

SUPERVISOR'S APPROVAL

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

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**CHALLENGES OF IMPLEMENTING LEAN SIX SIGMA (LSS) TOWARDS
PERFORMANCE IMPROVEMENT IN MANUFACTURING INDUSTRIES:
A CASE STUDY IN MALACCA AREA**

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This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Technology Management (Innovation) with Honours.

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DECLARATION

I hereby declare that this thesis “Challenges of implementing Lean Six Sigma (LSS) towards performance improvement in manufacturing industries: A case study in Malacca area” has been prepared by my own work except for the summaries and citation that I have been clarify the resources.

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DEDICATION

I would like to appreciate the dedication of my beloved families who educated me and motivate me in assisting me to complete this research study. It is also dedicated to my lecturers and friend who gives me support and encouraged me 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 challenges of implementing Lean Six Sigma towards performance improvement in manufacturing industries in Malacca area. Data was collected from the implemented lean six sigma strategies of companies through questionnaire survey. The relationship between these challenge of implementing Lean Six Sigma towards performance improvement were conducted by factor analysis and regression analysis. The respondents were requested to rate the extent of implications of Lean Six Sigma and most influential challenges that affect performance improvement. Data analysis was calculated and performed some statistical analysis. The results of this study highlight the Lean Six Sigma factors of human factors, organizational factors and cultural issues as the challenges affected towards performance improvement in manufacturing industries in perspectives measures of quality performance, operational performance and flexibility performance. The case studies have formed a theoretical framework that can conduct in Malacca's manufacturing firms.

ABSTRAK

Tujuan kajian ini adalah untuk mengkaji cabaran pelaksanaan Lean Six Sigma terhadap peningkatan prestasi industri pembuatan di kawasan Melaka. Data dikumpulkan daripada strategi six sigma syarikat yang dilaksanakan melalui kaji soal selidik. Hubungan antara cabaran untuk melaksanakan Lean Six Sigma terhadap peningkatan prestasi dilakukan oleh analisis faktor dan analisis regresi. Para responden diminta menilai sejauh mana implikasi Lean Six Sigma dan cabaran paling berpengaruh yang mempengaruhi peningkatan prestasi. Analisis data dikira dan dilakukan beberapa analisis statistik. Hasil kajian ini menyerlahkan faktor faktor Lean Six Sigma faktor manusia, faktor organisasi dan isu-isu kebudayaan apabila cabaran-cabaran itu terjejas ke arah peningkatan prestasi industri pembuatan dalam perspektif ukuran prestasi kualiti, prestasi operasi dan prestasi fleksibiliti. Kajian kes telah membentuk rangka kerja teoritis yang boleh dilakukan di syarikat pembuatan Melaka.

TABLE OF CONTENT

CHAPTER	TITLE	PAGES
	APPROVAL	
	TITLE	i
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENT	vii
	LIST OF TABLE	ix
	LIST OF ABBREVIATION	x
	LIST OF FIGURE	xi
	LIST OF SYMBOL	xii
	LIST OF APPENDIX	xiii
CHAPTER 1	INTRODUCTION	
	1.0 Research Background	1
	1.1 Problem Statement	4
	1.2 Research Questions	5
	1.3 Research Objectives	5
	1.4 Scope, Limitation and Assumptions of the Study	6
	1.5 Importance of the Study	7
	1.6 Summary	7

CHAPTER 2 LITERATURE REVIEW

2.0	Introduction	8
2.1	Lean Six Sigma (LSS) Strategy	8
2.2	Lean Six Sigma (LSS) Challenges	10
	2.2.1 Human Factors	11
	2.2.2 Organizational Factors	15
	2.2.3 Cultural Issues	18
2.3	Performance Improvement	20
2.4	Research Framework	23
2.5	Hypothesis	24
2.6	Summary	25

CHAPTER 3 RESEARCH METHODOLOGY

3.0	Introduction	26
3.1	Quantitative Methodology	27
3.2	Research Strategy	28
	3.2.1 Questionnaire Design	29
	3.2.2 Sampling Design	30
	3.2.3 Pilot Testing	31
3.3	Research Design	32
	3.3.1 Location of the Research	33
	3.3.2 Time Horizon	34
	3.3.3 Primary and Secondary Data Sources	35
3.4	Data Analysis	36
3.5	Reliability and Validity	37
3.6	Summary	38

CHAPTER 4**DATA ANALYSIS AND DISCUSSION**

4.0	Introduction	39
4.1	Result Dissemination Questionnaire	40
4.2	Results and Analysis	41
	4.2.1 Reliability Analysis	41
4.3	Descriptive Studies	42
	4.3.1 Respondent's Background	43
4.4	Validity Analysis	50
	4.4.1 Pearson Correlation Coefficient	50
4.5	Correlation Analysis of All Variables	55
4.6	Hypothesis Testing (Correlation Analysis)	58
	4.6.1 The Relationship between Human Factors towards Lean Six Sigma Performance Improvement	58
	4.6.2 The Relationship between Organizational Factors towards Lean Six Sigma Performance Improvement	60
	4.6.3 The Relationship between Cultural Factors towards Lean Six Sigma Performance Improvement	62
4.7	Multiple Regression Analysis	65
	4.7.1 Multiple Regression Analysis of Independent Variables towards Quality Performance	65
	4.7.2 Multiple Regression Analysis of Independent Variables towards Flexibility Performance	66
	4.7.3 Multiple Regression Analysis of Independent Variables towards Operational Performance	67
4.8	ANOVA Analysis	68
4.9	Regression Coefficient	70

4.10	Summary	71
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CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.0	Introduction	72
5.1	Summary of Findings	72
5.2	Justifications of Research Objectives	74
5.2.1	Fulfillment of First Research Objectives	75
5.2.2	Fulfillment of Second Research Objectives	76
5.2.3	Fulfillment of Third Research Objectives	77
5.3	Limitation of Research Study	77
5.4	Recommendation for Future Research	78
5.5	Summary	79
	REFERENCES	80
	APPENDICES	86

LIST OF TABLE

TABLE	TITLE	PAGE
2.0	Evidence of variables (IV1) from past studies	14
2.1	Evidence of variables (IV2) from past studies	17
2.2	Evidence of variables (IV3) from past studies	20
2.3	Evidence of variables (IV3) from past studies	22
3.0	Likert-scale Survey	29
4.0	Result Dissemination Questionnaire	40
4.1	Cronbach's Alpha (N=30)	42
4.2	Gender	43
4.3	Department	44
4.4	Designation	46
4.5	Duration of Service	47
4.6	Basic knowledge about LSS	49
4.7	Pearson Correlation Coefficient	51
4.8	Correlation of Human Factors	51
4.9	Correlation of Organizational Factors	52
4.10	Correlation of Cultural Factors	54
4.11	Correlation of All Variables	57
4.12	Correlation between human factors towards Lean Six Sigma Performance Improvement	59
4.13	Correlation between organizational factors towards Lean Six Sigma Performance Improvement	61
4.14	Correlation between cultural factors towards Lean Six Sigma Performance Improvement	63
4.15	Model Summary of MRA for Independent Variables towards Quality Performance	65

4.16	Model Summary of MRA for Independent Variables towards Flexibility Performance	66
4.17	Model Summary of MRA for Independent Variables towards Operational Performance	67
4.18	ANOVA Analysis for Independent Variables towards Quality Performance	68
4.19	ANOVA Analysis for Independent Variables towards Flexibility Performance	68
4.20	ANOVA Analysis for Independent Variables towards Operational Performance	69
4.21	Regression Coefficient for Independent Variables towards Performance Improvement	70

LIST OF ABBREVIATION

ABBREVIATION	MEANING
FIZ	Free Trade Industrial Zone
LSS	Lean Six Sigma
DMAIC	Define, Measure, Analyse, Investigate, Control
PDCA	Plan, Do, Check, Act
IOT	Industrial Internet of Things
ROI	Return of Investment
JIT	Just In Time
CI	Continuous Improvement
SPSS	Statistical Package for the Social Sciences

LIST OF FIGURE

FIGURE	TITLE	PAGE
2.0	Research Framework	23
4.0	Gender	44
4.1	Department	45
4.2	Designation	47
4.3	Duration of Service	48
4.4	Basic knowledge about Lean Six Sigma (LSS)	50

LIST OF SYMBOL

H_0 = Null (rejected)

H_1 = H one (Accepted)

% = Percentage

α = Confidence Interval (Alpha)

LIST OF APPENDIX

APPENDIX	TITLE	PAGE
A	Gantt Chart PSM I	45
B	Gantt Chart PSM II	46

CHAPTER 1

INTRODUCTION

1.0 Research Background

Over the past 20 years, the Lean Six Sigma (LSS) was effective in eliminating various forms of waste and activities that do not add value to customers. The rise of lean manufacturing and six sigma approaches for improving productivity and performance improvement accompanied the gradual transition of society from the pre-industrial era to industrial era in the 21st century of globalization world. Different approaches have emerged in the industrial proposing improvements in the production systems and elimination of trade-offs. Among them, Lean manufacturing and Six Sigma have become recognized as viable alternatives for improving processes from the study of (Diego Pacheco, 2015) to improve the performance in manufacturing industries. George (2010), advocate that the use of one strategy does not exclude the other and benefits may be reaped by using both strategies in conjunction.

The use of Lean Manufacturing and Six Sigma methodology in an integrated manner was initially held in 1986. However, the term LSS was introduced in the literature since 2000 (Sheridan, 2000) being defined by (Snee, 2010) as a management and organizational strategy methodology that improved the process improvement, customer satisfaction, and organizational results. Nowadays, a numerous number of the quality initiative programs have drastically increased over the years in most of the manufacturing industries. In late, many of the organization

had shifted their existing quality initiatives to LSS initiative as a business strategy to improve industrial performance and enhance the business strategy in driving performance goals (Habidin and Yusof, 2013).

Through the integration of lean and six sigma initiatives in the field of quality and continuous improvement in most manufacturing industries, it combines the advantages of each to help the organization increase competitive advantages and continuous improvement activities, achieve higher customer satisfaction and also gain business and operational excellence (Antony and Desai, 2009). It is necessary for an organization, especially in manufacturing sectors to understand and measure their performance improvement from LSS perspective. An effective performance measurement able to identify the strengths and weaknesses of an organization to be improved. In addition to that, a numerous number of empirical research is focused on identifying the level of benefits and obstacles in applying quality initiatives such as lean (Wong, et al., 2009) and six sigma (Antony and Desai, 2009). Therefore, since the LSS strategy is still newly implemented among manufacturing industries in Malaysia, hence the investigation of possible challenges and obstacles is important for achieving long-term strategic goals.

The implementation of the LSS initiative in manufacturing industries is a challenging and complex task for most of the company as the result of applied LSS strategy is not effective as expected and performance improvement goals are hard to achieve. Most companies are an encounter to less experience and lower exposure in managing LSS practices in organization and employees are lack of understanding to the real essence of LSS concept and philosophy that may affect the business operations and overall company performance.

LSS strategy is considered as a technique that is responsible for change and performance improvements in an organization through continuous improvement. According to the Lean enterprise institute founded by James P. Womack in 1997, Leans can be defined as utilizing fewer resources in creating value to achieve customer satisfaction. Lean practices aim at waste removal both inside and between

companies (Hines and Taylor, 2000). Lean tools and techniques are adopted commonly among the industrial sectors, for instance, automobile, customers' goods, and service, however the mere lean manufacturing implementation in the manufacturing industry is not sufficient to adopt the changing market requirements. A combination of six sigma would be an effective improvement strategy worldwide. Manufacturing organizations build six sigma efforts mainly to understand how defects occur to devise process improvement in order to reduce variation and errors. The six sigma DMAIC methodology is a proven problem-solving tool that able to improve overall performance improvement. As a consequence, lean and six sigma approach are emphasized in this research to explore comprehensively about the underlying challenges which act as the barriers to implementing LSS strategy in manufacturing firm.

1.1 Problem Statement

Manufacturing companies are facing a number of severe problems, such as global ecological damage, resource wastage and shortage, environmental pollution and discretionary exploitation of natural resources, which all significantly impact the production cost (Golroudbary and Zahraee, 2015). Moreover, firm efficiency and competitiveness are two important challenges in today's global market that have motivated many manufacturing firms to plan novel management strategies (Holweg, 2007; Zahraee et al., 2014a). The most critical matter faced by manufacturers today is how to deliver products or materials fast, at low cost and good quality (Holweg, 2007).

According to (Laureani and Antony, 2012a), Lean Six Sigma is defined as a business improvement methodology that aims at maximizing the value of shareholders by improving quality, speed, customer satisfaction and costs. It is achieved by merging tools and principles from both lean and six-sigma by reaping benefits of both. From the perspective of other authors (Gershon and Rajashekharaiyah, 2011), had to point out that leading texts fail to define LSS as a unique methodology.

The LSS concept had its development along with various methodologies focused on the increasing quality towards performance improvement in organizations. The pursuing of this optimization intensified the demand for high pressure to deliver quality products by eliminating non-value added activities to increase efficiency while improving the performance of works. However, as global market evolves, achieving this goal has become more difficult and complex and there are numerous challenges faced while implementing Lean Six Sigma. Pedersen and Huniche, (2011) found that 70 percent of companies that have tried to implement the LSS as a strategy fails in its realization. Problem that manufacturing industries faced as they need to learn ways of conducting business with suppliers and customers to improve delivering quality products and work in effective and efficient ways. Therefore, it is important and urgent to examine the challenges in implementing methodology LSS

and develop a solution in order to achieve performance improvement goals in the manufacturing industry.

1.2 Research Questions

This research is to study the challenges of implementing Lean Six Sigma (LSS) towards performance improvement in manufacturing industry in Malacca, Malaysia. Research questions refer to below:

1. What are the implications of implementing Lean Six Sigma?
2. What are the challenges faced for implementing Lean Six Sigma towards performance improvement?
3. What are the most influential challenges for implementing Lean Six Sigma towards performance improvement?

1.3 Research Objectives

This research purposely is to examine the implications of implementing Lean Six Sigma in manufacturing industry in Malacca, Malaysia. In addition, this research study focuses on investigating the challenges faced for implementing Lean Six Sigma towards performance improvement. This research also helps industries to identify the most influential challenges while practicing Lean Six Sigma towards performance improvement.

1. To examine the implications of implementing Lean Six Sigma.
2. To investigate the challenges faced for implementing Lean Six Sigma towards performance improvement.
3. To identify the most influential challenges for implementing Lean Six Sigma towards performance improvement.

1.4 Scope, Limitation and Assumptions of the Study

This research focused on examining the challenges faced in implementation of LSS towards performance improvement in manufacturing industries. The researcher had smaller the scope of study by conducting research in manufacturing industry in Free-Trade Industrial Zone area in Malacca state, Malaysia. The researcher had to select 150 employees as respondents of the study and the departments include human resources, marketing, production, engineering and quality control and other management executives.

The limitation of this research includes lack of information and experiences that causes researcher is out of control on the research methodology. Some of the LSS practices and principles that found in the previous study are only in secondary data form. The research is limited to study the manufacturing companies that had to implement LSS strategies in their organization and the respondents will be selected from those the industry in Free Trade-Industrial Zone in the state of Malacca.

As for assumptions, the researcher assumes that respondents provide an honest answer during the questionnaire session. Second, the researcher had assumed that all respondents have adequate knowledge about LSS strategies in order to be a part of respondent for primary data collection. Third, the researcher assumed the respondents have experienced in answering research topic and where respondents are able to provide a justifiable answer regarding the challenges in implementation.

1.5 Importance of the Study

This study examined the challenges of implementation LSS strategy in manufacturing industries. The research pursued to understand the possible failure factors that may affect the performance improvement in an organization in this fast-growing market to solve the real problem. Moreover, this research also focused to identify the most influential challenge in implementing LSS philosophy. This study has applied the theory and knowledge to enhance the practicality of research topic.

1.6 Summary

As summarized, LSS strategy plays an important role in the continuous improvement of industries. Lean Six Sigma can well establish towards performance improvement with an effective implementation of lean manufacturing and six-sigma to reduce waste creating value to deliver quality products to customers. It can benefit all industry employees, customers and competitors to gain maximum learning knowledge and competitive advantages. Chapter one discusses the research background by introducing the lean manufacturing and six sigma approach. Problems nowadays found that most of the manufacturing industries are less concern to this concept due to lack of understanding of management level, lack of knowledge and experience in this study. The research problems result in three research questions and research objectives in which the research explores the implication and main challenges in the implementation of LSS strategy.