



UNIVERSITI PUTRA MALAYSIA

***CORRELATION BETWEEN LEAN SIX SIGMA IMPLEMENTATION,
ADOPTION READINESS AND SME PERFORMANCE IN MALAYSIAN
MANUFACTURING FIRMS***

RAMI ABDULHAKEEM HASAN BA RAIDAH

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MANUFACTURING FIRMS**

By

RAMI ABDULHAKEEM HASAN BA RAIDAH

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfilment of the Requirements for the Degree of
Doctor of Philosophy**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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Lean Six Sigma (LSS) is considered as the current trend method of Quality Management in large enterprises. Yet, its implementation in small and medium sized enterprises is still at an early stage. Small and medium companies have not received sufficient attention regarding the critical success factors (CSFs) to LSS implementation, however 98.5% business establishments in Malaysia are SMEs. Literature review supported that there is an agreement about the importance of CSFs to LSS implementation, yet there is no agreement about what constitutes these CSFs. Further, just few studies are considering the outcome of LSS in manufacturing SMEs performance. Moreover, very few publications to date have scientifically measured the readiness for LSS deployment in manufacturing SMEs context. Accordingly, a standard model for CSFs of LSS implementation is still lacking in the current literature related to SMEs. Recognizing the severe global competition encountering Malaysian market and the influential role of SMEs in enhancing Malaysian economy, there is a need to emphasize the ability of manufacturing SMEs in achieving perfection and excellence in all operational dimension including Quality Management. This study investigated the direct relationship between CSFs to LSS implementation and manufacturing SMEs performance. Furthermore, this study investigated the moderation role of adoption readiness on the direct relationship between CSFs to LSS implementation and manufacturing SMEs performance. The present study limited its scope within the context of Malaysian manufacturing SMEs. Survey-based method has used to collect data. As current literature lack of using an advance analysis method such as structural equation modeling, Variance-based SEM, which is known as SmartPLS method is applied in this study. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) have used to assess convergent validity, discriminate validity, unidimensionality, and to test the goodness of model fit and to test the hypotheses. This study found that top management commitment, supplier quality management, training and education, reward and recognition system, process audit are positively influence

on manufacturing SMEs performance. However, linking LSS to SME strategy was found not effective on manufacturing SMEs performance. Moreover, the study found that the adoption readiness only moderates the direct relationship between top management commitment and manufacturing SMEs performance. Further, this research ended by developing a model for implementing LSS successfully in Malaysian manufacturing SMEs. The recommendations and implication also have provided in this research.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

HUBUNGAN ANTARA PERLAKSANAAN LEAN SIX SIGMA, KESEDIAAN MENGGUNA DAN PRESTASI IKS DALAM SYARIKAT PEMBUATAN MALAYSIA

Oleh

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Lean Six Sigma (LSS) dianggap sebagai kaedah Pengurusan Kualiti yang terkini di perusahaan besar. Pelaksanaannya di perusahaan kecil dan sederhana masih pada tahap awal. Syarikat syarikat di dalam kelompok ini belum mendapat perhatian yang sewajarnya mengenai faktor kejayaan pelaksanaan (*CSFs*) *LSS* tetapi 98.5% perniagaan di Malaysia terdiri daripada perusahaan kecil dan sederhana. Penyelidikan menunjukkan bahawa ada kesepakatan mengenai kepentingan *CSFs* untuk pelaksanaan *LSS*, namun tidak ada kesepakatan tentang dasar factor kejayaan pelaksanaan (*CSFs*) ini. Selain itu hanya terdapat beberapa kajian yang mempertimbangkan hasil *LSS* dalam menentukan prestasi *SME*. Di samping itu, bilangan penerbitan yang telah diterbitkan setakat ini masih tidak mencukupi untuk menentukan berkesan penggunaan *LSS* dalam industry yang melibatkan *SME*. Oleh itu, model piawai untuk pelaksanaan *LSS* masih di tahap permulaan. Menyedari persaingan global sengit yang dihadapi oleh pasaran di Malaysia dan peranan *SME* yang berpengaruh dalam meningkatkan ekonomi Malaysia. Terdapat beberapa keperluan untuk menekankan kemampuan *SME* untuk mencapai kesempurnaan dan kecemerlangan dalam semua dimensi operasi termasuk Pengurusan Kualiti. Kajian ini meneliti hubungan langsung antara *CSFs* dengan pelaksanaan *LSS* dan prestasi *SME*. Selanjutnya, kajian ini meneliti peranan moderasi kesediaan adopsi pada hubungan langsung antara *CSFs* dengan pelaksanaan *LSS* dan prestasi *SME*. Kajian ini menerhadkan skop *SME* di Malaysia sahaja. Kaedah berdasarkan tinjauan telah digunakan untuk pengumpulan data. Oleh kerana penerbitan semasa amat terhad dalam menggunakan kaedah analisis pendahuluan seperti pemodelan persamaan struktur, *SEM* berasaskan Variance, yang dikenali sebagai kaedah *SmartPLS* diterapkan dalam kajian ini. Analisis faktor penerokaan (*EFA*) dan analisis faktor pengesahan (*CFA*) telah digunakan untuk menilai kesahan konvergen, membezakan kesahan, *unidimensionality*, dan untuk menguji kesesuaian modal dan untuk menguji hipotesis. Kajian ini mendapati bahawa komitmen pengurusan atasan,

pengurusan kualiti pembekalan, latihan dan pendidikan, sistem penghargaan dan pengiktirafan, audit proses berpengaruh positif terhadap prestasi *SME*. Namun, strategi untuk mengaitkan *LSS* dan *SME* didapati tidak berkesan. Selain itu, kajian mendapati bahawa kesediaan adopsi hanya memoderasi hubungan langsung antara komitmen pengurusan atasan dan prestasi *SME*. Selanjutnya, penyelidikan ini diakhiri dengan mencipta model untuk pelaksanaan *LSS* dengan jayanya dalam bidang *SME* di Malaysia. Cadangan dan implikasi jugak telah disertakan dalam penyelidikan ini.



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LIST OF ABBREVIATIONS

CSFs	Critical Success Factors
CFFs	Critical Failure Factors
CFA	Confirmatory Factor Analysis
CI	Continuous Improvement
DMAIC	Define, Measure, Analyse, Improve, Control
DV	Dependent Variable
EDT	Employee Development and Training
EFA	Exploratory Factor Analysis
EFQM	European Foundation for Quality Management
EPQ	Employee Qualification
H	Hypothesis
IV	Independent Variable
ISM	Interpretive Structural Modelling
KM	Knowledge Management
KPI	Key Performance Indicator
LSS	Lean Six Sigma
LS	Linking LSS to SME strategy
MSME	Micro-Small and Medium Enterprises
OGC	Organizational Culture
PA	Process Audit
PM	Performance Measurement
RSM	Risk Management
R&D	Research and Development
RO	Research Objective
ROI	Return of Investment
RQ	Research Question
RRS	Reward and Recognition System
SME	Small and Medium-sized Enterprises
SME Corp.	SME Corporation Malaysia
SQM	Supplier Quality Management
TMC	Top Management Commitment
TE	Training and Education

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter introduces and discusses the overall research structure on the impact of Lean Six Sigma (LSS) methodology onto Malaysian manufacturing Small Medium Enterprises (SMEs) performance. Practically, this chapter initiates the foundation for this study through outlining the research purpose, illuminating the research problem, identifying the research questions and objectives and the influence of this research to LSS theory and practice. Furthermore, this chapter presents a brief background on Malaysian economic transformation, Malaysian manufacturing SMEs and government support to SMEs. Chapter one is divided into eight sections: introduction, background of the study, problem statement, research questions, research objectives, scope of the study, significance of the study, and thesis organization.

1.2 Background of the Study

This section clarifies a background on the significance impact of quality management practices onto manufacturing SMEs performance in Malaysia.

1.2.1 Impact of Quality Management onto Manufacturing SMEs Performance

The implementation of quality management approaches has brought excellent impact on manufacturing SMEs performance. Previous studies have showed that when quality management practices are implemented, positive effects on manufacturing SMEs performance noticed (O'Neill et al., 2016). Quality management is any practices that produce high quality products and achieve SMEs targets such as cutting the production cost while maintaining high quality products (Gandhi et al., 2019).

Parvadavardini et al. (2016) mentioned that the expected outcomes of quality management are improving SMEs performance, higher productivity, effective processes and competitive products that satisfies the customer and improves the SMEs competitiveness. Lobo et al. (2016) clarified that there is a substantial positive correlation between quality management and SMEs performance. The efficient relationship between quality management procedures and SMEs performance is tested in relations of conformance with Malcolm Bridge standard,

SMEs performance tested in four types of performance; workers relations, operating process, client's satisfaction and financial performance, and in two different perceptions: "client quality" and "practical quality". Client quality deals with characteristics attached to client perception of product quality, while practical quality is related to procedures characteristics which emphasis that the product is produced efficiently and effectively (Lobo et al., 2016).

Bhatia and Awasthi (2018) identified that quality management has expanded in the recent past as it directly effects on the general performance of manufacturing SMEs. From the primary changes made through the development of machines that accelerated creation to utilizing experimental or measurable strategies to break down procedures and employees, SMEs have sought after enhanced working techniques (Fujishima et al., 2017). Certain industries, for example, manufacturing and machining, center the larger part of their consistent change endeavors on expanding the nature of their products and management as much as their mechanism for cutting the cost. As a result, to cutting expenses and enhancing quality, fruitful nonstop improvement activities at last change the culture of SMEs (Li et al., 2019). This key change in operational environment requires consistent and developed quality management technique (Li et al., 2019).

Zhou and Li (2020) identified that during this period of extreme competition, quality has turned into the key motto in SMEs as they make progress towards being an upper hand in industry described by globalization and educated customers. SMEs survival in a competitive situation has dependably been a critical challenge in the current industrial situation. Meanwhile of globalization and development, managers think that it's hard to survive unless they have competitive quality techniques. Thus, content of quality management performance has been increased after the manufacturing revolution in Japan (Cheung and To, 2010).

Additionally, quality management has ended up being successful in bringing down manufacturing costs and moving forward efficiency (Neyestani and Juanzon, 2017). Therefore, Quality management is by all accounts the fitting system for manufacturing SMEs to survive and stay competitive. This has turned out to be much more imperative in the growing of worldwide market and put challenging real difficulties through competition among players inside and through expanded client's desires. Manufacturers producing quality products has increased competitive edge and more noteworthy market share (Neslihan and Jeremy, 2016).

1.2.2 SMEs Definition in Malaysia

SME is a flexible term. It combines organizations from both sectors manufacturing and service. Nevertheless, this research focus on manufacturing SMEs. Every country has its own definition for SMEs term which might various

from other countries based on many factors such as number of workers, sales income, organization size, location, age and technology used within the SME (Al Mamun et al., 2018). As its stated in Figure 1.1 SMEs are classified based on the number of workers and their asset or income (SME Corporation Malaysia, 2018).

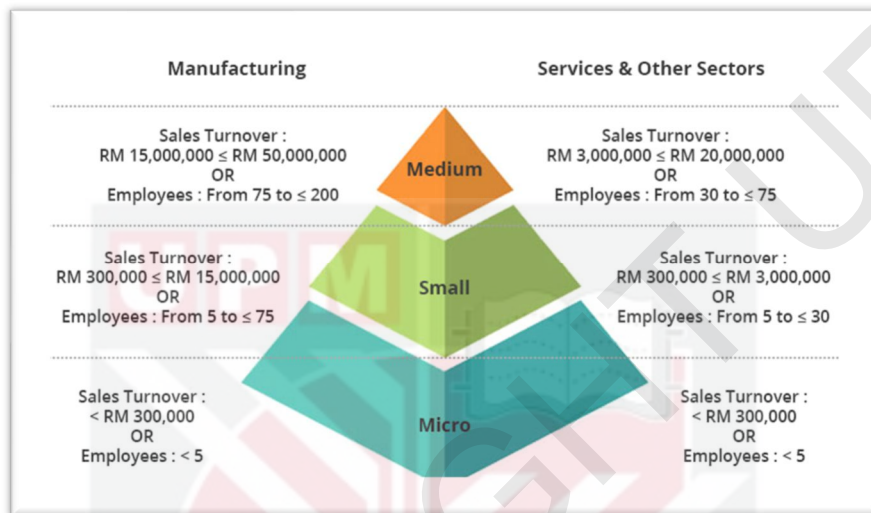


Figure 1.1: Classification of Malaysian SMEs (SME Corp., 2018)

SMEs have played enormous function in manufacturing industry all around the world. Malaysia has 98.5% SMEs of all establishments, which led 28.5% of overall production output. In addition, about 3.7 million out total of 7 million workers used by SMEs (SME Corporation Malaysia, 2018).

1.2.3 Malaysian Manufacturing SMEs

Most countries around the world are paying attention to constructing and assisting SMEs as one of the critical points of economic development. Regardless of these statistics, Malaysian SMEs exports are approximately 20% lower than some other neighbor countries, such as Taiwan, Hong Kong, Philippines and even the United States (Sze and Puhakka, 2019). Table 1.1 shows the Malaysian manufacturing SMEs sub-sectors in activities such as production of raw materials and processing. Malaysia SMEs represents 98.5% of the total manufacturing establishments in the country. Furthermore, most of Malaysian manufacturing SMEs are located in the West Cost of Malaysia where port facilities are nearby. Johor and Selangor focus in manufacturing SMEs such as textiles and wood industries tracked by Pinang and Perak. In addition, due to the huge forest concentration in Perak and Johor, SMEs focus in sectors such

as food and related manufacturers. SMEs in Selangor are mainly focus in electrical and equipment sectors (SME Corp. Malaysia, 2018).

Table 1.1: Principal statistics of SMEs in manufacturing sub-sectors

NO.	SMEs in manufacturing sub-sectors	NO. of SMEs
1	Manufacture of food and beverages products	8292
2	Manufacture of textiles and wearing apparel	8702
3	Manufacture of fabricated metal products except machinery	5284
4	Manufacture of machinery and equipment, repair & installation	4743
5	Manufacture of furniture	4224
6	Printing and reproduction of recorded media	3194
7	Manufacture of rubber and plastics products	2446
8	Manufacture of other non-metallic mineral products	1999
9	Manufacture of electrical and electronic	1701
10	Manufacture of chemicals and chemical products	1380
11	Manufacture of tobacco products	24
12	Manufacture of leather and related products	370
13	Manufacture of paper and paper products	901
14	Manufacture of coke and refined petroleum products	107
15	Manufacture of basic pharmaceutical products and pharmaceutical preparations	355
16	Manufacture of basic metals	1482
17	Manufacture of other transport equipment	1031
18	Other manufacturing	1463
Total		47698

(SME Corp. Malaysia, 2015)

1.2.4 Malaysian Government Support to SMEs

The Malaysian government has initiated a set of helpful rules and policies to expand the SMEs development. Hashim (2015) stated that the main role of Malaysian government is to encourage SMEs to move to an advanced level in order to have a competitive edge in the international markets. Thus, Malaysian administration through the Ministry of International Trade and Industry (MITI) and its agencies plays a hard work on supporting SMEs through many activities such as numerous export programs and incentives to encourage SMEs export their products and qualify them to compete in the international market (Ismail and Alam, 2017). Additionally, Malaysian government has announced to provide SMEs with financial assist, smooth financial transactions, tax exception as well as guaranteeing fair competition and equal chances for exporting SMEs (Ahmad et al., 2017; Yean and Yi, 2019).

Liang et al. (2019) stated that this high competition market era has influenced international products to compete the Malaysian products, particularly products from China and India delivered with lower price in contrast to local products. Most Chinese companies have controlled the market share in Asia, Europe and America (Liang et al., 2019). Nowadays, the manufacturers are not any more in the same level with the client's requirements. Thus, in order for SMEs to live in a challenging tough era, SMEs must look ahead to enhance the present quality systems and meet the customer requirements. Among the available quality improvement methods, LSS believed to be the best quality management practice for most industries (Raja et al., 2018).

1.2.5 SMEs Quality Management Challenges

Rahman et al. (2016) showed some of the barriers to SMEs growth and globalizing, such as the lack of financing, lack of high managerial capabilities, low productivity, poor access to management and technology. Furthermore, in the Malaysian situation, some other sources illustrated other challenges, such as lack of human resources, lack of access loans, limited adoption of quality management, technology and competition from multinational companies (Isa et al., 2016). Isa et al. (2016) identified that SMEs adopt quality management methods slower than larger establishments. Isa et al. (2016) delivered his opinion along with the viewpoint of other Lean Six Sigma experts on the question; 'could Lean Six Sigma be efficiently implemented in SMEs?' His study presented that SMEs could implement LSS more effectively than large establishments, if there is high commitment from the top management.

Small enterprises, in specific, lack proper human resources to classify roles and designate the typical LSS hierarchy needed for its successful implementation (Fonseca, 2015). Yet, when Motorola first came out with Six Sigma method, they didn't know anything about Black Belts; what they needed was extensive workers training combined with top management commitment. Additionally, higher

consultants' charges are another critical challenge to small enterprises (Timans et al., 2016). Therefore, Timans et al. (2016) support the role of national academic institutes to provide a budget LSS methodology.

Medium enterprises lack the essential quality awareness, and the loss of appropriate vision could be considered as an important challenge. Also, financial shortage is a critical factor to consider, yet with the help of an appropriate strategic planning this problem can be addressed (Antony et al., 2017). Antony et al. (2016) emphasized that best level of quality could be attained by adopting LSS through emerging a special combination of capabilities and available resources to understand the benefits of LSS. This research discusses the implementation of quality management systems and its effect on Malaysian manufacturing SMEs performance.

1.3 Problem Statement

Literature has recognized and provided compelling arguments that critical success factors (CSFs) to LSS implementation and adoption readiness are important determinants for manufacturing performance. However, the current literature has clear gap. This gap is that SMEs have not received sufficient attention regarding to CSFs to LSS implementation; more specifically, just few studies are considering the outcome of LSS in manufacturing SMEs performance. Moreover, very few publications to date have scientifically measured the readiness for LSS deployment in manufacturing SMEs context. In the following, this study will elaborate this gap.

Current literature argued that CSFs of LSS implementation are important drivers to improve the operational performance (Knol et al., 2018), and have an effective impact in terms of performance improvements in large organizations (Cherrafi et al., 2016). For example, Murphy (2016) found that the framework of LSS implementation in manufacturing SMEs has assisted to improve SMEs' performance to become more effective and to improve their competitiveness. As well, Murphy (2016) determined that LSS execution drives to better product quality and that SMEs can deploy it as successfully as larger organizations.

However, current literature has three issues related to critical success factors of LSS implementation. The first issue is that, although, there is agreement about the importance of CSFs for LSS implementation, and there have been many efforts to identify and conceptualize those CSFs, but there is no agreed about definition of CSFs, yet there's and no agreement about what constitutes these critical success factors within the scientific literature about the LSS critical success factors (Moya et al., 2019). Current literature lacks of a standardized toolkit and unify model for critical success factors of LSS implementation (Alexander et al., 2019), and thus, a standard framework for CSFs of LSS implementation is still lacking in the current literature (Walter and Paladini, 2019; Gaikwad and Sunnapwar, 2020; Ali et al., 2020).

Furthermore, small companies have not received sufficient attention regarding the critical success factors to LSS implementation in SMEs (Belhadi et al., 2019; Scheller et al., 2018). Just very few studies regarding LSS implementation in SMEs have been done in the available literature, thus, a research needs to be carried out in this area (Sahoo and Yadav, 2018), future researches have to consider the crucial role of CSFs on successful implementation of LSS and sustainability in the context of SMEs (Vallejo et al., 2020), using a large-scale survey to investigate the critical success factors for implementing LSS in SMEs (Gaikwad et al., 2020; Gaikwad and Sunnapwar, 2020).

The second issue is that, the role and contribution of critical success factors of LSS implementation for SMEs performance have narrowly been validated and tested. Most of the previous studies are based on conceptual papers (e.g., Alblooshi et al., 2020; Sreedharan et al., 2019), case study/ multiple case studies (Lande, et al., 2020; Georgiev and Ohtaki, 2020; Vallejo et al., 2020; Antony et al., 2017) or literature review (e.g., Gaikwad and Sunnapwar, 2020; Walter and Paladini, 2019; More empirical evidence required to statistically validate the relationship between CSFs of LSS and SMEs performance (Thanki and Thakkar, 2020; Singh and Singh, 2020; Ali et al., 2020; Alexander et al., 2019).

The third issue is that, although LSS is one of the best strategies for success, however, there is a lack of awareness among workers and managers regarding the need and importance of LSS, which reflect less readiness to adopt LSS (Sreedharan and Raju, 2016). Very few publications to date have scientifically measured the readiness for LSS deployment in manufacturing SMEs context. Thus, current literature lacks measuring the role of LSS adoption readiness in the relationship between quality initiatives and manufacturing SMEs performance (Sreedharan et al., 2019). In this context, organizational factors such as adoption readiness have to consider as a moderator in the relationship between critical factors of quality implementation and SMEs performance (Pambreni et al., 2019).

In an attempt to fill this research gap, this study develops a model in which CSFs of LSS implementation affect directly on SMEs performance and this relationship are moderated by the moderating effect of adoption readiness. An enhanced understanding of the moderating role of adoption readiness in the relationship between CSFs of LSS implementation and SMEs performance helps to provides an empirical evidence for the theoretical arguments that CSFs can create sustainable competitive advantage by effecting LSS implementation, and better explain the relationship between CSFs of LSS and SMEs performance.

1.4 Research Questions

Considering the theoretical and practical gaps in the context of quality management practices impact onto Malaysian manufacturing SMEs

performance, this study aims to provide explanations for each of the subsequent research questions:

1. What are the significant critical success factors for implementing LSS in manufacturing SMEs performance?
2. Do critical success factors for implementing LSS effect on manufacturing SMEs performance?
3. Does SMEs adoption readiness moderate the relationship between LSS critical success factors and manufacturing SMEs performance?
4. What is the developed model for implementing LSS successfully in manufacturing SMEs?

1.5 Research Objectives

To address the theoretical and practical gaps debated and the questions raised, this study attempts to accomplish the subsequent research objectives:

1. To identify the critical success factors for implementing LSS in manufacturing SMEs performance;
2. To verify the direct relationship between the critical success factors for implementing LSS and manufacturing SMEs performance;
3. To explore the moderating effect of adoption readiness on the relationship between LSS critical success factors and manufacturing SMEs performance;
4. To develop a model for implementing LSS successfully in manufacturing SMEs.

1.6 Scope of the Study

This research tends to identify the most important critical success factors for LSS implementation successfully in Malaysian manufacturing SMEs, and measure its impact on Malaysian manufacturing SMEs performance. Furthermore, the study will tend to explore the moderating effect of adoption readiness on the relationship between LSS critical success factors and manufacturing SMEs performance. Finally, the study will come out with an acknowledged model to implement LSS successfully in Malaysian manufacturing SMEs. Despite the fact that the data collected in this study were assembled from the manufacturing SMEs might tend to give positive outcomes, however there are challenges and barriers experienced which is critical to the SMEs performance. This research particularly concentrates on defining the operational LSS model, the management choices made to solve the difficulties and challenges confronted while the implementation of LSS into Malaysian manufacturing SMEs.

1.7 Significance of the Study

The current study 's findings provide beneficial influence on both aspects theoretical and practical.

1.7.1 Theoretical Contribution

Many of the previous studies found that quality management could be used to improve Malaysian SMEs performance, researchers such as (Imran et al., 2018; Rogo et al., 2017; Chan et al., 2016; Yunoh and Ali, 2015) have empirically studied the influence of quality management implementation towards Malaysian SMEs performance. Even though there are a number of past studies in Malaysia on quality management methods such as LSS practices, but not many were on manufacturing SMEs LSS execution.

A bulk of literature on critical success factors of LSS management practices have been done in Malaysia which have rapid development of manufacturing SMEs industry. Thus, the theoretical model and this study findings would assist to narrow down the lack of literature. Henceforth, this study anticipated to narrow the gaps in previous literature and provide useful guidelines that could determine the critical success factors of LSS practices in Malaysian manufacturing SMEs.

Moreover, manufacturing SMEs adoption readiness of LSS is rare through the international market (Douglas et al., 2017; Shokri, Waring and Nabhani, 2016; Albliwi et al., 2015) clarified that even though the literature review lists a high number of large organizations implementing LSS, still it is insignificant number in the stage of manufacturing SMEs. He (2016) used an organized theory to measure manufacturing SMEs adoption readiness of LSS in Chinese manufacturing SMEs. However, most studies on LSS showed an effective impact on manufacturing SMEs performance, and it has focused in the context of China and Western countries such as the European countries, US and Australia. Hence, conducting similar studies in other regions of the world is significant due to the alterations in national and SMEs culture, strategies, work environment, and management styles that might lead to different decisions. Consequently, this study is focusing on LSS impact on Malaysian manufacturing SMEs performance.

1.7.2 Practical Contribution

Malaysian manufacturing SMEs gain competitive edge and better market share through effective levels of performance by delivering quality products with a competitive price as needed by the demanding clients (Masdar, 2017). However, the implementation of quality management has not occurred at the same level in different areas of the world especially in Malaysian manufacturing industries

(Imran et al., 2018). Therefore, this research will assist to explore the effectiveness of LSS practices onto the performance of Malaysian manufacturing SMEs through investigating the critical success factors for LSS implementation in Malaysian manufacturing SMEs.

The literature widely discusses the execution of LSS by numerous organizations around the world (Antony et al., 2018; Antony et al., 2017; Timans et al., 2016; Albliwi et al., 2015). Therefore, owing to the limited and scarce practical studies dedicated to the execution methodology of manufacturing LSS in Malaysian SMEs, the current study contributes by delivering an extensive perspective concerning the critical success factors that impact the execution of LSS successfully on Malaysian manufacturing SMEs performance. The study as well contributes to the literature by highlighting the necessity for more practical studies in the future of the same caliber, especially in the middle east countries that face the same matter.

The study findings assist SME Corporation Malaysia to provide manufacturing SMEs with an updated LSS model which will help to improve the operational performance and sustain high-quality level of products with minimum operational cost. Moreover, the study findings will significantly contribute to improve the sustainability of Malaysian manufacturing SMEs performance. The findings will prove advantages in developing critical success factors strategies to improve the level of operational LSS performance and reduce the process variation and waste which will lead to decline the production cost.

1.8 Thesis Organization

This thesis is divided into five chapters. The next paragraphs provide an overview of each chapter 's contents.

Chapter one provides an introduction to the research outline. It introduces the research background, justification of the study problem and research questions and objectives. Furthermore, it presents the research significance, the research scope, the definition of key terms, and, lastly, the research structure.

Chapter two highlights the theoretical background for the research and presents a review of the related literature on the concepts involved in this research. These concepts are manufacturing SMEs performance, top management commitment, linking LSS to SME strategy, supplier quality management, training and education, reward and recognition system, process audit and SMEs adoption readiness. Additionally, this chapter acknowledged the literature gap and the research framework and the hypothesis.

Chapter three provides an outline of the research methodology and discusses the methods applied with justification. The research design is then discussed along with the development of the tool, population sample and data collection and methods applied in data analysis management.

Chapter four presents the research findings based on the gathered primary data from the interviews and questionnaire. Discussion of these findings in line with updated literature was presented.

Lastly, chapter five covers concluding statements. It goes over the main findings of the research, the research contribution, and suggestions. Then, it explains on the research limitations and recommendations for future research.



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LIST OF PUBLICATIONS

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