCM have emerged (Alafi, 2014; Brandenburg et al., 2014). According to the 2016 Ministry of Industry and Trade Report, roughly 30% of the Jordanian GDP is composed of output from the manufacturing sector (Jordan Economic Monitor, 2016). The manufacturing sector employs 21% of Jordan's labour force, most of whom are Jordanian. This stands in contrast to other sectors, such as construction and agriculture, which are made up of larger percentages of non-Jordanian workers (Abdallah, Obeidat & Aqqad, 2014).

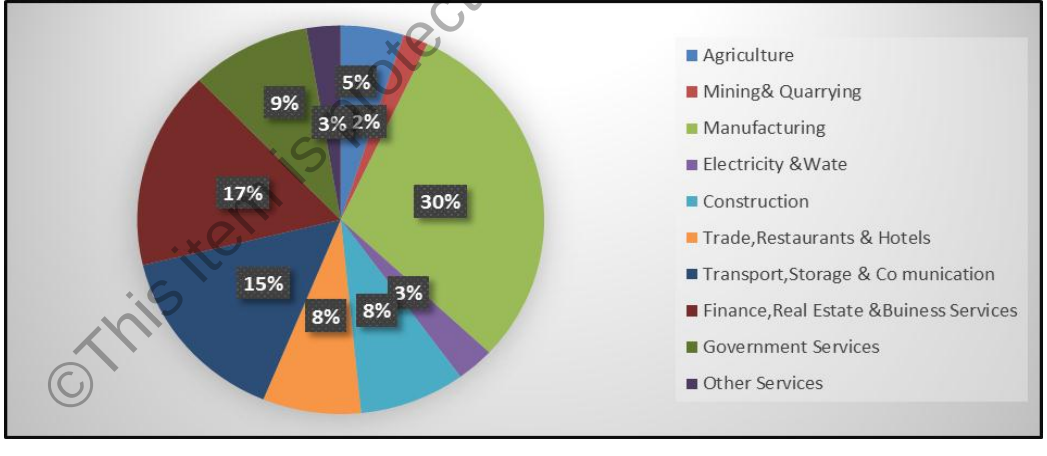

Figure1.1: Economic Sectors To GDP At Constant Basic Prices, Taken From The World Bank: Jordan Economic Monitor (2016)

In Figure 1.1, comparing with other areas, the manufacturing sector is the largest sector regarding its contribution to GDP at constant basic prices, which is around 30%,

while the mining and quarrying sector contributes to GDP by approximately 17%. Furthermore, the real value-added by the transport, storage and communication sector to the GDP contributes to nearly 15%, which is less than half of the industrial sector. Moreover, the manufacturing sector has been increasing from 26% to 30% during the 2011–2016 period (Jordan Economic Monitor, 2016). In light of that, the manufacturing sector in Jordan is the most important sector in terms of its contribution to the GDP at constant basic prices. This sector has been playing a vital role in boosting growth in Jordan over the last few years, and, therefore, it is important to focus on the manufacturing sector (Zu'bi, Tarawneh, Abdallah & Fidawi, 2015).

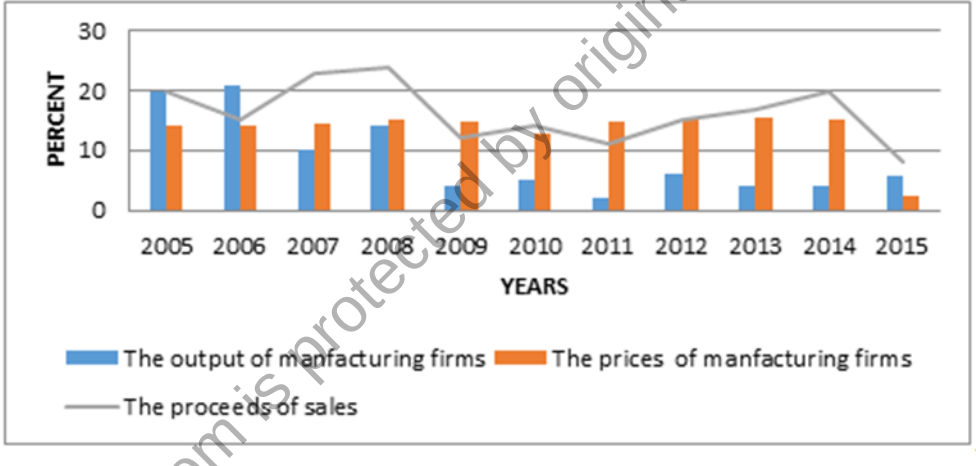

Figure 1.2: The Output of manufacturing firms/ The Prices of manufacturing firms & Proceeds of Sales, taken from The World Bank: Jordan Economic Monitor (2016)

In Figure 1.2, the output of manufacturing firms decreased by 1.5% from 2010 to 2015. The output of the manufacturing firms in 2015 increased by a moderate rate of 1.7% over the same of last year. However, the prices of manufacturing firms decreased by 13.3%. The result is that the sales proceeds shrank by 11.8% (Jordan Economic Monitor, 2016; Fanek, 2015). This is a dramatic decrease that will suppress industrial profits and convert

expected profits into losses, resulting in the eventual demise of the industry (Alafi, 2014; Fanek, 2015).

Jordanian manufacturing industries have imported products from countries that provide electricity and fuel at symbolic prices, such as the Gulf states, from countries that subsidise exports through the exchange rate, such as Turkey, from countries that enjoy the benefits of large-scale low production costs, such as China and other Far Eastern countries, or from advanced industrial countries in Europe and America (Zu'bi, 2015). This means that Jordanian manufacturing industries are not ready to meet the competition of foreign products, neither in quality nor price (Fanek, 2015; Zu'bi et al., 2015).

Based on the sharp decline of the sales proceeds side-by-to the concern of the Jordanian manufacturing industries not being able to compete neither in quality nor in price, Jordanian manufacturing industries will have no future unless the government and private sector decide to intervene in a strong way and take the necessary steps to boost manufacturing (Zu'bi et al., 2015). The government and private sector need to adopt a series of new operational approaches to improve quality, reduce cost, enhance productivity, and advance competitive positions of manufacturing firms (Zu'bi et al., 2011). Such approaches include, but are not limited to, TQM and SCM. Despite Jordanian's unfavourable circumstances, the manufacturing industries remain a primary contributor in the Jordanian economic sector (Al Hasan & Zu'bi, 2014; Fanek, 2015).

The product quality and manufacturing process of suppliers have an important effect on the quality of the final product of core firm, which means that the emphasis of research and practice of TQM has centred on firm and supply chain. An emphasis not only on producing high quality of products and services but also on providing a high-level of quality control for the entire supply chain system ensures competitive advancement

(Munizu, 2013). The essence of competitive advantage is not merely pursuing product and process quality, but it is the performance of the entire supply chain system. Thus, the integration of TQM and SCM practices will promote the involvement of all members and facilitate implementation of a quality supply chain system inside the firm (Pokrovskii, 2011; Munizu, 2013).

In the context of Jordan's challenging economic conditions, the use of integrated approaches to TQM and SCM practices is vital (Tran, 2013). By making the most of TQM and SCM practice synergies, customer satisfaction, employee motivation, and overall firm output can be improved (Shepherd & Günter, 2010). Hence, there is an increasing need for new constructs, frameworks, and theories of TQM and SCM practices to obtain operational performance.

Even though there have been a large number of studies investigating the effects of different operational approaches on the overall performance in separate investigations, the studies on the integration of TQM and SCM practices are still limited (Kuei, Madu & Lin, 2001; Flynn & Flynn, 2005; Lin, Chow, Madu, Kuei, &Yu, 2005; Kannan & Tan, 2005; Kaynak & Hartley, 2008; Yeung, 2008).

In addition, it is apparent that TQM and SCM are closely interrelated in the sense that achieving the objectives of one depends on the role played by the other. Due to the close links between TQM and SCM, it is sometimes difficult to differentiate between practices of TQM and SCM (Vanichchinchai & Igel, 2009). In the literature of both management approaches, it is possible to observe a practice that is considered a TQM practice in one study, but in another, the same study element might be accepted as an SCM practice (Lin et al., 2005; Kaynak & Hartley, 2008). Thus, in this study, the nature of the integration practices between TQM and SCM is to integrate similar practices as a single practice