

Relationship between Workplace Learning and Sustainable Lean
Implementation with Continuous Improvement as Mediator:
A Study of Lean Manufacturing in Malaysia

Agnes Lim Siang Siew

A thesis submitted

In fulfilment of the requirements for the degree of Doctor of Philosophy

(Human Resource Development)

Faculty of Cognitive Sciences and Human Development
UNIVERSITI MALAYSIA SARAWAK
2019

DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulation of Universiti Malaysia Sarawak. The thesis has not been accepted for any degree and is not concurrently submitted in candidature for any other degree.

Name of student:	Agnes Lim Siang Siew
Student ID No:	15010068
Degree:	Doctor of Philosophy
Faculty:	Faculty of Cognitive Sciences and Human Development
Thesis Title:	Relationship between Workplace Learning and Sustainable Lean Implementation with Continuous Improvement as Mediator: A Study of Lean Manufacturing in Malaysia

Signature of Student:

Date: 2/10/2019

ACKNOWLEDGEMENT

The researcher is not the only person who contributes to the completion of this Doctoral dissertation. First of all, thanks be to God for giving me the opportunity and strength to accomplish this study with great supervision and guidance from my supervisor Dr. Surena Sabil and my co-supervisor Associate Professor Dr. Abang Ekhsan Abang Othman. I would like to express my deepest gratitude for the constructive feedback, time and effort that they had spent with me in reviewing this report throughout the study. Their patience, perseverance and endurance in the meeting, discussion as well as their personal time spent after the working hours are respected in terms of the comment provided for the development of this study. Apart from that, I would also like to thank my family members for their encouragement, inspiration and support in order for me to accomplish this study.

Thanks, as well to the management people in the organizations which grant me their permission to conduct my study at their workplace. Apart from that, I wanted to thanks all the respondents involved in this study. Without their effort, time and sincere intentionality to participate in responding to the questionnaire, I will not be able to carry out the research designed for the purpose of this study in a timely manner. Besides I would also like to thanks all the individuals who are not mentioned above that have ever helped me throughout this research.

ABSTRACT

The objective of this study is to identify the relationship between employee's perception towards workplace learning and sustainable Lean implementation with the presence of continuous improvement as a mediator in Lean manufacturing companies in Malaysia. In response to Resource Based Theory (RBT), this study fulfils the need to identify the characteristics (learning) and unique capabilities (continuous improvement) that must be possess by the resources (employees) to create value rather than merely identifying the type of resource in order to sustain competitive advantage in Lean firms. This study adopted quantitative research approach suitable for descriptive human resource development research. The design of this study is in the form of cross-sectional study. Survey questionnaire is utilized as the instrument for data collection. Eight Lean manufacturing companies located in Malaysia participated in this study which contributed to a total of 219 collectable gains. All the empirical findings obtain through a series of hypothesis testing achieved the sufficient level of significance to support the presence of mediator of this study, which is continuous improvement influenced the relationship between the predictor variable, which is workplace learning and the dependent variable, which is sustainable Lean implementation. However, Simple Linear Regression result shows that continuous improvement partially mediates the relationship between continuous learning and Sustainable Lean Implementation. Besides, the result of Pearson Correlation shows that there is a significantly strong positive relationship between embedded systems and Sustainable Lean Implementation. From the support of empirical findings, this study intends to serve as guidelines for practitioners to develop a more solid roadmap for Lean implementation.

Keywords: Lean manufacturing, continuous improvement, Kaizen, workplace learning

Perkaitan antara Pembelajaran di Tempat Kerja dan Kemampanan Pelaksanaan ‘Lean’ dengan Penambahbaikan Berterusan Sebagai Pengantara: Kajian Bidang Pembuatan ‘Lean’ di Malaysia

ABSTRAK

Objektif kajian ini adalah untuk mengenal pasti perkaitan antara persepsi pekerja terhadap pembelajaran di tempat kerja dan pelaksanaan ‘Lean’ yang mampan dengan kewujudan penambahbaikan berterusan sebagai pengantara di syarikat pembuatan ‘Lean’ di Malaysia. Berdasarkan “Resource Based Theory (RBT)”, kajian ini bertujuan untuk mengenal pasti ciri-ciri pembelajaran and keupayaan unik iaitu penambahbaikan berterusan yang mesti dimiliki oleh sumber pekerja untuk mewujudkan nilai dan bukan sekadar hanya mengenal pasti jenis sumber yang diperlukan untuk mengekalkan kelebihan daya saing dalam syarikat ‘Lean’ semata-mata. Kajian ini menggunakan pendekatan penyelidikan kuantitatif yang bersesuaian dengan tinjauan deskriptif dan penyelidikan pembangunan sumber manusia. Reka bentuk kajian ini adalah dalam bentuk kajian keratan rentas. Tinjauan soal selidik digunakan sebagai instrumen pengumpulan data. Lapan syarikat pembuatan ‘Lean’ di Malaysia mengambil bahagian dalam kajian ini. Justeru menyumbang kepada sebanyak 219 maklumbalas yang diterima. Kesemua hasil penemuan empirikal yang diperolehi melalui satu siri ujian hipotesis mencapai tahap signifikan yang mencukupi untuk menyokong kewujudan perantara kajian ini, iaitu penambahbaikan berterusan dalam mempengaruhi hubungan antara pembolehubah, iaitu pembelajaran di tempat kerja dan pembolehubah bersandar, iaitu kemampanan pelaksanaan ‘Lean’. Namun, hasil daripada ujian Regresi Linear menunjukkan bahawa penambahbaikan berterusan cuma memainkan sebahagian peranannya sebagai pengantara di antara hubungan pembelajaran berterusan dan kemampanan pelaksanaan ‘Lean’. Selain itu, hasil dapatan melalui ujian Korelasi Pearson

menunjukkan bahawa terdapat hubungan positif yang signifikan dan kuat di antara sistem tersirat dengan kemampanan pelaksanaan 'Lean'. Kajian ini mendapat sokongan melalui penemuan empirikal untuk dijadikan sebagai garis panduan kepada para pengamal bidang ini bagi membentuk pelan tindakan yang lebih kukuh untuk pelaksanaan 'Lean'.

Kata kunci: *Pembuatan 'Lean', penambahbaikan berterusan, Kaizen, pembelajaran di tempat kerja*

TABLE OF CONTENTS

	Page
DECLARATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
<i>ABSTRAK</i>	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	xii
LIST OF FIGURES	xv
LIST OF ABBREVIATIONS	xvi
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Background of the Study	2
1.3 Problem Statement	13
1.3.1 Theoretical Gap	16
1.3.2 Empirical Gap	28
1.3.3 Practical Gap	30
1.3.4 Methodological Gap	33
1.4 Research Objectives	34
1.4.1 General Objectives	34
1.4.2 Specific Objectives	35
1.5 Theoretical Framework	36
1.6 Conceptual Framework	42

1.7	Research Questions	44
1.8	Hypothesis of the Study	45
1.9	Significance of the Study	51
1.10	Limitation of the Study	55
1.11	Definition of Terms	57
1.11.1	Learning	58
1.11.2	Workplace Learning	58
1.11.3	Continuous Improvement	59
1.11.4	Lean	60
1.11.5	Sustainable Lean Implementation	61
1.11.6	Continuous Learning	63
1.11.7	Dialogue Inquiry	63
1.11.8	Team Learning	64
1.11.9	Embedded Systems	65
1.11.10	Empowerment	65
1.11.11	System Connections	66
1.11.12	Support Leadership	67
1.12	Organization of the Thesis	68
1.13	Summary	69
CHAPTER 2: LITERATURE REVIEW		71
2.1	Introduction	71
2.2	Basis for Formulating Conceptual Framework	71
2.2.1	Continuous Learning	73
2.2.2	Dialogue Inquiry	74

2.2.3	Team Learning	75
2.2.4	Embedded Systems	76
2.2.5	Empowerment	77
2.2.6	System Connections	78
2.2.7	Support Leadership	79
2.2.8	Continuous Improvement	80
2.2.9	Sustainment of Lean Implementation	81
2.3	Concepts and Models	82
2.3.1	Models for Human Resource Development (HRD) Practice	82
2.3.2	Workplace Learning	86
2.3.3	The Learning Disciplines	88
2.3.4	The Learning Process	90
2.3.5	Informal and Incidental Learning Model	93
2.3.6	Shewhart Model of Plan-Do-Check-Act (PDCA) a.k.a. the Deming Cycle	95
2.3.7	Toyota Production System	98
2.3.8	Lean Thinking	99
2.4	Theories	103
2.4.1	Resource Based Theory (RBT)	103
2.4.2	Adult Learning Theory: Principles of Adult Learning	107
2.5	Empirical Evidences	113
2.5.1	Continuous Learning and Lean	115
2.5.2	Dialogue Inquiry and Lean	117
2.5.3	Team Learning and Lean	118

2.5.4	Embedded Systems and Lean	119
2.5.5	Empowerment and Lean	120
2.5.6	System Connections and Lean	121
2.5.7	Support Leadership and Lean	122
2.5.8	Mediating Effect of Continuous Improvement	124
2.6	Summary	128
CHAPTER 3: RESEARCH METHODOLOGY		129
3.1	Introduction	129
3.2	Philosophy of the Research	129
3.3	Design of the Study	132
3.4	Variables and Measures	134
3.5	Location, Sample and Population of the Study	137
3.6	Instrument of the Study	140
3.7	Pilot Study	142
3.8	Reliability and Validity	145
3.8.1	Reliability	145
3.8.2	Validity	147
3.9	Data Collection Procedure	148
3.10	Research Ethics	149
3.11	Data Screening	151
3.12	Data Analysis Procedure	151
3.12.1	Descriptive Statistics	152
3.12.2	Inferential Statistics	153
3.13	Summary	157

CHAPTER 4: ANALYSIS AND EVALUATION	158
4.1 Introduction	158
4.2 Data Screening Test Results	158
4.3 Demographic Characteristics of Respondents	159
4.4 Reliability and Validity of the Instrument	164
4.4.1 Item Validity	164
4.4.2 Goodness of Data	169
4.5 Hypothesis Testing	170
4.5.1 Results of Correlation Analysis	170
4.5.2 Results of Regression Analysis	182
4.5.3 Results of Mediation Analysis	187
4.5.4 Results of Bootstrapping Analysis using PROCESS	205
4.6 Summary	207
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS	209
5.1 Introduction	209
5.2 Summary of the Study	209
5.3 Implications of the Study	211
5.3.1 Theoretical Implications	211
5.3.2 Practical Implications	216
5.3.3 Methodological Implications	220
5.4 Recommendations	221
5.4.1 Recommendations for Future Researchers	221
5.4.2 Recommendations for Human Resource Practitioners	224

5.4.3	Recommendations for Strategic Decision Makers in Lean Manufacturing Companies	225
5.5	Conclusion	228
REFERENCES		230
APPENDICES		257

LIST OF TABLES

	Page
Table 1.1 Lean in Western Studies	3
Table 1.2 Lean in Eastern Studies	5
Table 1.3 Lean Studies in Malaysia	10
Table 1.4 Lean Evolution Through Stages of Development of Organizational Learning	22
Table 1.5 Dimensions of Workplace Learning as Predictor Variable Affecting Sustainable Lean Implementation	23
Table 1.6 Dimensions of Workplace Learning as Independent Variable Affecting Continuous Improvement	26
Table 2.1 Rhetoric Policies and Reality in HRM Practice	84
Table 2.2 VRIO Framework for Resource-based Analysis	104
Table 3.1 Summary of Data Collection Process	139
Table 3.2 Likert Scale	141
Table 3.3 Summary for the Questionnaire	142
Table 3.4 Demographics Characteristics of Pilot Study Respondents	143
Table 3.5 Pilot Study Results	146
Table 3.6 Cronbach's Alpha Values	147
Table 3.7 Level of Lean Sustainment with Range of Scores	153
Table 3.8 Strength of Correlation	154
Table 3.9 Summary of Data Analysis Procedure	156
Table 4.1 Data Screening Test Results	158

Table 4.2	Descriptive Statistics of Respondents	159
Table 4.3	Level of Sustainable Lean Implementation Based on Employee's Current Job Position	162
Table 4.4	Factor Analysis Results	164
Table 4.5	Goodness of Data	169
Table 4.6	Results of Correlation between Continuous Learning and Sustainable Lean Implementation	170
Table 4.7	Results of Correlation between Dialogue Inquiry and Sustainable Lean Implementation	172
Table 4.8	Results of Correlation between Team Learning and Sustainable Lean Implementation	174
Table 4.9	Results of Correlation between Embedded Systems and Sustainable Lean Implementation	175
Table 4.10	Results of Correlation between Empowerment and Sustainable Lean Implementation	177
Table 4.11	Results of Correlation between System Connections and Sustainable Lean Implementation	179
Table 4.12	Results of Correlation between Support Leadership and Sustainable Lean Implementation	180
Table 4.13	Results of Regression Analysis between the Dimensions of Workplace Learning and Continuous Improvement	183
Table 4.14	Results of Regression Analysis between the Dimensions of Workplace Learning, Continuous Improvement and Sustainable Lean Implementation	185

Table 4.15	Results of Mediation Test for Continuous Improvement on the Relationship between Continuous Learning and Sustainable Lean Implementation	187
Table 4.16	Results of Mediation Test for Continuous Improvement on the Relationship between Dialogue Inquiry and Sustainable Lean Implementation	190
Table 4.17	Results of Mediation Test for Continuous Improvement on the Relationship between Team Learning and Sustainable Lean Implementation	193
Table 4.18	Results of Mediation Test for Continuous Improvement on the Relationship between Embedded System and Sustainable Lean Implementation	195
Table 4.19	Results of Mediation Test for Continuous Improvement on the Relationship between Empowerment and Sustainable Lean Implementation	197
Table 4.20	Results of Mediation Test for Continuous Improvement on the Relationship between System Connections and Sustainable Lean Implementation	200
Table 4.21	Results of Mediation Test for Continuous Improvement on the Relationship between Support Leadership and Sustainable Lean Implementation	203
Table 4.22	Results of Sobel Test of Indirect Effects of Workplace Learning, Continuous Improvement and Sustainable Lean Implementation	205
Table 4.23	Summary of Hypothesis Testing	206

LIST OF FIGURES

	Page
Figure 1.1 Conceptual Framework of the Relationship between Workplace Learning and Sustainable Lean Implementation with Continuous Improvement as a Mediator	43
Figure 1.2 Organization of Thesis	68
Figure 2.1 Relationship between Workplace Learning, Continuous Improvement and Sustainable Lean Implementation	72
Figure 2.2 Learning Process Sequence	91
Figure 2.3 Marsick and Watkins' Informal and Incidental Learning Model as adapted with Cseh	94
Figure 2.4 Revised PDCA Cycle	96
Figure 2.5 The VRIO Framework	105

LIST OF ABBREVIATIONS

ASTD	American Society for Training Directors
CEPS	Column-Type Electric Power Steering
DBKU	Dewan Bandaraya Kuching Utara
DLOQ	Dimensions of The Learning Organization Questionnaire
DMAIC	Define-Measure-Analyze-Improve-Control
DOSM	Department of Statistics Malaysia
FDI	Foreign Direct Investment
FIFO	First In First Out
GDP	Gross Domestic Product
GLCs	Government-Linked Corporations
HR	Human Resource
HRD	Human Resource Development
HRDF	Human Resources Development Fund
HRM	Human Resource Management
HSNZ	Hospital Sultanah Nur Zaharah
HUSM	Hospital Universiti Sains Malaysia
IMVP	International Motor Vehicle Program
IT	Information Technology
JIT	Just-in-Time
KKTMPJ	Kolej Kemahiran Tinggi Mara Petaling Jaya
KMO	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
MFF	Federation of Malaysian Manufacturer

MITI	Ministry of International Trade and Industry
MOF	Ministry of Finance
MOHR	Ministry of Human Resources
MPC	Malaysia Productivity Corporation
MPK	Majlis Perbandaran Kuantan
PDCA	Plan-Do-Check-Act
PKPj	Pejabat Kesihatan Wilayah Persekutuan Putrajaya
PMO	Project Management Offices
PSMB	Pembangunan Sumber Manusia Berhad
RBT	Resource Based Theory
RBV	Resource Based View
SHE	Safety, Health and Environment
SMED	Single Minute Exchange of Dies
SOPs	Standard Operating Procedures
SPS	Scania Production System
SPSS	Statistical Package for Social Sciences
TPM	Total Productive Maintenance
TPS	Toyota Production System
TQM	Total Quality Management
TTT	Train-The-Trainer
TVET	Technical and Vocational Education and Training
UPM	Universiti Putra Malaysia
VPS	Volvo Production System
VSM	Value Stream Mapping

WIP	Work in Progress
WWF	World Wide Fund for Nature

CHAPTER 1

INTRODUCTION

1.1 Introduction

In recent years, massive changes in global economic stipulation have forced many surviving organizations, be it large or small, to continuously change their way of thinking. New industrial trend and practices are needed by almost every corporate establishment to catch up with a new technological influx in order to reach wider coverage of targeted market so the business can survive in today's competitive market arena. Growing business entities are facing the evolution of corporate culture and issues related to workforce diversity which have become one of the challenges to sustain organizational competitiveness in the corporate world. As a result, organizations including those in Malaysia have become more aware of the needs to develop their human capital in order to survive the market forces.

Priorities to develop employee's readiness to learn through various designs of training and development activities are allocated in most of the organization's annual budget nowadays. The importance of knowledge management to avoid intellectual waste has been recognized through various human resource practices. Lean success stories in the elimination of intellectual waste begins to be increasingly noticeable not only within the manufacturing sector (Wahab et al., 2017; Sahwan, Rahman & Deros, 2012), but, have gained certain level of attention from the service sector (Ballé, Chaize & Jones, 2015; Jönsson & Schölin, 2014) as well. This study defended Lean implementation as supposedly a people-centred intervention that continuously improves people's capabilities through problem-solving initiatives when facing issues that arise as the implication of dynamic transformation within

the working environment. Implementation of Lean have proven to encourage employees to think out of the box when dealing with unanticipated events. The impetus through continuous improvements or “Kaizen” establishment are believed to be one of the forces that drive employees to acquire new knowledge and skills, which, can later be applied to encounter upcoming challenges, establishing a culture of continuous learning that sustain Lean implementation. The introduction chapter of this study further discusses the importance of recent business trend in developing human competencies, complications and the gaps which arise from the struggles and initiatives to achieve sustainable competitive advantage within the perspectives of workplace learning, continuous improvement (Kaizen) and sustainable Lean implementation among Lean manufacturing companies in Malaysia.

1.2 Background of the Study

For over 30 years of implementation in Toyota, Lean remains undisclosed until the 70s where it has been made available in manuals for companies outside Toyota, written in Japanese, and a decade later, Lean was made available in the form of English text (Averill, 2011; Jørgensen, Mathiessen, Nielson & Johansen, 2007; Hines, Holweg & Rich, 2004). However, the interpretation was rather limited until the book “The Machine that Changed the World” was first published by Womack, Jones and Roos (1990). Successful stories about Lean implementation have caught the attention not only from the researchers but also practitioners seeking for improvements. Originated from Toyota Production System (TPS), Lean concepts are very much influenced by the Eastern values, more specifically, Japanese culture, which then, emerged and influenced the development of business processes in the Western countries. Today, Lean or formerly known as Toyota Production System (TPS) is a

well-recognized system that has been widely adopted across the world (Salleh, Kasolang, Jaffar & Halim, 2015; Jönsson & Schölin, 2014; Wong & Wong, 2011). More attention on the effort of sustaining Lean lifelong learning has been observed in recent years especially literature from the America and Europe. Summary of several related literature on Lean in Western studies are highlighted in Table 1.1.

Table 1.1: Lean in Western Studies

Researchers	Year	Research interest	Origin
Boyer	1996	An Assessment of managerial commitment to Lean production	USA
Hines et al.	2004	Review of contemporary Lean Thinking	UK
Bateman	2005	Sustainability: the elusive element of process improvement in manufacturing	UK
Comm & Mathaisel	2005a	Case study on the application of Lean sustainability concepts to universities	USA
Comm & Mathaisel	2005b	A preliminary study to explore the best Lean sustainability practices in higher education	USA
Mohd-Zainal et al.	2011	Organizational learning to sustain Lean implementation in manufacturing companies	New Zealand
Angelis & Fernandez	2012	Innovative Lean in machinery, appliances & electronics, motor vehicles and instrument manufacturing sites	Brazil
Meiling et al.	2012	Case study on the evaluation of Lean management principles in off-site construction	Sweden
Malmbrandt & Åhlström	2013	Development of instrument for assessing Lean service adoption	Sweden
Netland & Aspelund	2013	Case study on Volvo production systems from the perspectives of resource-based view	Sweden
Jönsson & Schölin	2014	Potential facilitators of workplace learning in a TPS based company	Sweden
Raghavan et al.	2014	Case study on Lean transformation in electronic assembly	USA
De Zan et al.	2015	Case study on the assessment of experiential learning Lean methodology	Italy
Gelei et al.	2015	Lean production and leadership attribute in manufacturing companies	Hungary
Lantz et al.	2015	Participative work design in Lean production within the Volvo group	Sweden
Waterbury	2015	Case study on Lean implementation in higher education	USA
Lindskog et al.	2016	Sustainability of Lean implementation in Swedish psychiatric healthcare	Sweden

Table 1.1 continued

Secchi Camuffo	&	2016	Case study on the implementation of Lean production systems from a knowledge-based perspective	Italy
Birkie et al.		2017	Case study on the role of Lean in sustaining performance under operational turbulence	Italy
Seidel et al.		2017	Lean leadership competencies in several sectors	Brazil
Garza-Reyes		2018	The case of Lean readiness in pharmaceutical manufacturing industry	Europe
Kregel & Coners		2018	Action research on Lean Six Sigma in German municipality	German
Psomas et al.		2018	Case study assessment of Lean adoption in food SMEs	Greece
Scheller et al.		2018	Case study on Lean Six Sigma in manufacturing firm	Brazil

Continuous improvement is one of the concepts promoted in Lean Thinking. “Kaizen” in Japanese terms by Masaaki Imai (1986) is often used to represent constant work to perfection activities in the Lean-based workplace that means “ongoing improvement involving everyone, including both managers and workers” (p. 3). The original idea of continuous improvement focuses a lot on the human aspect such as communication, teamwork, empowerment and respect for people. A “Kaizen” project follows the cycle of Plan-Do-Check-Act (PDCA) originally proposed by Shewhart and introduced by Deming (1982, 1986) to Japan as the “Deming Cycle” or “Deming Wheel” of quality management (p. 88). The “Kaizen” philosophy of continuous improvement aims at creating value by reducing waste commonly found in the workflow. Today, “Kaizen” or continuous improvement is being taught in Japanese schools. Most of the Eastern countries are also interested in Lean studies. Interestingly, most of the Lean literature found in this study was developed in India and has shown a significant level of Lean adoption.

Table 1.2: Lean in Eastern Studies

Researchers	Year	Research interest	Origin
Chauhan & Singh	2012	A study on the relationships between various parameters of Lean manufacturing	India
Arya & Jain	2013	Case study on the impact of Kaizen in small-scale industry	India
Gao & Low	2013	Application of Kaizen in construction firms	China
Prashar	2014	Case study on assembly line redesign through Lean-Kaizen in Column-Type Electric Power Steering (CEPS) manufacturing company	India
Jadhav et al.	2014a	Framework for sustainable Lean implementation	India
Jadhav et al.	2014b	General review on barriers in Lean implementation	India
Raghu Kumar et al.	2015	Experimental investigation of Lean management in aviation	India
Habtoor	2016	A study of quality improvement practices as a mediator on the relationship between human factors and organizational performance in Yemeni industrial companies	Yemen
Nawanir et al.	2016	Empirical study on Lean manufacturing practices in manufacturing firms	Indonesia
Wickramasinghe & Wickramasinghe	2016	Effects of continuous improvement on shop-floor employees' job performance in Lean production at textile and apparel firms	Sri Lanka
Zahraee	2016	Case study on Lean manufacturing implementation in Iranian automotive firms	Iran
Khaba & Bhar	2018	Empirical study on Lean awareness and potential for Lean implementation in coal mining industry	India
Kumar et al.	2018	Case study on Lean-Kaizen implementation in SME	India

However, Habtoor (2016) reviewed the fact that “implementation of quality management within the Eastern countries are generally lower than in Western economies” which might be comparable to the area of Lean development as well (p. 476). Although the basic principles underlying the principles of Lean Thinking was originated from Japan, less empirical studies were found from the Eastern literature (refer to Table 1.2) as compared to the development of evidence found in Western studies (as shown in Table 1.1). These

situations signify a call for more studies in a similar area to be done in order to reveal and develop a better understanding of Lean evolution in the Eastern economy.

Malaysia's economy is positioned in the midst of growth and the market has high potential and opportunities for business development. Malaysia has been ranked 37th in the Global Innovation Index 2017 (MPC, 2018; Cornell University, INSEAD & the World Intellectual Property Organization, 2017). In the course of achieving the status of a higher-income nation, the Malaysian government is striving to develop the Malaysian workforce through various statutory bodies, government agencies and government-linked corporations (GLCs). The reason is that the Malaysian government recognized human capital as one of the important productivity variables. Upon realizing that, in order to sustain and promote strategic economic growth, the nation be it a governmental or private institution, have exerted continuous effort to make available, various approaches that expand the nation's workforce capabilities. The nation is aware that there is a need to catch up with a massive influx of information from the world marketplace which is affecting the Malaysian business environment at each moment.

One of the prominence action in developing skilled, knowledgeable and competitive workforce is the adoption of Human Resource Development Act 2001 (Act No. 612 of 2001) as "an Act to provide for the imposition and collection of a human resources development levy for the purpose of promoting the training and development of employees, apprentices and trainees, the establishment and the administration of the Fund by the Corporation and for matters connected therewith" (Pembangunan Sumber Manusia Berhad [PSMB], 2018a). The Human Resources Development Fund (HRDF) was established and administered as an agency under the Ministry of Human Resources (MOHR) Malaysia with the intent to strengthen Malaysian economic development by enhancing the value of Malaysian human

capital through strategic learning and development interventions that bridge the current and future industry needs (PSMB, 2018b).

Another statutory body operating under the Ministry of International Trade and Industry (MITI), which is responsible for Malaysian productivity, is Malaysia Productivity Corporation (MPC). The provision under Section 7 of the Malaysia Productivity Corporation Act (Incorporated) 1966 (Act No. 408 of 1966) listed that one of the functions of the corporation is “to enhance the development of human resources both at the supervisory and management levels in the country” (Malaysia Productivity Corporation [MPC], 2016a). Understanding adult learning principles and Lean management approach are among the efforts executed by these governmental establishments through various methods such as Train-The-Trainer (TTT) program and Lean Workshop to promote the competitiveness of the nation. MPC has been collaborating with the Federation of Malaysian Manufacturers (FMM) to introduce Lean Management System since the year 2014 (Federation of Malaysian Manufacturers [FMM], 2017). Moreover, MPC is also venturing into Lean transformation alongside with the promotion of Industry 4.0 or the Fourth Industrial Revolution (MPC, 2018). Besides promotional activities, among several other initiatives pursued by MPC includes, active publication of Lean success stories and sharing of best practices adopted by both private as well as public sector in Malaysia, that are made available in the MPC Productivity Report and Just Lean Bulletin, seminar, advisory services as well as workshop for capacity building.

All these initiatives share a common purpose which is to produce skilful and knowledgeable Malaysian workforce that is capable of promoting growth for businesses in the country to achieve higher overall productivity. The reason is that competitive workforce is the source that enables efficiency in the functioning of systems being deployed by any forms of

organizations. As the powerhouses that are capable of ensuring productive utilization of the organization's resources at the most cost-effective condition, skilled and knowledgeable workers are the company's best asset to achieve competitive advantage in the marketplace. Eventually, the growing market activities are believed to attract potential investors and create more opportunities for capital growth thus, increase the rate of employment in the country. These are in line with Malaysian strategic intent to provide better a quality of life for the people in the country by achieving a higher standard of living through an increase in Gross Domestic Product (GDP) (MPC, 2018).

Manufacturing sector remains as one of the important contributors to Malaysia's first quarter Gross Domestic Product (GDP) for the year 2018 registering a 5.3% growth rate which marked the second highest growth among all sectors (Department of Statistics Malaysia [DOSM], 2018). Among the three important sectors (services, manufacturing, mining and quarrying) which contributed to the production side of the GDP growth, manufacturing sector is the second employment contributor to the Malaysian workforce (17.4% of the total labour force in the year 2017) but industrial waste is, on the other hand, one of the stationary sources that pollute the country (DOSM, 2017b; MOF, 2018a). As one of the important sectors to the Malaysian economy (Agus & Hajinoor, 2012) registering 22.8% share to GDP in the first quarter of year the 2018, manufacturing sector is also the highest contributor (73.6%) for Environmental Protection Expenditure (EPE) at RM1.88 billion (DOSM, 2018; DOSM, 2017a) due to the creation of pollution especially to the river (WWF, n.d.) and atmosphere (DOSM, 2016). The reports by the Department of Statistics Malaysia (DOSM) showed that the paradox exists between encouraging the growth of manufacturing sector to boost Malaysian economic development versus systematic conservation planning as an allegation against pollution.

Malaysia is aware of the issue related to contamination and increasing pollution alongside the growth of the manufacturing sector. Despite the bigger representation of what Malaysian wish to achieve in the near future, the country is constantly emphasizing on “Systematic Conservation Planning” to balance economic growth and quality of life (WWF, 2015). Lean and green business system could be the answer provided that the Lean initiatives do not only focus on cost reduction but to emphasize the outcome of sustainable value creation through waste reduction. Considering the significant impact of this sector to the country, this study acknowledged that it is worthwhile to study Lean since it’s principles are aiming at waste reduction practices within the manufacturing sector. In addition, Lean practices is best to be studied within the manufacturing sector due to the consideration that Lean introduction is still new in Malaysia and the initial kickoff are mostly pioneered by organizations operating under the manufacturing sector.

Due to its’ wide adoption in various disciplines and practices, “Lean as a concept has evolved over time, largely driven because of the shortcoming of Lean that surfaced as organizations progress on their learning curve, as well as the extension of Lean Thinking into new sectors and will continue to do so which as a result, significant confusion about Lean has arisen” (Hines et al., 2004, p. 997). Lean related study has evolved and found, but the sustainability of Lean implementation has been overlooked especially in the local context. “Only a few Lean studies have been found within the context of Malaysian manufacturing industry” (Habidin & Yusof, 2013, p.63). Although this area of study is not a totally new area to look at, however, new ideas on Lean continue to evolve in Malaysia. Some proposed framework or model and reviews in the available conceptual papers and preliminary studies (Muraliraj et al., 2018; Kamal & Habidin, 2017; Wahab et al., 2017; Yusof & Aoki, 2016; Mamat et al., 2015; Foo, Ang, Rajamony & Lee, 2015) still lack support from empirical evidences.

Most of the discussions are still focusing on the implementation of Lean practices from the shop-floor and technical perspectives without much emphasis on both, the human aspect of Lean Thinking and the sustainment of Lean initiatives. Since Lean introduction in Malaysia by MPC which started back in November 2011 (Jau, 2014), most adoptions are only active among manufacturing companies, especially those operating in the automotive industry. Furthermore, Lean sustainability study is still considered new to the local industry and needs more research attention. The following Table 1.3 shows the current progress of Lean-related studies in Malaysia.

Table 1.3: Lean Studies in Malaysia

Researchers	Year	Research interest	Industry
Nordin et al.	2010	Lean manufacturing implementation	Automotive
Nordin et al.	2011	Managing change in Lean manufacturing implementation	Automotive
Wong & Wong	2011	Case study on Lean manufacturing implementation	Electronic manufacturing
Jayaraman et al.	2012	Empirical study on Lean six sigma	Electronic manufacturing
Roslin et al.	2012	Case study on Lean manufacturing implementation	Automotive
Sahwan et al.	2012	Barriers to Lean manufacturing implementation	Automotive
Agus & Hajinoor	2012	Case study on the relationship between Lean production, product quality and business performance	Non-food manufacturing
Habidin & Yusof	2013	Critical success factors of Lean six sigma	Automotive
Manzouri et al.	2013	Lean supply chain practices	Halal food supply chain
Ali et al.	2013	Sustainability of continuous improvement	Manufacturing
Puvanasvaran et al.	2014	Case study on waste elimination database	Manufacturing
Salleh et al.	2015	Lean TQM leadership management practices	Automotive
Bakar et al.	2017	Lean management practices	Public sector
Tabatabaee et al.	2017	Awareness on Lean Thinking concept in Construction among Higher Learning Students	Construction
Ng & Ghobakloo	2018	Lean manufacturing implementation	Manufacturing
Minh et al.	2018	Impact of Lean manufacturing practices on job satisfaction	Manufacturing

Based on Table 1.1, Table 1.2 and Table 1.3, Lean development has gained significant attention within the Western economies although the original principles were first practiced among Japanese firms. Past literature shows that the progress of Lean emergence is affecting various sectors in Western setting and is beginning to pay more attention in the area of learning along with its implementation. Evidences from Eastern Lean-related literature also shows some progress, but are mostly made available in more recent years as compared to those available in Western literature which have been developed for quite some time. It is undeniable that the practice from the Western perspective might have somehow affected the development of global Lean effort since it's long establishment. In addition, it is evident that most of the study from Eastern side of the world including Malaysia, is still focusing more on Lean within manufacturing sector. MPC is also aware of the importance of Lean principles and its weak adoption in non-manufacturing companies. In the year 2014, MPC persists to double its efforts based on the national Lean roadmap focusing not only on manufacturing but also, the health service sector, education and small-enterprises from a various sector (Jau, 2014). After several years of Lean implementation in the manufacturing firms, this study is therefore, interested in the sustainment of Lean effort.

Psomas, Antony and Bouranta (2018) suggested that “investment in educational seminars, attending international conferences, consulting experts in the field and benchmarking successful Lean organizations are needed to enhance the level of Lean adoption and make the Lean journey sustainable” (p. 76). This research shared the same viewpoint that learning plays important role in sustaining competitive advantage through constant improvement in the business environment. Realizing that it is important to discover the determinants which can fulfil the gap of an ideal Lean practices against actual sustainment of Lean implementation in the workplace, this study is interested to look into the interconnectedness

between workplace learning and continuous improvement (Kaizen) in creating a solid system which support sustainability in the Lean-based business process.

The environment that promotes effective learning transfer at the workplace must be made available for Malaysian workforce to ensure higher success rate of continuous improvement initiatives among businesses in Malaysia so that the investment to develop the country's human capital is worthwhile. Learning is the process of knowledge acquisition and the thinking process that relates the new knowledge to an individual's experiences is known as reflection. A meaningful learning that occurs within the organizational context enables the organization to respond to the changes in the environment and enhance the readiness to pursue more innovation in the complex business environment. The attribute of conducive workplace learning environment is a major area to be explored as it impinges the effectiveness of knowledge transfer in promoting efficient knowledge management in the learning system as a whole. The foundation underlying the construct of workplace learning under this study originates from the Andragogical assumptions. Knowles (1984) theory of adult learning acknowledged that the learning situation has a higher impact in determining the suitable learning method than the individual learner (Merriam, 2001).

Marsick and Watkins (2003) pointed out that "although studies confirm that culture oriented towards supporting learning can lead to improved performance, the path toward performance improvement is highly complex and idiosyncratic" (p. 142). Therefore, the researchers recommended the Dimensions of the Learning Organization Questionnaire (DLOQ) for "additional studies, translation beyond six languages, also new practical and research uses as it is reliable and proven across national boundaries, organizational types and against competing for organizational indices" (p. 142). The issues related to adult learning paid much attention to the learner's personal experiences from different contextual and cultural

setting. Therefore, in order to understand Lean from the perspectives of the employees' perception at the workplace in Malaysia, there is a need to generalize the findings of previous studies in this area of study into the local situation. These initiatives are believed to promote deeper insight through comparisons and discussions to assist the current situation.

1.3 Problem Statement

Malaysia is a developing country in South-East Asia. The country must develop the economy under the most affordable costs possible. Aside from resource constraint, emerging complexities in the business environment also caused constant changes to the corporate culture. Facing all these challenges, companies operating under the Malaysia economic system must constantly keep up with the effort to develop their intellectual capital as a key to sustain and expand the organization's operational and strategic entities. Therefore, the need to achieve operational excellence through adoption and sustainment of Lean initiatives must be acknowledged by businesses operating in Malaysia. The reason is simply because besides proven to be an effective tool for waste elimination, Lean way of thinking represents a contemporary intervention of continuous improvement to achieve better business performance, which adds values to the operations from various aspects such as "cost, productivity, efficiency as well as safety, health and environment (SHE)" (Averill, 2011, p. 1). Hence, this study recognizes the fact that any possibility to yield better performance shall not be overlooked as many local organizations still uphold traditional operational systems and facing critical challenges of opportunity loss. Identifying the determinants that help sustain Lean implementation will ease these local organizations in their struggle to keep in pace with contemporary interventions.

According to the Ministry of Finance (MOF) Malaysia, from the supply side, the manufacturing sector was one of the sectors which contributed the most to Malaysian economic expansion in the first half of 2017 (MOF, 2018b). Referring to the data from Ministry of Finance Malaysia (MOF, 2018a), the manufacturing sector is the second most important players in the labour market contributing to an overall 17.4% out of 14,450,000 total employment in Malaysia for the year 2017. Furthermore, under the strategic initiatives of 2018 Budget, the Malaysian government will improve “partnership with private sector and employers” to strengthen policy guidance and regulatory “framework for technical and vocational education and training (TVET)” as an effort to develop future generation and will continue to do so in the following year (MOF, 2018a; 2018b). These facts imply the significant impact of the manufacturing sector in the development of Malaysia economy which provides justification to this study in responding to the call for a need for research within this area of concern.

Lean has been adopted in various disciplines and practices by organizations from various industries. Hines et al. (2004) expressed the view that due to such wide adoption of Lean principles in different business environment, it is unavoidable that the evolution of Lean principles is happening from time to time. The authors have strong reason to believe that such evolution is a result of the alteration from the original Lean principles based on each organizational need to respond to the challenges in the business environment. Consequentially, it is inevitable that “significant confusion about Lean has arisen” simply because organization might have more tendency to focus on the financial saving and cost reduction aspect of Lean application while at the same time, neglecting one of the important meaning behind the reason for such waste elimination, which is to focus on creating more value for the customers (Hines et al., 2004, p. 997).

“Only a few Lean studies have been found within the context of Malaysian manufacturing industry” (Habidin & Yusof, 2013, p.63). Habidin and Yusof (2013) are also aware that most of the surveys conducted in the local context are “based only on the automotive industry in Malaysia” and may “not be generalizable to other industry” (p. 60). This situation implies that Lean principles which originate from the automotive industry and the success stories have caught the interest of Malaysian researchers as well as practitioners. Therefore, the current research has the reason to believe that the study related to sustainment of Lean implementation is still considered new to the local manufacturing sector and need more research attention.

Even though this area of study is not a totally new area to be paid attention to, yet most of the discussions and ideas are still maintained in the form of theoretical and conceptual assumptions (Antony, Gupta, Sunder & Gijo, 2018; Sangwa & Sangwan, 2018; Aij & Teunissen, 2017; Raval & Kant, 2017; Hu, Found, Williams & Mason, 2016; Aij, Visse & Widdershoven, 2015; Ballé et al., 2015; Balzer, Brodke & Kizhakethalackal, 2015; Chay, Xu, Tiwari & Chay, 2015; Pakdil & Leonard, 2015; Zan, Toni, Formasier & Battistella, 2015; Dibia, Dhakal & Onuh, 2014; Jørgensen et al., 2007; Murray & Chapman, 2003; Buckler, 1996) with lack of support from empirical evidences. Although there are several ideas that share the same thought on the role of learning in the area of Lean manufacturing, the researchers perceived that objective evidence are needed to make convincing recommendations for real practices in Lean manufacturing organizations which have overlooked this important factor during their Lean implementation. Abdullah, Rose and Kumar (2007) mentioned that “understanding Malaysian national strategies towards human resources development will assist academicians and researchers with literature and further research to add justice to the lack of empirical literature in Malaysia as well as in the Asia-

pacific region” (pp. 221-222). Therefore, this study is responding to the call by providing more statistical evidence that may be useful for Malaysia in achieving the aim of enhancing the “accessibility to quality education and training in strengthening the human capital to support the development of k-economy” (Abdullah et al., 2007, p. 221).

Studying continuous improvement, “Kaizen” is another effort which is perceived to be having the potential of contributing towards the growth of an innovation-driven nation. The nation need to have continuous improvement mindset in everyday life in order to achieve first class mentality alongside the country’s development. In response to the acknowledgement that little has been done in Malaysia on study related to sustainable Lean implementation, this study seeks to identify the presence of mediation effect by continuous improvement on the relationship between workplace learning and sustainability of Lean implementation within the context of Lean manufacturing companies in Malaysia. Further detailed explanation of the importance of each variable in bridging various research gaps in this area of study is further discussed under the following sections.

1.3.1 Theoretical Gap

Resource-based theory (RBT) (Barney & Clark, 2007) is the theoretical foundation of this study. This study focuses on the sustenance of Lean manufacturing implementation by conducting resource-based research, especially in the Human Resource discipline. The justification behind the development of the existing theoretical insight in this study which is grounded on resource-based theory is due to the recognition that “human resources are examples of socially complex resources” (Barney & Clark, 2007). The authors further highlighted the human resources as one of the “socially complex resources and capabilities”

is one of the utmost important sources to sustain firms' competitive advantages. Although popular in the study of Strategic Management, this resource-based logic has long been examined in the field of Human Resources. One of the earliest works in Lean manufacturing is evidenced from "The Machine That Changed the World" by Womack et al. (1990) and is undoubtedly impacting the field of Human Resources (Barney & Clark, 2007; Lewis, 2000).

Unfortunately, most of the empirical study on Lean implementation did not highlight the importance of human capital and little has acknowledged RBT in their theoretical foundation. There are only a few research papers (Prajogo, Oke & Olhager, 2016; Secchi & Camuffo, 2016; Netland & Aspelund, 2013; Lewis, 2000) which discussed Lean production from the perspective of RBT. However, although RBT emphasized the importance of human factors as a source of sustained competitive advantage, not all existing Lean studies that acknowledged RBT pay attention to employees learning and development. Some of the study did acknowledge human resources as one of the Lean production characteristics such as the case study by Secchi and Camuffo (2016) that look into Lean production systems from the knowledge-based perspectives, while others studied human factors related to teamwork (Netland & Aspelund, 2013), and the performance-related systems (Lewis, 2000) under Lean settings. However, these case studies are carried out in Western industrial settings and the main focus is still, mostly on other technical characteristics such as manufacturing processes and supplier inputs (Prajogo et al., 2016; Netland & Aspelund, 2013; Lewis, 2000). Moreover, Barney and Clark (2007) make a fair justification based on the Value-Rareness-Imitability-Organization (VRIO) analysis that HR activities such as best selection system or best reward system might be valuable and rare but can be easily imitable, therefore, could not be regarded as a source of sustained competitive advantage. Although some of the previously studied HR activities might not be a source of sustained competitive advantage,

Barney and Clark (2007) indicated an important point that these functions should not be ignored or else, it might result in a severe competitive disadvantage.

The socially complex phenomenon that is imperfectly imitable due to the need of time and energy investment such as trust and cooperative team-based culture, nurturing, developing and managing human capital skills, as well as employee commitment, are some example of sources with higher potential to sustain competitive advantage (Barney & Clark, 2007). Instead of studying the type of resources the firm must possess, which was perceived by Barney and Clark (2007) as no longer important for the theoretical development of RBT, this study took a step further to study the dimensions that the human resources must possess in order to create value and to be a source that sustains competitive advantage, which is the employee's learning capabilities at the workplace.

According to Barney and Clark (2007), sustained competitive advantage is not depending on the type of resource ownership, but rather, on the characteristics and unique capabilities of that particular resource to create value while at the same time, imperfectly imitable by the competitors. Therefore, instead of studying human as a type of organizational resource, this study put more emphasis on the identification of dimensions which could contribute towards the development and enhancement of employees' potential in the Lean manufacturing firm. The reason is simply that knowledge acquisition and unique experiences acquired through effective learning process at the workplace not only enhance the economic value of the firm's human capital, but at the same time the application of such knowledge in continuous improvement activities are firm-specific which is rare and is imperfectly imitable by other competitors.

Barney and Clark (2007) also recognized information technology (IT) as a source of sustained competitive advantage. Based on resource-based logic, managerial IT skills is the only sustained sources of competitive advantage identified by Barney and Clark (2007) from four other IT attributes, namely “customer switching costs, access to capital, proprietary technology and technical IT skills” (pp. 145-150). Managerial skills (Barney and Clark, 2007) from IT perspectives are referring to the development and exploitation of IT applications to support and enhance other business functions such as communication support. Therefore, this study seeks to fulfil the theoretical gap as anticipated by Barney and Clark (2007) to examine “other attributes of IT whose competitive implications have not been fully evaluated in their work” and proposed future research to apply the RBT framework to explore and evaluate these competitive implications (p. 156). Therefore, this study pursues the search for empirical evidence to explain embedded systems as a well-maintained information technology system that enhances learning as well as knowledge management at the workplace and its’ relationship with sustainable Lean implementation.

According to Barney and Clark (2007), one of the “most obvious extensions of resource-based theory will take place through additional empirical tests of the theory” (p. 254). Looking into explaining the influence of continuous improvement on the relationship between workplace learning and sustainable Lean implementation from RBT perspectives, little empirical evidence has been found from past studies. Previous evidence in this area of study often emphasize on the direct effect between two of the variables studied in this research and no empirical support was found on the mediating effect of continuous improvement on the relationship between workplace learning and sustainable Lean implementation. For instance, the relationship between certain dimensions of workplace learning and continuous improvement can be found in one literature and the relationship

between workplace learning and sustainable Lean are mentioned in another literature respectively.

Mohd-Zainal, Goodyer and Grigg (2011) shared the same discoveries by suggesting that little has been done on providing empirical evidence to explain the linkage between learning and Lean sustainability despite the fact that there are still a lot of organizations that do not have a proper organizational learning system and hardly ever make use of the important concept underlying successful learning process. This area of concern has been given little attention due to more focus on Lean and its success stories. As a consequence, many Lean practitioners neglect the important details on the learning process itself during the journey to achieve successful Lean implementation.

Besides, this study is also extending the application of Adult Learning Principles (Knowles, 1984) by studying the impact of workplace learning on continuous improvement and in the area of Lean studies. Not every Lean effort is sustainable. Jayaraman, Teo and Keng (2012) pointed out that not all Lean organizations are successful as some initiatives failed due to cost and time constraints. In order to sustain Lean implementation, resource allocation to the right area of development is very important. Jørgensen et al. (2007) also believed that the sustainment of Lean “involves more than the use of tools and methods” (p. 6). This situation indicated that an extra effort is needed to support the development of Lean Thinking, yet, not much guidelines have been found from the previous studies that could serve as a “roadmap” for organization currently seeking to provide sustenance with this type of growth (Jørgensen et al., 2007, p. 7).

Jönsson and Schölin (2014) also stated that the concept of learning is often mentioned in general sense besides not being taken seriously in most Toyota Production System (TPS)

literature. Besides, Jørgensen et al. (2007) mentioned that there is a possibility that “training and development targeted at learning and knowledge sharing, compensation and reward schemes, and focus on Lean as a means towards career development may facilitate the establishment of a Lean culture that is sustainable” (p. 377). Therefore, this research has a reason to defend that, more effort is needed in order to reach a fuller understanding of the impact of continuous improvement on the relationship between workplace learning and sustainable Lean implementation should there be a need to enlighten organizations investing heavily on the Lean initiative in the hope to achieve the sustainable competitive advantage. Research on sustainability of Lean implementation is thus, critical especially in the context of Malaysia manufacturing sector, where studies on this particular issue are relatively lacking.

The Relationship between Workplace Learning and Sustainable Lean Implementation

According to Hines et al. (2004), some Lean approaches in certain organizations have been criticized on the lack of human integration. Barney and Clark (2007) also commented that there are still countless of organizations that do not practice their commitment to people or prioritize their HR functions although many of these organizations have publicly claimed that they valued their employees which took precedence over any other considerations. The current study initiated that there is a need to pay more attention to the linkage between the current application of Lean and workplace learning by studying the relationship between employee’s learning at work and the sustainment of Lean implementation. Hines et al. (2004) also highlighted that the real Lean Thinking should not be focusing only on Lean tools and techniques but, have to take into serious consideration as well, the human aspect of

“motivation, empowerment and respect for people” which, the researcher believed to be vital for “long-term sustainability of any Lean program, regardless of the industry sector” (pp. 994-1000). Hines et al. (2004) further defined Lean evolution through stages of development of organizational learning which is summarized in Table 1.4.

Table 1.4: Lean Evolution Through Stages of Development of Organizational Learning

Stages	Facets	Dimensions
Knowing organization	Knowledge management	Embedded systems
Understanding organization	Clarify, communicate and reinforce company culture	Dialogue inquiry Team learning Support leadership
Thinking organization	Problem-solving management practices	Empowerment System connections
Learning organization	Maximizing learning opportunities of employees	Continuous learning Support leadership

Zahraee (2016) also suggested that Lean organization, especially those categorized under manufacturing sector to “consider introducing appropriate Lean education, training and professional development” for the employees because human resources are found to be significantly related to Lean manufacturing in their study (pp. 144-145). The investment in employee learning is believed to enhance the growth of the human potential which will benefit the Lean organizations. Besides, team leaders who practised Lean Thinking are proven to be related with “team members’ information sharing behaviour” which lead to “Lean-team effectiveness” (van Dun & Wilderom, 2016, p. 1541). Team leaders that understand the true meaning of Lean principle will be able to influence their team members by encouraging active communication of goals and achievements, empowerment as well as creating a sense of ownership in order to ensure the team’s direction is consistent with the organizational Lean values. Averill (2011) also maintained similar idea that the real implementation of “Toyota Production System and modern Lean production both value

factory workers for their muscle and their brains and tap into employee creativity and ingenuity by involving everyone in continuous improvement activities” (p. 3). The current study is in agreement with prior literature that without the element of learning being incorporated into Lean implementation, sustainment of Lean effort is seen to be nearly impossible especially when employees are unclear of their roles for further engagement in the initiatives. Several other authors also acknowledge elements of workplace learning that are related to sustainable Lean implementation as summarized in Table 1.5.

Table 1.5: Dimensions of Workplace Learning as Predictor Variable Affecting Sustainable Lean Implementation

Authors	Facets	Dimensions
Comm & Mathaisel (2005a; 2005b); Mohd-Zainal et al. (2011); Jadhav et al. (2014b)	Training and learning development	Continuous learning
Comm & Mathaisel (2005a; 2005b); Mohd-Zainal et al. (2011); Jadhav et al. (2014b)	Open communication and dialogue	Dialogue inquiry
Mohd-Zainal et al. (2011); Jadhav et al. (2014b)	Cooperation and mutual trust	Team learning
Comm & Mathaisel (2005b); Mohd-Zainal et al. (2011)	Convergence of IT network	Embedded systems
Comm & Mathaisel (2005a); Mohd-Zainal et al. (2011); Jadhav et al. (2014b); Lindskog et al. (2016)	Decision making authority, power and authority and employee empowerment	Empowerment
Comm & Mathaisel (2005a; 2005b); Mohd-Zainal et al. (2011); Jadhav et al. (2014b)	Collaborative effort, strategic partnership and information sharing	System connections
Comm & Mathaisel (2005a; 2005b); Mohd-Zainal et al. (2011); Jadhav et al. (2014b)	Leadership, management commitment and support	Support leadership

Continuous Improvement as Mediator

“The linkage between organizational learning and Lean can be explained via continuous improvement” (Mohd-Zainal et al., 2011, p. 152). Jönsson and Schölin (2014) also claimed

that in the context of Lean manufacturing, workplace learning can be related to the fundamental concept of “Kaizen” or continuous improvement. Continuous improvement emphasizes a lot of teamwork in its implementation. Under Lean initiatives, employees work in a team and are “expected to take ownership of equipment” besides being empowered to make decisions for the entire operations under their own specific work area (Averill, 2011). This phenomenon best explains the interconnectedness between the dimensions that promote workplace learning and Lean sustainability. Working in teams enables employees to learn from each other through collaborative effort which acts as a catalyst to generate more improvement ideas in the workplace. Improvement ideas generated through continuous improvement or “Kaizen” projects gradually sustain Lean implementation.

Habtoor (2016) found out that the presence of quality improvement practices significantly mediates the relationship between the human factor and organizational performance. Angelis and Fernandes (2012) also believed that “continuous improvement through worker participation is a core Lean principle” (p. 77). Therefore, one can derive that the presence of continuous improvement as a result of the employee’s learning application is the cause that leads to sustained Lean implementation. Sustainable Lean implementation enriches the knowledge system of an organization creating a flow of information which derived from problem-solving experiences during the continuous improvement or “Kaizen” project. Eventually, successful sustainment of Lean implementation is believed to enhance employee’s learning and create more opportunities for future improvements. These capabilities according to Barney and Clark (2007) RBT framework are not only valuable and rare but also unique due to its’ specific application which provides imperfect imitable experiences to the employees and thus, can be regarded as a source of sustained competitive advantage when retained within the organizational environment.

The Relationship between Workplace Learning and Continuous Improvement

Most of the studies in the area of continuous improvement have overlooked the significant impact of knowledge management as one of the pre-conditions in the implementation of continuous improvement or “Kaizen” event (Lam, O’Donnell & Obertson, 2015; Magnier-Watanabe, 2011). “The higher the learning behaviour or knowledge sharing in the organization, the better the sustainability of continuous improvement” is (Ali, Islam & Lim, 2013, p. 415). This important finding had led to the interest of this study to pursue a more detailed understanding of the impact caused by continuous improvement in the relationship between a different aspect of workplace learning and sustainable Lean implementation. Furthermore, Bateman (2005) also emphasized the need to fulfil the theoretical gaps which exist between the two constructs by stating that “major theoretical area that needs to be explored is the characteristics of organizational learning and continuous improvement” (p. 274). The interconnectedness between workplace learning and continuous improvement are predictable through review of several past studies. Lam et al. (2015) studied several “influence tactics in soliciting employee commitment to continuous improvement task” (p. 201). The researchers found that “collaboration, consultation, integration, inspirational appeal and rational persuasion” are among several influence tactics which significantly predicts “employee commitment to continuous improvement” or “Kaizen” events (Lam et al., 2015, p. 201). From the findings in past literature, one can derive at the assumption that continuous improvement is a causal result of employees learning at the workplace.

Besides, Mitki, Shani and Meiri (1997) also proposed that learning foster the “Kaizen” culture of continuous improvement. Continuous improvement or “Kaizen” projects need employee’s input to solve a certain problem and one of the ways to enrich employee’s knowledge in the area of concern is through learning. Besides, employees also need learning

to acquire analytic skill in order to make an accurate decision, one which is needed in problem-solving and should be prioritized in the improvement activities. Learning from previous continuous improvement or “Kaizen” experience also enables employees to identify and evaluate common error and mistake so that the same mistake will not be repeated in future improvement activities. As a result, organizations which encourage learning and innovation among their employees through gradual support for the accomplishment of continuous improvement activities have a higher chance of sustaining their competitive advantage in the industry. Several research have also indirectly acknowledged the role of employee involvement in process improvement and their implementation under Lean setting as summarized in Table 1.6.

Table 1.6: Dimensions of Workplace Learning as Independent Variable Affecting Continuous Improvement

Authors	Facets	Dimensions
Magnier-Watanabe (2011); Angelis & Fernandes (2012); Gao & Low (2013); Hirzel et al. (2017)	Opportunistic knowledge acquisition, education and training	Continuous learning
Bateman (2005); Magnier-Watanabe (2011); Angelis & Fernandes (2012); Ali et al. (2013); Hirzel et al. (2017)	Co-worker interaction, communication, open information and knowledge sharing	Dialogue inquiry
Bateman (2005); Magnier-Watanabe (2011); Angelis & Fernandes (2012); Hirzel et al. (2017)	Team-based work, team-based decision	Team learning
Bateman (2005); Magnier-Watanabe (2011); Angelis & Fernandes (2012); Gao & Low (2013); Hirzel et al. (2017)	Job autonomy, high level of decision making	Empowerment
Love & Gunasekaran (1999); Papadopoulos (2011); Psomas et al. (2018)	Creating learning alliances, collaboration through Lean networking, getting answers across supply chain	System connections
Bateman (2005); Magnier-Watanabe (2011); Angelis & Fernandes (2012); Ali et al. (2013); Gao & Low (2013); Glover et al. (2013); Lam et al. (2015)	“Blame free” supervisory training and disciplinary policies, management focus & involvement, management support	Support leadership

The Relationship between Continuous Improvement and Sustainable Lean Implementation

The relationship between continuous improvement and Lean implementation was found to be significant in the manufacturing industry (Angelis & Fernandes, 2012; Chauhan & Singh, 2012). Nordin, Deros and Wahab (2010) also pointed out that among all Lean practices, “Kaizen” or continuous improvement are found in the leading practice that triggers the implementation of Lean manufacturing. Several other literature (Secchi & Camuffo, 2016; Arya & Jain, 2013; Gao & Low, 2013; Glover, Liu, Farris & Aken, 2013; Netland & Aspelund, 2013; Prashar, 2014; Averill, 2011; Jørgensen et al., 2007; Bateman, 2005; Womack et al. 1990; Imai, 1986) also supported the claims that continuous improvement or “Kaizen” is one of the key principles developed by Toyota which is widely implemented by Lean organizations in various sectors. Without the presence of continuous improvement, Lean implementation might reach an end upon standardization of improved Standard Operating Procedures (SOPs) without further review and revision. Since previous literature (Ali et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005) supported the linkage between learning at the workplace to have a direct impact on continuous improvement, it logically follows that workplace learning also contributes towards Lean sustainability. Review of discussions and evidence from past studies have led the researcher to acknowledge the statistical evidence to clarify the relationship between workplace learning, continuous improvement and sustainment of Lean implementation within the context of Lean manufacturing companies in Malaysia which is still lacking. This study seeks to provide a more empirical support that explains the effect of continuous improvement as a mediator towards the relationship between workplace learning and sustainable Lean implementation.

1.3.2 Empirical Gap

As far as for the researcher's knowledge, there is a huge empirical gap yet to be bridged due to lack of attention being given by previous researchers on the issues related to sustainment of Lean implementation. Review of previous literature has called for a need to provide more empirical evidence especially in this area of study due to the lack of statistical evidence found in previous research. The research paper among few others, that has quantitatively acknowledged the best practices in sustaining Lean implementation such as communication, training, employee empowerment and leadership are found in Comm and Mathaisel's (2005a) study. The second empirical evidence found in this area of study is the research paper by Lindskog et al. (2016) which conducted a focus group interview on 24 first line managers which focused mainly on sustainability concept in Lean implementation such as goal clarity, role clarity, besides, participation and learning from empowerment point of view. Most of the literature (Yusof & Aoki, 2016; Foo et al., 2015; Jadhav et al., 2014a; 2014b; Mohd-Zainal et al., 2011) on sustainment of Lean efforts are still reviewing the relationship between both variables through conceptual discussions. Moreover, Habidin and Yusof (2013) mentioned the importance of employee involvement for Lean implementation. However, the researchers acknowledged that employee involvement is not studied in their research. Acknowledging the importance of workplace learning in sustaining Lean implementation and the potential benefits from the development of such initiatives, has brought to the interest of this study to provide significant evidence that is backed up through statistical support. This study aimed to verify empirically supported evidence as a point of reference or guidelines with higher credibility for practitioners and organizations implementing Lean with the hope that further application would produce higher chances of harvesting positive results that is consistent and sustainable.

Another concern is that “most of Lean studies conducted in Malaysia focused on the automotive industry, therefore, may not be generalizable to other types of industry” (Habidin & Yusof, 2013, p. 60). As a result, this could lead to the lack of a comprehensive understanding about the effect of continuous improvement as a mediator on the relationship between workplace learning and sustainability of Lean implementation in the context of Lean manufacturing companies in Malaysia. Therefore, this study collected the samples from different types of Lean manufacturing companies in order to enhance the generalizability of the findings obtained through this area of study so that the benefits will not be constrained to only the application for a particular type of industry.

Besides, this study also recognized the importance of continuous improvement in sustaining other areas of Lean implementation, be it from socio and technical aspect, which motivate the intention of this research to look into the presence of continuous improvement initiatives and its’ mediating impact on the relationship between each of the dimensions of workplace learning and the sustainability of Lean implementation. The reason behind the rationale of this study to look into the potential effect of continuous improvement as mediating variables is due to a number of previous literature (Hirzel et al., 2017; Lam et al., 2015; Ali et al., 2013; Gao & Low, 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005) which proposed that active engagement in workplace learning has significantly lead to continuous improvement. Continuous improvement is also proven to have a significant impact on Lean implementation (Angelis & Fernandes, 2012; Chauhan & Singh, 2012). Since continuous improvement is proven as a causal result of certain dimensions of workplace learning, which in turn, lead to sustainment of Lean initiatives, there is a reason to believe that there is a possibility at the time, where continuous improvement could explain the relationship between workplace learning and sustainability of Lean implementation.

Jadhav et al. (2014a) proposed a roadmap for a successful Lean implementation which highlighted the cruciality for “human resource management practice bundle” to be given highest priority, followed by “creativity and innovation practice bundle” or continuous improvement as the foundation for sustainable Lean implementation (p. 19). However, up to this point, the researcher has found out that little, from any past research, that produces statistical support in order to explain the function of continuous improvement as the mediating variable affecting the relationship between workplace learning and the sustainability of Lean implementation. Therefore, this research is presenting important empirical evidence to enrich the area of its kind until further discoveries of more similar studies to be found, that quantitatively seek to clarify the mediating effect of continuous improvement on the relationship between workplace learning and sustainability of Lean implementation in the manufacturing sector in Malaysia.

1.3.3 Practical Gap

There are valid reasons for the increasing attention being shifted towards Lean concepts and application. Several benefits of Lean include identification of “bottlenecks, work stoppages, lead time and downtime” (Comm & Mathaisel, 2005b, p. 235) through time study and quality control, as well as positive results in terms of “improved work process, cost saving and overall improvement of service quality to customers” (MPC, 2018). However, there is still considerable literature within the academic discussion on Lean implementation that mainly focusing on shop-floor application, indicating that the understanding of contemporary Lean approach is still very limited especially from the human resource perspective (Lindskog, et al., 2016; Lam et al; 2015; Hines et al., 2004). Angelis and Fernandes (2012) also expressed

the same view in confronting with operational decisions to overcome blockage towards innovativeness in Lean systems still lacks statistically valid guidance. Insufficient evidence to be used as a guideline by human resource practitioners could be the reason for the difficulty faced by Western manufacturers to introduce, nurture and embed Lean Thinking (Hines et al., 2004) despite a number of Lean literature have been published in Western studies. In contrary, most Japanese manufacturers successfully instil the culture of respect for employees and high level of employee problem-solving in their Lean Thinking (Averill, 2011). Practically, Lean organizations that are facing difficulties in sustainment of their Lean effort still lack reference to learn from other organizations that are benefiting from successful Lean implementation.

Consequently, many organizations often thought that the fundamentals of their operations are following Lean principles when they launched massive cost control and cost reduction initiatives making the confident assumptions that they effectively and efficiently make use of their financial and human resources. The same situations are being observed in Malaysia manufacturing (Sahwan et al., 2012) as well as public sectors (Bakar, Mat, Fahmi & Urus, 2017) where employees are still resisting continuous improvement due to a misunderstanding about Lean concept. This study agreed with Comm and Mathaisel (2005b) argument that these beliefs are merely short-term, short-sighted savings instead of actual Lean Thinking. For instance, Lean implementation from the operational perspective especially those focusing on shop-floor activities often forsake intellectual facet of human assets towards operational excellence as the core to the Lean manufacturing approach (Jørgensen et al., 2007; Hines et al., 2004). Therefore, in order to achieve long-term sustainability, it is notable that Lean practices are about focusing on long-term value creation

for the customers instead of merely treating cost reduction as the sole means to achieve competitive cost structure, which is not sustainable.

Several researchers (Lindskog et al., 2016; Yusof & Aoki, 2016; Foo et al., 2015; Jadhav et al., 2014a; Ali et al., 2013; Glover et al., 2013; Mohd-Zainal et al., 2011; Jørgensen et al., 2007; Bateman, 2005) also commented that implementation is easier than sustainability, be it in terms of continuous improvement (Kaizen) projects or Lean manufacturing. Jayaraman et al. (2012) also mentioned that Lean implementations in some companies do not show effectiveness due to cost and time constraint. The reason why most of the organizations failed to sustain Lean implementation could be due to little emphasize in the investment on human aspect when carrying out Lean initiatives. Insufficient support in terms of cost and time on employee development while focusing on merely cost reduction from all aspect of operations could be one of the potential reasons behind the failure. Hines et al. (2004) suggested that Lean implementation should not be treated “as a set of mechanistic hard tool and techniques” because the basic foundations such as “human dimensions of motivation, empowerment and respect for people” are extremely crucial for the sustainment of Lean application in the long run irrespective of the industry sector (pp. 994-1000). It is undeniable that there is a need to empirically validate the correlation between workplace learning and Lean sustainability as it will impinge on organizational decision-making based on calculated prospect to invest in learning. Therefore, this study seeks to bring the practical gap nearer by looking at sustainment of Lean effort from the perspective of employees towards the presence of continuous improvement (Kaizen) initiatives in hope to provide some light by pointing out certain significant predictors which might have been left-out unnoticed, disregarded, overlooked or ignored in past studies done on Lean in Malaysia.

1.3.4 Methodological Gap

Up-to-date, it is reported that studies in the area of Lean still lacking in Malaysia (Habidin & Yusof, 2013). Moreover, “there do not appear to be any Lean assessment tools that incorporate both technical and organizational perspectives” (Jørgensen et al., 2007, p. 375). Therefore, there is still a critical gap to be fulfilled for the development of instrumentation in a similar area of studies especially one which is applicable to the local industry. This research decided to adopt well-validated research instrumentation in order to find a better representation that clearly depicts the factors studied in this research. As a result, this research adopted the use of Dimensions of The Learning Organization Questionnaire (DLOQ) as a valid instrumentation considering the problem with the failure of adapting appropriately validated research instrument that may lead to “lack of comprehensive understanding” of the research area (Ng, Ahmad & Ismail, 2011). DLOQ is a well-established instrumentation which has been adopted by many past research and is proven in terms of its reliability to be applied and studied from different national boundaries. Psomas et al. (2018) also highlighted that “bias might be present regarding the subjective assessment of the adoption of Lean principles” besides suggesting that the future research should be taking into consideration the opinion from a larger sample size (p. 76). The researcher of this study has also observed a lot of case studies which is based mainly on observations, as well as other subjective approaches, have been carried out on a selectively limited sample size (Kregel & Coners, 2018; Kumar, Dhingra & Singh, 2018; Psomas, et al., 2018; Birkie, Trucco & Kaulio 2017; Scheller, Sousa-Zomer & Cauchick-Miguel, 2018; Eaidgah, Maki, Kurczewski & Abdekhodae, 2016; Secchi & Camuffo, 2016; De Zan, De Toni, Fornasier & Battistella, 2015; Longoni & Cagliano, 2015; Piercy & Rich, 2015; Waterbury, 2015; Prashar, 2014; Raghavan, Yoon & Srihari, 2014; Suárez-Barraza & Miguel-Dávila, 2014;

Arya and Jain, 2013; Burgess & Radnor, 2013; Gao & Low, 2013; Netland & Aspelund, 2013; Yokozawa & Steenhuis, 2013; Roslin, Ahmed, Dawal & Tamri, 2012; Marksberry, Badurdeen, Gregory & Kreaflle, 2010; Magnier-Watanabe, 2011; Papadopoulos, 2011; Suárez-Barraza, Ramis-Pujol & Sandoval-Arzaga, 2011; Wong & Wong, 2011; Savolainen & Haikonen, 2007; Comm & Mathaisel, 2005b; Alstrup, 2000; Mitki et al., 1997) especially in the area of Lean studies as well as research area related to continuous improvement. Furthermore, Jadhav et al. (2014a) proposed that there is a need to robustly and quantitatively carried out the framework for sustainable Lean implementation through the “sample surveys as the issues in manufacturing sectors may vary based on country, geographic location within the country and even work culture of the organization itself” (p. 23). Therefore, there is a need for the current study to focus on manufacturing sector based on quantitative methods in order to acquire more breadth of information across a larger pool of input data from different work boundaries (Psomas et al, 2018; Jadhav et al., 2014b). Kumar, Talib and Ramayah (2013) also suggested that findings from “quantitative research is more generalizable” (p. 19). Accordingly, this study seeks to contribute statistical valid findings to enrich the under-developed area of Lean study through quick, inexpensive and systematic methods of evaluating information about Malaysia Lean manufacturing sector.

1.4 Research Objectives

1.4.1 General Objective

The main objective of this study is to identify the relationship between workplace learning and sustainable Lean implementation with continuous improvement as mediator within Lean manufacturing companies in Malaysia.

1.4.2 Specific Objectives

- i. To identify the relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- ii. To identify the relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- iii. To identify the relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- iv. To identify the relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- v. To identify the relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- vi. To identify the relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- vii. To identify the relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.
- viii. To identify the relationship between continuous learning and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.
- ix. To identify the relationship between dialogue inquiry and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.
- x. To identify the relationship between team learning and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.

- xi. To identify the relationship between embedded systems and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.
- xii. To identify the relationship between empowerment and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.
- xiii. To identify the relationship between system connections and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.
- xiv. To identify the relationship between support leadership and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia.

1.5 Theoretical Framework

The theoretical framework of this study is based on Resource Based View (RBV) by Barney (1991) which focuses on the original purpose to sustain Lean implementation. “Sustainability (Shitsuke) in Lean methodology entails developing the organizational discipline and processes via training, education, empowerment, enforcement, promotion and commitment to maintain its four high-level Lean principles, namely, go and see for yourself, continuous improvement or (Kaizen), respect teamwork as well as challenge” (Averill, 2011, pp. 3-58). The methodology of Lean practice suggested various application of tools and technique to deploy resources in the most productive ways. The most popular Lean practices that are widely adopted across Lean organizations are waste elimination and zero defects to

create more value in terms of the product offerings for the customers. This is in line with the main idea underlying RBV which is to achieve sustainable competitive advantage through efficient utilization of available resources over rivals in the competitive market. The paper presented by Mohd-Zainal et al. (2011) proposed the theoretical relationships between organizational learning and Lean sustainability which support the foundation underlying the purpose and design of this study. The paper proposed by the scholars focuses on the context of New Zealand manufacturing companies. Therefore, this study also brings together the original idea from Marsick and Watkins (2003) on the Dimensions of Learning Organization and Imai's (1986) concept of continuous improvement as the contributor which affects Lean ways of thinking as the key towards competitive success in the long run.

Andragogy, the principles of Adult Learning by Knowles (1984) is another strand that serves as the foundation of the theoretical framework for this study to examine the relationship between workplace learning and sustainable Lean implementation with the presence of continuous improvement as a mediator. The predictor variables are constructed based on the adoption of both elements that affect adult's learning namely, the "physical environment" such as embedded systems and the "psychological atmosphere" such as communications, teamwork, empowerment, system connections, leadership and the culture of continuous learning. From interdisciplinary perspectives, this study also takes into consideration the concept of continuous improvement (Kaizen) or "Ky'zen" proposed by Masaaki Imai (1986). Continuous improvement is believed to mediate the relationship between workplace learning and sustainability of Lean implementation due to the nature of the relationship with both the predictor (Ali et al., 2013; Magnier-Watanabe, 2011; Bateman, 2005) and the dependent variable (Gao & Low, 2013; Angelis & Fernandes, 2012). Both variables,

workplace learning and continuous improvement, are believed to have an impact on the sustainability of the dependent variable of this study, Lean implementation.

Reviewing further into the school of thoughts by previous scholars on the foundation of workplace learning, this study also comes across The Dimensions of Learning Organization Questionnaires (DLOQ) proposed by Marsick and Watkins (2003). It is noteworthy that the metrics proposed by the authors have contributed significantly towards various development of the human resource literature. According to Jönsson and Schölin (2014), “workplace learning is closely related to the concept of organizational learning and learning organization” (p. 1010). Besides the adaptation of the “General Nordic Questionnaire for Psychological and Social Factors at Work”, Jönsson and Schölin (2014) also adapted DLOQ as measures for their workplace learning questionnaire. DLOQ are constructed as a universal standard to measure the value of knowledge capital in an organization based on different levels of learning. DLOQ can be considered as a reliable instrument which has been widely adopted by many researchers (Jönsson & Schölin, 2014; Awasthy & Gupta, 2012; Michna, 2009; Nafukho, Graham & Muyia, 2009; Ellinger, Ellinger, Yang & Howton, 2003; Hernandez, 2003; McHargue, 2003) in multiple studies abroad to effectively measure changes in organizational performance.

Continuous improvement or “Kaizen” on the other hand, is recognized as an important concept under quality studies and Project Management Offices (PMO) to drive process improvement and enhance productivity. Many researchers (Hirzel et al., 2017; Sraun & Singh, 2017; Lam et al., 2015; Suárez-Barraza et al., 2014; Gao & Low, 2013; Glover et al., 2013; Prashar, 2014; Arya & Jain, 2013; Yokozawa & Steenhuis, 2013; Magnier-Watanabe, 2011; Suárez-Barraza et al., 2011) have paid attention to this area especially in the study of process improvement. The concept of continuous improvement has proven its significance

in terms of effectiveness and practicality in the real working environment. Continuous improvement or “Kaizen” culture that is successfully nurtured portrays the ideal representation of RBV application in practice. Barney and Hesterly (2010) recognized that a firm that is capable of maximizing the values of their resources will strengthen their position in the market and to have a higher capability to capture market opportunities besides neutralizing external threats. Apparently, continuous improvement is one of such initiatives which will leverage the capabilities of an organization to deploy their resources in the most productive manner and thus, enhance the value of its products, be it in the form of goods or services.

Although some Lean practitioners may not agree that Lean initiative could strategically enhance the value of human capital as they are constrained by the believed that Lean is to eliminate the seven-deadly waste in production namely time, inventories, motion, waiting, overproduction, over-processing and defects (Tabatabaee, Mahdiyar, Yahya, Marsono & Sadeghifam, 2017; Imai, 1986) which create value only for production areas. Jekiel (2011) have an opposite claim towards this idea. Jekiel (2011) provided an important insight for the development of this study which maintains that “too many companies do not realize they waste people’s abilities” and recognized that intellectual waste should also be considered on top of the seven-deadly waste in production if the company wish to flourish and prosper (p. 1). Besides, all the above-mentioned non-value-added types of waste or “Muda” are only a part of the aims to eliminate waste. According to Liker (2004) the two other aims that are important for waste elimination include “Muri”, which mean “overburdening equipment or people beyond their natural limits” and “Mura”, “unevenness” or workload instability. Although it is easy to identify “Muda”, failure to acknowledge “Muri” will result in safety and quality problem when employees are overburdened while overburdening of equipment

is claimed to have adverse impact on machine breakdown and defects. “Mura” then again, is explained by Liker (2004) as the resolution of the other two aims especially “Muda” which is the result of imbalance that exist in the production process. Therefore, Liker (2004) pointed out that in order for all the three aims to fit together as a Lean system focusing on waste elimination, Lean organization should level out the production schedule or workload to improve stabilization a principle known as “Heijunka”.

Barney (1991) advocated that RBV also recognized that the optimization of employee’s capability and productive human resources are seemingly one of the potential assets that are unique for an organization to prosper. Employee’s unique learning experience that is firm-specific is believed to be a valuable and imperfectly imitable source of competitive advantage for Lean manufacturing organizations. Based on the claims of previous literature that inefficient use of human talent is a source of intellectual waste, this study seek to justify the needs of human development at work through employee learning by investigating the relationship between workplace learning and the sustainment of Lean implementation as a source of competitive advantage.

In order to eliminate production waste through Lean initiatives, the employees need to be encouraged in terms of generating new ideas for improvement. Therefore, organizations need to make sure that their employees are capable to learn and share their new knowledge to continuously improve the operations. Thus, this study acknowledged that intellectual waste such as knowledge waste (Hu et al., 2016) and underutilized human potential (Wahab et al., 2017; Sahwan et al., 2012) is too costly to be disowned in that sense. Here, the needs for adult learning are found to be significant towards continuous improvement or “Kaizen” initiatives and eventually sustain Lean implementation as a way of thinking. Continuous

learning environment serves as an important enabler which provides the opportunity and resources for adult learners to fulfil their learning needs at work.

Moreover, the unique learning experiences can also be explained based on the “Andragogical” model. During continuous improvement activities, employees engage in an active dialogue inquiry which promotes effective communication. Collaboration and active sharing of expertise and experiences can happen during this stage of “Kaizen” or continuous improvement initiatives. Active interactions during continuous improvement activities are also believed to stimulate team learning which builds system connections based on mutual understanding, exchanges and a common sense of direction to achieve the end goals. It is believed that empowerment also provides adult employees with their own sense of direction to pursue their learning goals when provided with autonomy during the problem-solving process.

In addition, supportive leaders play an important role in driving the entire team to believe in the concept of continuous improvement and engage in the process. Top management’s support for adult learning is also expected to enhance employees’ readiness to learn when a sufficient level of autonomy is granted. Employee’s perception of having control over learning resources as well as accountability towards their own learning orientation is important to predict the successfulness of continuous improvement activities. Successful transfer of knowledge which results in successful continuous improvement or “Kaizen” projects enhances employees’ confidence and strengthen their commitment towards upholding Lean ways of thinking thus, increasing the potential of sustaining its implementation over the long run.

The last assumption in Andragogy used for the formulation of the theoretical framework in this study is the adult's "motivation to learn" which is affected by both extrinsic and intrinsic motivators. Extrinsic factors of motivation can be offered in the form of tangible rewards such as incentives, or alternatively, be presented in the form of intangible rewards such as recognition to inspire employees to learn new knowledge and pursue more improvement projects. On the other hand, intrinsic factors such as a sense of worth and self-respect can also be nurtured through various employee development initiatives to enhance learner's motivation in sustaining Lean initiatives. Learning effort that focus on employee's motivation will enhance not only employee's learning abilities but as well, their willingness as well as commitment to transfer their learning into the continuous improvement projects at work.

1.6 Conceptual Framework

Figure 1.1 illustrates the conceptual framework of this study which is formulated and modified based on the framework proposed by Mohd-Zainal et al. (2011). The original framework proposed by Mohd-Zainal et al. (2011) identified seven elements from Marsick and Watkins (2003) Dimensions of Learning Organization Questionnaire (DLOQ) and continuous improvement as the criterion variables. This study extended the roles of continuous improvement as a mediator based on past literature which believed that continuous improvement accounts for the relationship between workplace learning and sustainable Lean implementation in Lean manufacturing companies.

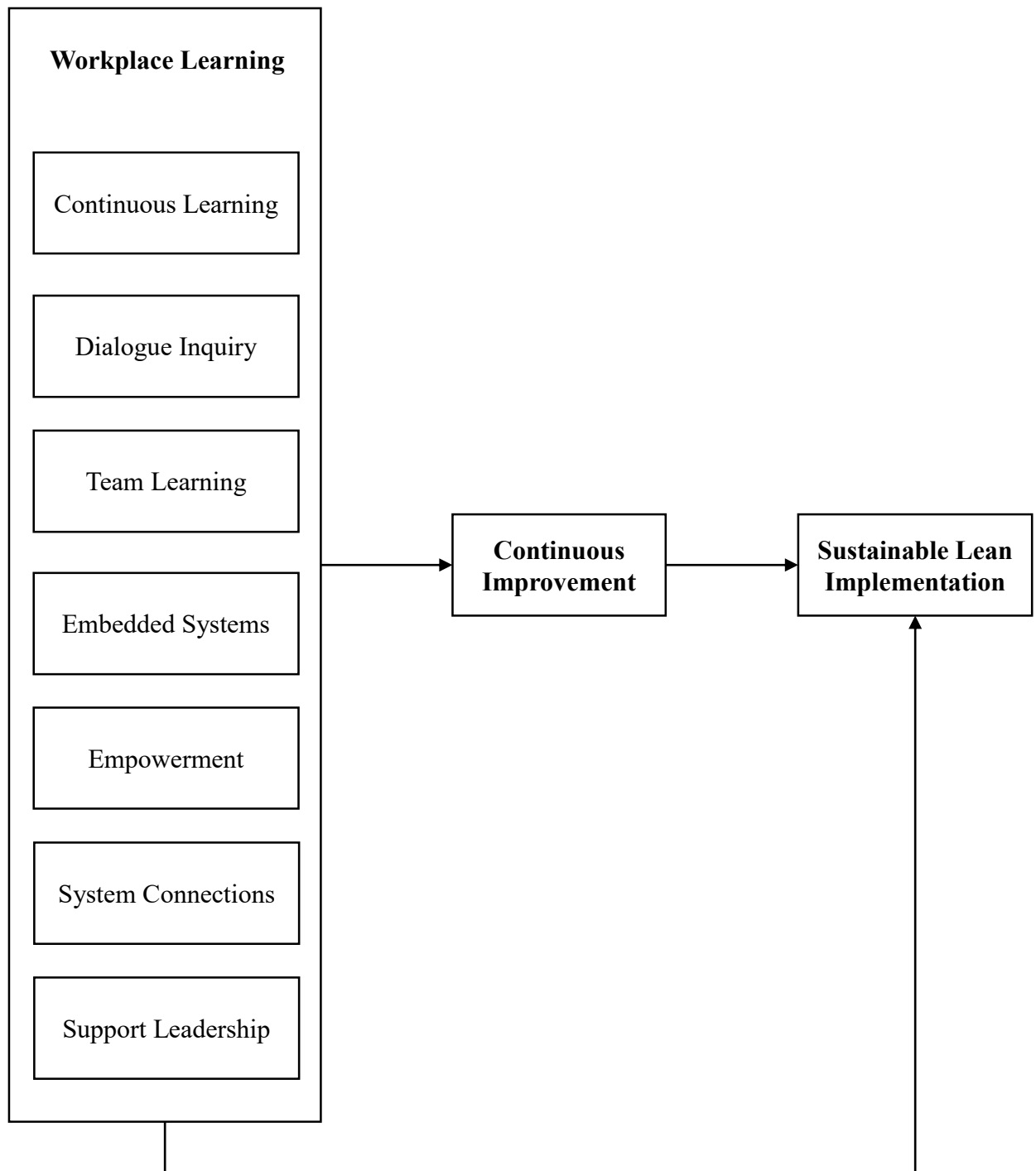


Figure 1.1: Conceptual Framework of the Relationship between Workplace Learning and Sustainable Lean Implementation with Continuous Improvement as a Mediator.

Source: Mohd-Zainal et al. (2011); Marsick and Watkins (2003)

Referring to the conceptual framework as illustrated in Figure 1.1, seven dimensions adopted from DLOQ (continuous learning, dialogue inquiry, team learning, embedded systems, empowerment, system connections and support leadership) are depicted as independent variables representing a single factor, which is workplace learning. Sustainable Lean implementation is represented as the dependent variable of this study.

1.7 Research Questions

- i. What is the relationship between continuous learning and sustainable Lean implementation?
- ii. What is the relationship between dialogue inquiry and sustainable Lean implementation?
- iii. What is the relationship between team learning and sustainable Lean implementation?
- iv. What is the relationship between embedded systems and sustainable Lean implementation?
- v. What is the relationship between empowerment and sustainable Lean implementation?
- vi. What is the relationship between system connections and sustainable Lean implementation?
- vii. What is the relationship between support leadership and sustainable Lean implementation?
- viii. What is the mediating effect of continuous improvement on the relationship between continuous learning and sustainable Lean implementation?

- ix. What is the mediating effect of continuous improvement on the relationship between dialogue inquiry and sustainable Lean implementation?
- x. What is the mediating effect of continuous improvement on the relationship between team learning and sustainable Lean implementation?
- xi. What is the mediating effect of continuous improvement on the relationship between embedded systems and sustainable Lean implementation?
- xii. What is the mediating effect of continuous improvement on the relationship between empowerment and sustainable Lean implementation?
- xiii. What is the mediating effect of continuous improvement on the relationship between system connections and sustainable Lean implementation?
- xiv. What is the mediating effect of continuous improvement on the relationship between support leadership and sustainable Lean implementation?

1.8 Hypotheses of the Study

The current study has identified several dimensions that could enhance learning at the workplace as proposed in past literature. In order to sustain Lean, previous researchers (Jadhav, Mantha & Rane, 2014b; Mohd-Zainal et al., 2011; Comm & Mathaisel, 2005a; 2005b) proposed that training and learning development should be made available. These findings have led to the conclusion that an opportunity for continuous learning such as investment and support to create conducive learning environment is needed to encourage the development of knowledge and enhance further understanding on Lean concepts and principles in order to ensure successful execution of Lean initiatives. Therefore, the research formulated the following hypothesis to be tested:

H_{a1}: There is a relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Other than setting up a sustainable learning environment, open communication and dialogue are also being perceived (Jadhav et al., 2014b; Mohd-Zainal et al., 2011; Comm & Mathaisel, 2005a; 2005b) as one of the important dimensions that would bring positive impact towards sustainment of Lean initiatives. Effective dialogue inquiry is believed to be able to create a learning environment which is the buildup of mutual trust and respect. Open and honest communication that is delivered based on trust and respect is the main foundation of Lean implementation. In order to clarify the relationship, the following hypothesis was developed:

H_{a2}: There is a relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Previous conceptual discussions (Hines et al., 2004) also believed that the foundation for Lean is more humanistic rather than just a set of mechanistic tools on cost reductions. Several authors (Jadhav et al., 2014b; Mohd-Zainal et al., 2011) also proposed that cooperation and mutual trust supported the sustainment of Lean initiatives. Learning in a team is crucial for employees to share knowledge and skills in a Lean organization. Effective teamwork will generate more positive results for the sustainment of Lean efforts. Hence, the research developed the following hypothesis to be tested:

H_{a3}: There is a relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Comm and Mathaisel (2005b) found out that there is a need to improve the information technology and centralize the information system for successful implementation of Lean. Embedded systems are believed to make information more readily available for employees

learning. Sufficient quality information for analysis and evaluation prior to problem-solving and decision making are believed to be positively related to sustainable Lean implementation. In order to verify the relationship, the following hypothesis was formulated:

H_{a4}: There is a relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Lindskog, Vänje, Törnkvist and Eklund (2016) found out that employee participation and learning will lead to a sustainable Lean in psychiatry. Thus, this study seeks to clarify the relationship between employee empowerment and sustainability of Lean implementation in Malaysia manufacturing sector. Based on the review of past literature, this study found a justifiable reason to support the development of the following hypothesis:

H_{a5}: There is a relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Previous literature (Jadhav et al., 2014b; Mohd-Zainal et al., 2011; Comm & Mathaisel, 2005a; 2005b) agreed that in order to achieve sustainable Lean effort, employees must learn to be more customer focused and be ready to work with stakeholders in the external business environment. Employee's collaborative learning with external industrial players across the supply chain that is promoted through strategic partnership and information sharing is believed to bring positive impact on Lean implementation. Thus, the research developed the following hypothesis to be tested:

H_{a6}: There is a relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Consistent support from leaders is identified as a sustainable practice in Lean (Jadhav et al., 2014b; Mohd-Zainal et al., 2011; Comm & Mathaisel, 2005a; 2005b). Therefore, the following hypothesis was formulated to verify the relationship between support leadership and sustainment of Lean implementation:

H_{a7}: There is a relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Opportunities created for continuous learning is believed to encourage more engagement from employees in continuous improvement or “Kaizen” activities (Hirzel, Leyer & Moormann, 2017; Gao & Low, 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011). Successful continuous improvement effort as a result of active continuous learning environment will eventually promote the sustainment of Lean initiatives. Therefore, there is a reason to believe that continuous improvement is a potential mediator variable which explains the relationship between workplace learning and sustainable Lean implementation. Therefore, the following hypothesis was formulated:

H_{a8}: Continuous improvement mediates the relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Frequent interaction and knowledge sharing are proven to be among several workplace learning dimensions which serve as the foundation for trust and respect and eventually contribute towards successful continuous improvement or “Kaizen” activities (Hirzel et al., 2017; Ali et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005). It is undeniable that there is a high possibility where continuous improvement mediates the relationship between active dialogue inquiry and a sustainment of Lean implementation. Hence, the following hypothesis was developed:

H_{a9}: Continuous improvement mediates the relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Continuous improvement or “Kaizen” activities are carried out in teams. However, Kululanga (2009) warned that “mere application of teams, teamwork and their intensive use does not necessarily result in learning for continuous improvement” (pp. 311-313). Several researchers (Minh Zailani, Iranmanesh & Heidari 2018; Lantz, Hansen & Antoni, 2015) also argued that paradox exist between continuous improvement and teamwork in Lean organization due to work standardization that limits autonomy for improvement within the team. Lantz et al. (2015) later find that team learning is the answer that can solve the paradox between teamwork and continuous improvement in organizational practicing Lean. In this situation, learning in a team will somehow affect the outcome of continuous improvement or “Kaizen” program through team participation and team-based decision (Hirzel et al., 2017; Lantz et al., 2015; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005). Thus, there is a reason to suggest that continuous improvement is a result of the team learning process which sustained Lean implementation at a later stage. Therefore, the following hypothesis was developed:

H_{a10}: Continuous improvement mediates the relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Little statistical evidence was found to support the direct relationship between a well-maintained information system that supports workplace learning and continuous improvement. However, based on several empirical support, the current study has the reason to believe that development of information systems such as knowledge and visual management system would assist in learning, monitoring and provide inputs for continuous

improvement or “Kaizen” events (Savolainen & Haikonen, 2007; Eaidgah et al., 2016). Therefore, this study is interested to explore the mediating effect of continuous improvement in the relationship between embedded systems and sustainment of Lean implementation. Hence, the following hypothesis was formulated:

H_{a11}: Continuous improvement mediates the relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Previous literature (Hirzel et al., 2017; Gao & Low, 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005) agreed that a high level of empowerment that encourages employee’s involvement in learning about organizational direction and active participation in decision making will result in a positive effect on continuous improvement. This study also acknowledged that employee’s perceived autonomy in their work will affect their commitment towards continuous improvement initiatives which ensure higher chances of success. Successful continuous improvement or “Kaizen” activities as a result of high employees’ support will eventually sustain Lean gains. Thus, the following hypothesis was formulated:

H_{a12}: Continuous improvement mediates the relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Studies on the relationship between system connections from the perspective of workplace learning and continuous improvement were not that popular as compared to other dimensions of workplace learning such as communication, empowerment and leadership. However, this research is able to synthesize some information from previous research that exhibits the element of system connections and its impact on continuous improvement. For instance, creating learning alliances (Love & Gunasekaran, 1999), collaboration through

Lean networking (Papadopoulos, 2011) and getting answers across supply chain (Psomas et al., 2018) for continuous improvement or “Kaizen” activities supported the formation of the following hypothesis:

H_{a13}: Continuous improvement mediates the relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

One of the important aspects in Lean implementation is to establish a “blame-free” environment which encourages employee learning through active experimentation, of course, under a controlled condition with calculated risk. Leader’s support not only lead to employee’s empowerment for learning and development, but as well is a source of sustenance that encourage employee’s involvement and commitment towards sharing a mutual direction to achieve the organizational vision. Establishment of consistent support from the leaders towards continuous improvement or “Kaizen” activities are supported by many (Hirzel et al., 2017; Gao & Low, 2013; Ali et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005) and is believed to have significant impact on ensuring successful Lean implementation. Therefore, the following hypothesis was developed:

H_{a14}: Continuous improvement mediates the relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

1.9 Significance of the Study

The objective of this study is to test the relationship between predictor variables, which is dimensions of workplace learning and continuous improvement which would subsequently

affect the sustainment of Lean implementation, the dependent variable of this study. At the moment, research related to workplace learning and Lean sustainability still lack statistically valid findings and needed more research attention. As to the researcher's knowledge, more statistical evidence is needed which call to the attention to the area of this study which is still new to the local industry. It is believed that the identification of success factors which would lead to successful Lean implementation would eventually be beneficial to achieve not only a long-term competitive advantage for Lean manufacturing companies in Malaysia but it is also intended for the extended practice in other areas that would account for continuous performance of Malaysia economic growth and development as a whole.

From the theoretical perspectives, statistical findings obtained through this study will also serve as the empirical insights to cast off some unclear issues pertaining to some conventional ideas of cost reduction. Some evidence from previous literature has shown that "leader conservation values that are conceptually related to hierarchical values are negatively related to Lean-team effectiveness" (van Dun and Wilderom, 2016, p. 1542). Leaders that enforce stringent cost control mechanism will limit employee's capabilities to propose improvement ideas as they are confined in an unproductive environment which limit their learning capabilities without much support. For instance, a study by Bakar et al. (2017) found that employees in Malaysia public sector have a high tendency to follow rigid rules, policies and procedures. This situation has prevented employee's involvement in continuous improvement activities (Bakar et al., 2017).

Hines et al. (2004) also mentioned that "value creation is often seen as equal to cost reduction and this represents a common yet critical shortcoming of the understanding of Lean" (p. 995). From RBT perspectives, such initiatives might be perceived to enjoy short-term economic value but are easily imitable, thus will not sustain long-term competitive gain.

“Unlike mass production, Lean production valued workers for more than their brawn” (Averill, 2011, p. 4), therefore, this study highlighted the importance of human resources, not just as an asset like any other organizational resources, but as a unique and valuable source of sustained competitive advantage when much effort is being shifted to develop employee’s distinctiveness as well as potential through workplace learning and firm-specific continuous improvement program. This effort is in line with Barney and Clark (2007) call for the theoretical development of RBT by investigating the dimensions of human development through learning and continuous improvement to sustain competitive advantage in Lean environment instead of merely identifying the type or characteristics of human resources that the Lean firm must possess, which the authors perceived as no longer important for the extension of RBT.

The author also claimed that justification to defend RBT through empirical support is the most prominent evidence of extending the theory. Besides extending the existing theory, the empirical result of this study also provide enrichment to previous literature and at the same time, justify the need to reflect on the ambiguity of certain literature which might mislead practitioners in this profession towards vagueness and misunderstanding when interpreting the true meaning on Lean. Thus, the empirical findings of this study lead to further insights and understanding towards real sustainment of Lean implementation which is not merely based on cost reductions but should be grounded on the consciousness that there is a prerequisite to be fulfilled which is to embrace the philosophy of lifelong learning during the implementation for long-term competitive advantage.

Jadhav et al., (2014a) proposed that there is a need to robustly and quantitatively carry out the framework for sustainable Lean implementation through sample survey due to the reason that the issues in manufacturing sectors might be different across different national

boundaries, geographical setting within the country and even varying work culture of the organization itself. Besides, advancement in terms of manufacturing operations is happening rapidly in developing country, indicating that highly skilled and trained workers are needed for effective implementation of continuous improvement initiatives (Sraun & Singh, 2017). The information gathered from this study is useful for generalization of the idea and school of thought related to Lean Thinking to the local context.

Another significant area of this study is to assist the situation of Lean manufacturing companies in Malaysia which may not be having sufficient resources to be allocated for research purpose. “Limited data, unreliable information, or the high cost of conducting a market research, pose formidable challenges for estimating the true potential of emerging markets” like Malaysia (Cavusgil, Knight & Riesenberger, 2017, p. 241). There are still many organizations nowadays which renounce research and development initiatives due to many reasons such as prioritization in other business areas. Furthermore, another problem commonly faced by some organization operating in a developing country is lack of skills and expertise in the research area and has thus, becoming a barrier to pursue any research. This situation has caused unavailability of quality information to assist management in decision making.

Acknowledging the practical gaps, this study also recognized the importance of generating contemporary findings for human resource practitioners to raise awareness and responsiveness towards the dynamically changing workforce. This is because, those engaging in human resource profession plays important roles in seizing the best opportunities to establish effective learning environment as an effort to upgrade the values of their human capitals which is believed to support the development of the knowledge-based economy in the long run. Furthermore, identification of effective workplace learning

setting, support in terms of resources and leadership encouragement towards continuous improvement or “Kaizen” activities is of utmost important to be taken into consideration because such findings are believed to facilitate an organization’s capability to not only perform at minimal costs but also focusing on long-term value creation for sustainable competitive advantage. Consequently, productivity is expected to increase and results in profitability. Growth in the Malaysia manufacturing sector also means greater enhancement of Malaysian competitiveness in the global market besides generating higher income for the country.

Defining the dimensions that predict sustainability of Lean as a culture is important as a source of reference or serves as a guideline which could assist strategic leaders, corporate officers as well as practitioners in related areas during the process of planning and decision making for strategy formulation. The reason is simply that misunderstanding of Lean concept has been evidenced to arise in both, private (Salleh et al., 2015; Sahwan et al., 2012) as well as public Lean institutions (Bakar et al., 2017) in Malaysia. Effective decisions making is believed to collectively enhance the business functions, promoting better performance and strengthen strategic positioning, enabling organizations to seize market opportunities and achieve sustainable competitive advantage through the achievement of operational excellence. Eventually, positive growth among Lean manufacturing companies in Malaysia will, in turn, elevates positive impact on Malaysia economy at large.

1.10 Limitation of the Study

Many research studies have its deficiencies (Psomas et al., 2018; Habtoor, 2016; Lam et al., 2015), which is of no exception in this study. One of the limitations of this study is that there

are many different translations for Dimensions of The Learning Organization Questionnaire (DLOQ) which is widely practised abroad in multiple studies conducted under various research designs. This study adapted the dimensions translated from a study in Turkish by Basim, Sesen and Korkmazyurek (2007) because the items were straightforward and have been proven in terms of validity instead of just reliability of the instrument. Although the findings in previous literature showed that the version of DLOQ by Basim et al. (2007) was a valid instrument to measure learning process and the reliability and validity test from this study has also proven a similar assumption, there might still be a slight probability that limitation exists when applied to the local context. This study also needs to narrow down the scope of study with several limitations related to moderately small sample size in proportion to the real number of elements within the population in Lean manufacturing. The source of sample for this study is limited to only manufacturing companies adapting Lean principles considering that the real introduction is still new in terms of its introduction in Malaysia as compared to its' long establishment in Western culture. As a result, collectable data may not be sufficient to be perfectly generalized to the entire populations of manufacturing industry registered under the Ministry of International Trade and Industry (MITI).

In the attempt to make an allowance to include a larger sample size from a small group of manufacturing employees who are exposed to Lean practices in Malaysia, this study applied a quantitative survey as the research design. Consequently, although the research design in this study matches positivist approach, yet, this research proceeds with purposive sampling in order to cover responses only from respondents who are involved in Lean implementation among Lean manufacturing companies in Malaysia. The use of this sampling method is also due to the consideration that all the manufacturing companies agreed to participate for the purpose of this research are upholding a very strict private and confidential policy in terms

of keeping their employees' database and information. Acknowledging the limitation of purposive sampling in terms of its generalizability, the researcher attempted to minimize the weakness by conducting the study at multiple sites of Lean manufacturing organizations within Malaysia which consented to participate in this study taking into account employee's perception which might varies across these sites. Lean sustainability recognizes the involvement of all employees from a different level in the organization. Considering this fact, survey questionnaire is the most practical instrument to collect a huge amount of data from employees scattered at each corner of their workplace while maintaining the private and confidential policy of the companies which consented to participate in this study. Psomas et al. (2018) suggested that researchers should take into consideration the "opinions of a representative sample of company managers and employees from all operations in order to gain more insight into Lean adoption" (p. 76). However, the limitation of this instrumentation is the restriction to obtain in-depth insights from each participant. The goodness of data is highly dependent on the respondent's honesty in responding to the items in the questionnaire.

1.11 Definition of Terms

This section explains all the terms used to fulfil the intention of this study which is defined through conceptual and operational definitions. Conceptual definition explicates the terms used in this study according to the general terminologies. Operational definition, on the other hand, clarifies the key terms based on the concepts specifically interpreted for the purpose of this study.

1.11.1 Learning

Conceptual Definition

Senge, Roberts, Ross, Smith and Kleiner (1994) define learning as “mastery of the way of self-improvement” through “study”, continuous “practice” and “gaining experience” (p. 49). Also, learning is defined by Fiol and Lyles (1985) as “the development of insights, knowledge and associations between past actions, the effectiveness of those actions and future actions” (p. 811). Learning is also defined as “a collective experience and tends to result from the need to respond to an organization’s environmental influences” (Berg & Chyung, 2008, p. 230).

Operational Definition

Learning is referring to the process of knowledge acquisition and the assimilation of work-related skills and abilities with an individual learner’s experience through reflection to create new ideas in the workplace setting. It is an initiative generated through education, culture and wisdom that emerges from activities and interaction within the workplace environment. This study also acknowledges learner’s ability to adapt to the changes in contemporary workplace setting and their motivation to search for answer to improve their current situation.

1.11.2 Workplace Learning

Conceptual Definition

Marsick and Watkins (2003) regarded learning at the workplace as “a part of knowledge capital of the organization that provides for ongoing experimentation using lesson learned

to draw a link between learning outcomes and changes in knowledge performance” (pp. 133-138). “The lived realities of workplace learning are also explained by factors such as organizational culture and history, the way jobs are designed and work is organized, besides the way people are managed and their performance is judged” (Fuller & Unwin, 2005, p. 22).

Operational Definition

Workplace learning in this study refers to the extent employees are exposed to formal and informal learning activities and the degree of empowerment provided to encourage employees’ involvement in the learning process to acquire new competencies at the workplace. It is the learning opportunity made available at the workplace for the employees to achieve better performance at work. It is also a system of beliefs, norms, mores and shared value created in the working environment as a collective joint attempt to support learning. Put it simply, workplace learning includes the process of knowledge acquisition in the workplace.

1.11.3 Continuous Improvement

Conceptual Definition

Imai (1986) conceptualized improvement as “KAIZEN” which “is a continuous process” (p. 23) which “brings about gradual progress” (p. 25) through “small steps” that “maintain and improves” the working standard (p. 24). From the Western perspective, “continuous improvement is a key element of corporate pursue towards innovation as a key source of competitiveness in the knowledge economy” (Angelis & Fernandes, 2012, p. 74). According to Sun et al. (2008), the philosophy of continuous improvement that “employees are able to

think is a deviation from the traditional Taylorism approach” (p. 113). Within the context of Malaysian study, continuous improvement is simply defined as “a collection of activities that constitute a process intended to achieve performance improvement” (Ali et al., 2013, p. 409).

Operational Definition

Continuous improvement in this study refers to a ceaseless effort in pursuance for advancement, refinement and constant upgrading of existing standards in all area within an organization to boost productivity and reduce waste for the sustainment of long-term competitive gains. It is referring to the gradual development and upgrading of the existing way of getting the work done, involving quality performance both in terms of human skills and technical tools. It involves a culture of teamwork and brainstorming in an attempt to generate new, creative ideas as well as innovative “out-of-the-box” thinking with the ultimate objectives which is to create values for customers or end users. This study also acknowledged continuous improvement as a drive to measurable, incremental steps of change for the betterment of the entire value stream.

1.11.4 Lean

Conceptual Definition

Lean is “a term coined by the International Motor Vehicle Program (IMVP) researcher John Krafcik because it uses less of everything compared with mass production” (Womack et al., 1990, p. 13). The authors further elaborated on the characteristics of Lean production by acknowledging that “the ultimate objective of Lean is to set sights explicitly on perfection by changing the way people work, the meaning of professional career and calls for learning

far more professional skills as well as applying these creatively in a team setting rather than in a rigid hierarchy” (pp. 13-14). On the other hand, “Lean culture, by definition, are devoted to continuous improvement, which inherently requires people to actively learn” (Jekiel, 2011, p. 9). Besides, Comm and Mathaisel (2005b) also defined Lean as “a dynamic process of change for the total enterprise aimed at continuous improvement and eliminating waste” (p. 231). Furthermore, “Lean is a globally competitive standard for product assembly of discrete part” (Angelis & Fernandes, 2012, p. 74).

Operational Definition

Lean in this study refers to a human-centric innovative way of thinking for continuous improvement effort. This study looks at Lean as a universal standard that guides systematic waste elimination to create values for customers and end users in a smooth uninterrupted flow by focusing on variation reduction within work processes and products quality. Lean concept in this study also recognized the inefficient use of intellectual resources as one of the wastes to be eliminated. This study refers to Lean tools as the technique and methods employed during Lean implementation. However, Lean implementation is not merely recognized as a set of tools intended for the purpose of cost reduction but is being viewed as a source of long-term competitive advantage. Therefore, this study defines the success of Lean through improvement in overall operational performances including the human aspect.

1.11.5 Sustainable Lean Implementation

Conceptual Definition

“Sustainability (Shitsuke) in Lean methodology entails developing the organizational discipline and processes via training, education, empowerment, enforcement, promotion and

commitment to maintain its four high-level Lean principles, namely, go and see for yourself, continuous improvement or (Kaizen), respect teamwork as well as challenge” (Averill, 2011, pp. 3-58). Sustainability in the context of Lean was defined by Comm and Mathaisel (2005b) in their study as “the strategic deployment of resources to allow the institution to continue to thrive economically and focus on its’ core mission” (p. 231). According to Barney & Clark (2007) from RBT perspective, sustainability does not have to be defined in terms of calendar time. “Sustainability is a race to the top as sustainability strategies give companies a sustainable competitive advantage by improving revenues, reduce costs and help win the talent war” (Willard, 2012, pp. 2-4). “Sustain the process and strive for perfection by continually removing the wastes as they appear” is one of the approaches suggested by Isack, Mutingi, Kandjeke, Vashishth and Chakraborty (2018) to apply Lean principles. In addition, Jekiel (2011) acknowledge sustainability under Lean setting as “a core concept for improvements due to the reason that good ideas that are not implemented or only exist for short term would be a waste” (p. 76).

Operational Definition

Sustainable Lean implementation refers to sustaining Lean gains through a set of initiatives such as relentless support from leaders as enablers and leveraged operating system. Sustainment of Lean implementation is also depending on the successfulness of continuous improvement or “Kaizen” effort and other value-added activities such as building expertise through workplace learning, enhanced visibility of visual management as well as effective communication within the working environment. Besides, sustenance of Lean implementation in this study is also recognize as a way of thinking at the workplace which is developed for the purpose of continuous improvement in daily operation, besides having the sense of ownership in fulfilling daily tasks, duties and obligations through teamwork and

quality performance. In short, this study focuses on the sustainment of Lean implementation from a more humanistic perspective instead of treating Lean as a mechanistic tool from the operational point of view. Lean implementation is considered achieving its maturity and sustainable in the manufacturing system when it shows positive results and consistent improvement in all areas across the value stream.

1.11.6 Continuous Learning

Conceptual Definition

“Learning is designed into work so that people can learn on the job where opportunities are provided for ongoing education and growth” (Marsick & Watkins, 2003, p. 139).

Operational Definition

Continuous learning in this study is referring to employees’ persistent to anticipate in capturing the available learning opportunities in their work environment for personal development. Therefore, continuous learning is defined as the presence of a learning environment which is made available to encourage knowledge acquisition.

1.11.7 Dialogue Inquiry

Conceptual Definition

Marsick and Watkins (2003) described dialogue inquiry as the “productive reasoning skills gained by people to express their views and the capacity to listen and inquire into the views

of others which is established through change in culture to support questioning, feedback and experimentation” (p. 139).

Operational Definition

Dialogue inquiry in this study is referring to the presence of knowledge sharing and information exchange through an established level of trust, respect and open discussion to explore complex work-related issues regardless of positional level and job ranking. It involves an active search for knowledge through effective communication etiquette.

1.11.8 Team Learning

Conceptual Definition

“Work is designed to use groups to access different modes of thinking at which groups are expected to learn together and work together and collaboration is valued by culture and rewarded” (Marsick & Watkins, 2003, p. 139). Under Lean setting, Lantz et al. (2015) perceive team learning as “team participation and building share meaning of work” to achieve consensus in decision making (p. 22).

Operational Definition

Team learning is defined in this study in a way that takes into consideration the employee’s perception of their own contribution towards team effort. Besides the perceived importance of employee’s own contribution of professional competencies as part of the continuous improvement team, the dimension of team learning is also referring to employee’s perceived benefits and gains from the recognition and be rewarded based on their collective effort to accomplish given tasks.

1.11.9 Embedded Systems

Conceptual Definition

“Both high- and low- technology systems to share learning are created and integrated with work under the condition that access is provided and systems are maintained” (Marsick & Watkins, 2003., p. 139). Embedded systems as an important learning variable are described as systems needed for “knowledge management” by Hernandez (2003, p. 219).

Operational Definition

As one of the facets of workplace learning, embedded systems in this study take into consideration the integration of technological infrastructure and facilities in an organization which serves as one of the mediums of organizational communication to facilitate employee’s knowledge acquisition. It is best described as a well-maintained information system which provides temporal flexibility and cost advantages in accessing information for various work purposes. Example includes access to an up-to-date employee’s database to identify skill gap, to keep track and evaluate the return of investment such as time resources allocated for training.

1.11.10 Empowerment

Conceptual Definition

“People are involved in setting, owning and implementing a joint vision upon which responsibility is distributed close to decision making so that people are motivated to learn toward what they are held accountable to do” (Marsick & Watkins, 2003, p. 139). Garavan

(1997) pointed out that in empowerment-oriented culture, “individuals are expected to accept greater responsibility and to follow a path of continuous improvement” (p. 48).

Operational Definition

The term empowerment in this study is referring to the measurement of the freedom permitted by the organization to provide choices on alternatives that employees can pursue during problem-solving to accomplish their continuous improvement projects under Lean setting. This simply means employees are being entrusted with control over resource allocation with the condition that they are able to perform a proper risk assessment. In addition, empowerment in this study also acknowledges the recognition that employees received, for making the move in partaking of their own initiatives to align with the organizational vision.

1.11.11 System Connections

Conceptual Definition

“People are helped to see the effect of their work on the entire enterprise at which people are able to scan the environment and use the information to adjust work practices when the organization is linked to its communities” (Marsick & Watkins, 2003, p. 139).

Operational Definition

For the purpose of this study, the term system connections also take into consideration the overview of learning activities which took place across the value chain such as collaboration with business partners. Besides, other condition that helps employees to assimilate and

optimize their concentration and readiness for learning at work is of similar importance for this study.

1.11.12 Support Leadership

Conceptual Definition

“Leaders model, champion and support learning reflected through leadership that uses learning strategically for business results” (Marsick & Watkins, 2003, p. 139). Under Lean setting, leader’s support especially in terms of continuous commitment in employee’s training and development, besides “practicing, mentoring and coaching” are critical in engaging and developing employees for “root cause problem solving” (Alefari, Saloniitis & Xu, 2017, p. 760).

Operational Definition

Provision from leaders especially for the sustenance of learning culture among the employees is one of the main concerns under the dimension of support leadership in this study. Support leadership recognized leader’s role to sustain Lean gain through their influence as motivator, enablers and resource provider. This study acknowledged leader’s direct participation as one form of support to create better and more learning opportunities as a developmental effort which reinforces the learning motivation among their subordinates. The study also takes into consideration leader’s mentoring and coaching initiatives as a form of support which encourages learning where active sharing of information takes place to enables the pursuance towards prospective development of shared vision.

1.12 Organization of the Thesis

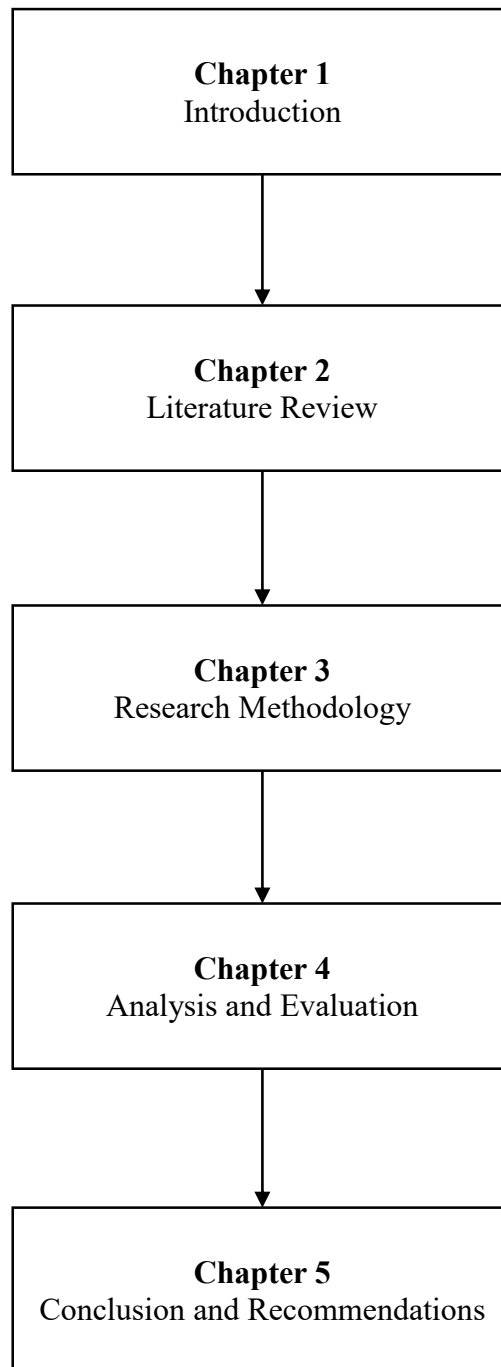


Figure 1.2: Organization of Thesis

Figure 1.2 shows that the main body of this thesis comprises of five chapters. The main part of the Introductory Chapter is to highlight the issues pertaining to the area which this study seeks to answer with support from empirical evidence provided in Chapter 4. This chapter also explain the rationale of conducting this study by justifying the need as well as importance of the study. Chapter 1 also defend the objective of the study besides discussing the limitation of this research. Chapter 2 provides an extensive review to previous literature related to the area of this study. Based on the purpose of this study, the second chapter review related theories and empirical evidence covering all the variables involved in this study which serves as the basis for formulating the conceptual framework. Furthermore, review of literature also add justice to the present as well as new knowledge besides supporting the formulation of research hypothesis of this study. The design of this study is explained in further detail, which can be found in Chapter 3. Chapter 3 also describe the research method involving data collection and data analysis in detail. The population and sample selected for the purpose of this study is also describe under this chapter. Chapter 4 analyses and interprets the results findings obtained from data collection. The last chapter, Chapter 5 concludes the findings of this study and highlighted several implications as well as recommendations for future researchers and practitioners in the area covered under the design of this study.

1.13 Summary

Chapter 1 discussed the background of this study in detail focusing on the development of Lean from the Malaysia perspective acknowledging that the current adoption has been very much influenced by Lean from the Western perspectives. Upon interpretation of relevant information, the introductory chapter of this report also identified several research problems

that are worth studying considering the call for extension of RBT through support from empirical evidences besides taking steps further, to study the sustainment of Lean rather than just implementation alone. Chapter 1 also justifies the purpose of this study in a formal way that solidifies the presentation of a serious argument for defending the significance of this study. Limitations of the study are also acknowledged by the researchers in Chapter 1.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Chapter 2 further discusses the foundation for the formulation of the research framework with more details by referring to previous empirical literature. This chapter also focuses on the fundamental ideas and understanding by previous scholars in this area of interest by reviewing their related studies and literature for further insights. Review of previous literature thus serves as the foundation to provide justification for the proposed hypothesis in order to meet the intention of this study. Moreover, the variables to be studied and its relationships are also reviewed in accordance with research findings published in recent years.

2.2 Basis for Formulating Conceptual Framework

The foundation underpinning the construction of the research framework in this study is based on the model proposed by Mohd-Zainal et al. (2011). The models proposed by the authors suggested the interrelationship between the Dimensions of Learning Organization, continuous improvement and problem-solving behaviour to explain the linkage between organizational learning and Lean sustainability. According to Mohd-Zainal et al. (2011) anything that “contributes toward continuous improvement plays a role in sustaining Lean” (p. 152). Apparently, several other studies (Ali et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005) found out that the learning enablers at the workplace also contribute towards continuous improvement under Lean setting.

Independent Variables

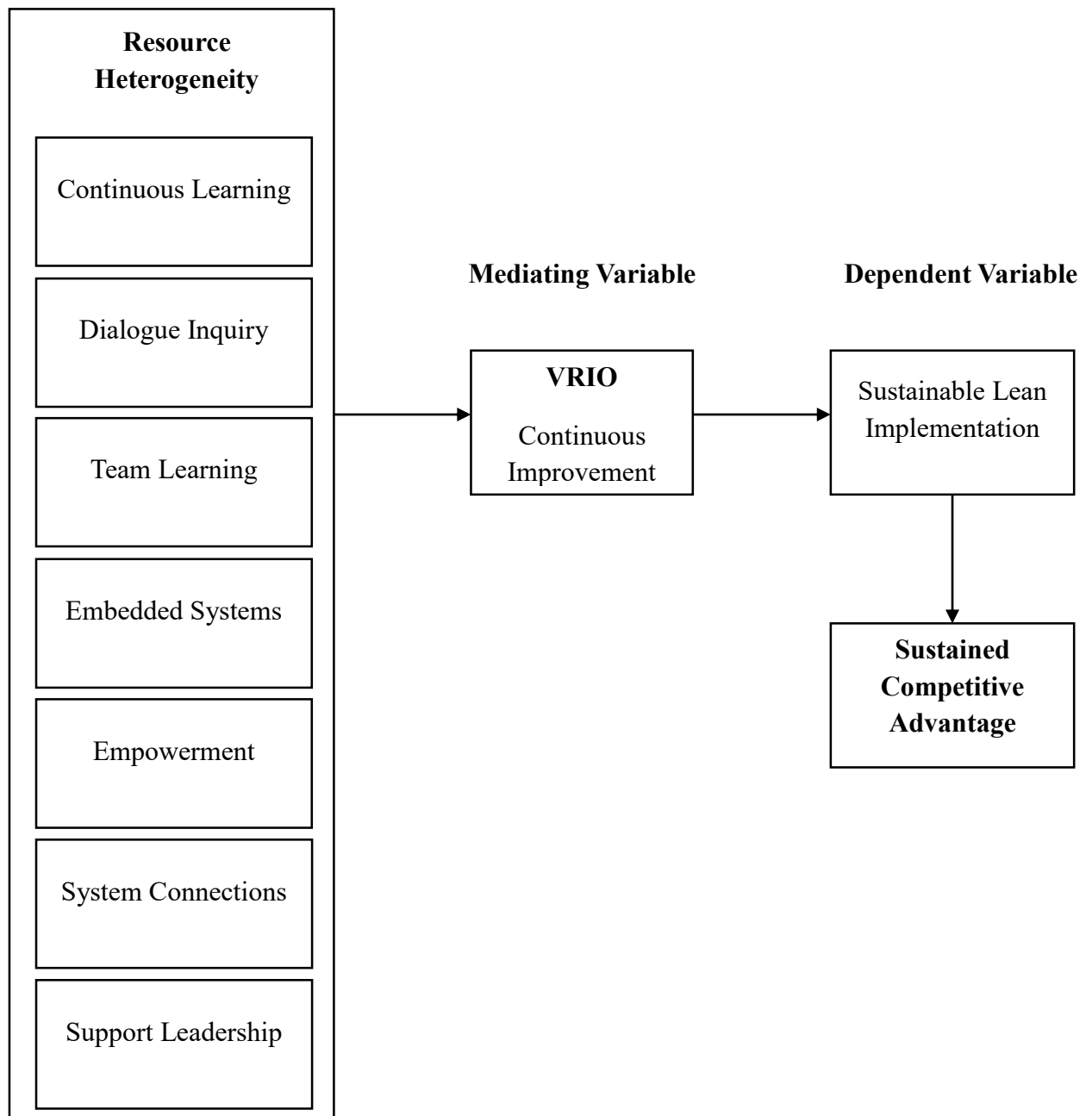


Figure 2.1: Relationship between Workplace Learning, Continuous Improvement and Sustainable Lean Implementation.

Source: Adapted from Mohd-Zainal et al. (2011); Barney and Clark (2007).

For the purpose of this study, the conceptual framework is focusing more on the solution developed by Marsick and Watkins (2003) to address the need for better measurement of learning in exploring the linkage between workplace learning and sustainable Lean implementation. Marsick and Watkins (2003) argued that “learning must be captured and embedded in ongoing systems and practices besides structures so that it can be shared and regularly used to intentionally improve changes in knowledge performance” (p. 133). The reliability of diagnostic tools Dimensions of The Learning Organization Questionnaire (DLOQ) developed by the authors is an established instrument. DLOQ have been adapted by over 200 companies as a measure for organizational progress in the development of learning practices and culture.

When the term “sustainability” was used with regard to Lean manufacturing, most authors (Longoni & Cagliano, 2015; Piercy & Rich, 2015; Averill, 2011) would look at it from the perspective of corporate social responsibility or ecological preservation of the “triple bottom line” coined by John Elkington (Crane & Matten, 2016; 2010). As from socio-technical perspective, “goal clarity, role clarity, participation and learning” are used to represent sustainability concepts (Lindskog et al., 2016). However, “sustainability of Lean” itself is considered under this study “both in terms of how to maintain momentum once initial pilots are complete and on how members of the organization actually develop their Lean implementation capabilities” (Jørgensen et al., 2007, p. 372).

2.2.1 Continuous Learning

One of the focus of this study is the continuous learning aspect of workplace learning. This is because sustainable learning culture is the gist of continuous improvement or “Kaizen”

and is important in sustaining Lean. In order to create learning opportunities in the workplace, it is essential to identify the learning needs and appropriate resources. Continuous learning is explained by Lohman (2006) as an “increased amounts of unencumbered time with discretion over how that time is used that would provide employees with greater opportunities for learning” (p. 153). Although time is an important source to support continuous learning initiatives, several others resources such as financial allocation also need to be made available in order to sustain learning activities over time. The investment to develop employees through learning is a must in order to “enable effective skills in achieving mission where workers are given opportunities and resources to learn, discuss their mistakes and see them as an opportunity to learn” (McHargue, 2003, p. 200). This is because, without continuous learning, continuous improvement or “Kaizen” effort will not be available to achieve the mission of effective Lean sustainment in an organization.

2.2.2 Dialogue Inquiry

Dialogue inquiry is another important aspect of workplace learning that is believed to have a significant impact on continuous improvement and sustainment of Lean. In order to embrace learning culture at work, open and honest feedback among collegial members in an organization is crucial for employees to accept criticism with an open-minded approach and provide them with the courage to admit mistakes. Effective communication is important to promote learning from experiences, both positive and negative, especially within the culture of continuous improvement, so that discussion on error and mistake will reduce the likelihood of employees repeating the same mistake in the future (Michna, 2009). It is one of the foundations to reach maturity in preventive maintenance and eventually enhance

productivity by avoiding corrective maintenance costs to a certain extent. In addition, the ideas for continuous improvement or “Kaizen” often arise from a basic discussion about a problem and further dialogue on the solutions. From McHargue (2003) point of view, encouragement provided is to enhance individual learning and to proceed with the development of systems to manage learning, as well as knowledge sharing at a later stage, is a reasonable method for human resource management and development. Without an effective communication system in place, the culture of knowledge sharing will not be established and these conditions often become a blockage to sustain Lean effort in an organization. The willingness in treating everyone’s idea with respect during problem-solving will establish a higher level of trust rather than blaming over mistakes when something went wrong at the workplace.

2.2.3 Team Learning

Team learning is an important facet under workplace learning that creates an opportunity which facilitates the diffusion of Lean Thinking from an individual level to a larger group of people. Teamwork is also the key concept in continuous improvement as “Kaizen in group work is a permanent approach that can improve team member’s morale as everybody masters the art of solving immediate problem” (Imai, 1986, p. 95). It is best being made available when the team places equality above all individual differences when teamwork is involved. Michna’s (2009) study best explains the condition to promote effective team learning by suggesting that collaboration is better developed when everyone in the team is treated with an equal level of respect regardless of their ranking in their job position. Michna (2009) further elaborated that learning culture ingrained within the team characteristics are

portrayed in the way the team responds to information sharing as well as the exchange of ideas and it is better built when the team treats each other with dignity which allows the feeling of mutual confidence towards each other's strengths.

2.2.4 Embedded Systems

Today's workplace environment requires effective communication systems as one of the dimensions that are vital to the success of workplace learning interventions. "Enterprise should have and use constantly updated databases to maintain their knowledge and experience" (Michna, 2009, p. 363). In order to complete the learning cycle, the information system is very important in talent management as it is a mechanism that enables the circulation of information through knowledge sharing and reduces brain drain lost effect. To support that embedded systems establish a strong connection with continuous improvement under Lean environment is an important insight synthesized from Hernandez (2003) research findings which reported that embedded systems is another variable besides empowerment, to show a strong correlation with the internal transfer of tacit knowledge. Hernandez's (2003) findings suggested that information technology has been deployed as storage to keep all the information that is produced through a series of learning activities and provides access to others within the organization which facilitates information sharing. Therefore, the effectiveness of embedded systems within Lean organization will also affect continuous improvement cycle as it is the fundamental channel to check, monitor and follow up on progress and outcomes of improvement projects. A well-maintained information system will also enable employees to obtain reliable and up-to-date quality information for analysis. A proper evaluation will assist employees in problem identification and carry out systematic

impact studies prior to decision making. Visual management which is closely linked to performance management is also a successful example of embedded systems that support continuous improvement or “Kaizen” (Eaidgah et al., 2016). McHargue (2003) also recommended investment in technology which needs to be taken into serious consideration due to the reason that developing well-maintained embedded systems will facilitate the availability of access to quality information which is needed for the prediction of financial and knowledge performance within an organization.

2.2.5 Empowerment

In order to sustain Lean at the workplace, empowerment is needed to kick-start the next learning cycle in order to generate continuous improvement ideas and activities. Without empowerment, learners might lack the stimulus to apply their knowledge gained from previous learning or continuous improvement (Kaizen) activities into current situation as human nature tends to avoid the blaming consequence on their error and mistakes. Hines et al. (2004) also believed that “the human dimensions of motivation, empowerment and respect for people are the key to the long-term sustainability of any Lean program, regardless of the industry sector” (p. 1000). Michna (2009) too, supported this thought by claiming that empowerment is a strong predictor for sales and employment growth apart from other dimensions such as feedback, respect and a trusting relationship among the employees. The researcher believed that the management should have a higher tolerance towards risk acceptance and encourage experimentation in the workplace. This is a noteworthy finding as the management plays important role in sustaining Lean by encouraging, granting recognition and delegating authority to the employees so that they are not constrained by

limited freedom of choices to pursue innovation and idea generation in improving their everyday work. Besides, empowerment in the form of providing the employees with a higher level of control of resources will also assist their initiatives in the course of accomplishing their improvement projects.

2.2.6 System Connections

System connections are another component in workplace learning that is believed to have significant impacts on Lean Thinking by establishing a productive environment for continuous improvement at the workplace. Yang, Watkins and Marsick (2004) claimed that system connections seemed to be more significant than embedded systems when it comes to predicting the organizational outcome. The authors further explained that the reason is due to the consideration on today's dynamic business environment. There is a perceived importance that urges the organization to be proactive in responding towards the changes within the market environment, over the creation of systems as storage to keep and share learning information (Yang, Watkins & Marsick, 2004, p. 50). It is believed that learner's environment often offers inspiration for employees to think holistically. Infusion of information from the learner's environment will enrich learner's current state of knowledge by helping them to gain deeper acuity and think out of the box when considering alternatives to solve problems. McHargue (2003) shared his thought on the importance of learning from the external environment by stating that the process will develop employee's capabilities and skills "to better respond to clients, easily implement suggestions and increase their skills" (p. 200). Therefore, the author also proposed that organizations should encourage a various form of collaboration, not only within the firm but, must be extended to include other

external stakeholders and society at large (McHargue, 2003). Active collaboration across the supply chain is also encouraged in Lean implementation. Such exertion is expected to benefit both the individual learners as well as organization by creating an environment that supports critical thinking among the workforce which eventually contributes useful improvement ideas back to the company to refine the current processes.

2.2.7 Support Leadership

Lohman (2006) proposed that the consideration on organizational culture, strategy, rules and measures is important for the development of instrument when assessing the workplace environment. Support from leaders is of utmost importance at the organizational level as it permits transfer of information across the value chain, provides empowerment as well as opportunities for learning, besides monitoring the progress of continuous improvement or “Kaizen” projects. Habidin and Yusof (2013) pointed out that effective leadership supports employee’s involvement and commitment towards continuous improvement initiatives, besides encouraging effective dialogue inquiry and cooperation to ensure better information sharing that lead to effective strategy roll-out. This is because leaders play important roles as motivator and enablers to acknowledge, encourage, recognize and embrace the philosophy of lifelong learning at the workplace. In addition, “leaders and other key people, who learn from their experience, influence the learning of others and create an environment of expectations that shapes and support desired results which in turn get measured and rewarded, are needed to build a learning climate and culture” (Marsick & Watkins, 2003, p. 134). Therefore, leader’s influence and support to promote a learning culture in creating the mindset of continuous improvement at the workplace are evidenced in their ability to provide

a clear sense of direction which is consistent with Lean principles. McHargue (2003) also provides important insights on leader's role by stating that "learning process does not need to be expensive and can be performed with little cost" but leader's support especially in terms of the time spent is of the utmost importance in this course of action (p. 203). Leaders play a significant role in terms of providing support in enhancing employee's learning capabilities. Support from leaders is a source that guides employees towards the firm-specific directions throughout their learning process to achieve sustained competitive advantage.

2.2.8 Continuous Improvement

Continuous improvement or "Kaizen" is an important concept as the foundation for formulating the research framework of this study. This is because continuous improvement is closely associated and highly cited in both workplace learning as well as Lean implementations literature. Since, "continuous improvement is normally associated with problem solving", Mohd-Zainal et al. (2011) believed that "if there is systematic problem solving in place, there is a possibility that for every problem solved, more learning can be generated, which in turn can create more opportunities for continuous improvement in future" (p. 153). As a result, continuous improvement serves as a purpose for meaningful learning which is firm-specific while on the other hand, reduces waste and boosts productivity by ensuring quality at source. The outcome of continuous improvement serves as an assurance in meeting customer's expectation and sustain competitive advantage of an organization.

2.2.9 Sustainment of Lean Implementation

Lean success stories (Kumar et al., 2018; Prashar, 2014; Raghavan et al., 2014; Arya & Jain, 2013; Fraser, 1995; Wittenberg, 1994; Womack et al. 1990) have influence not only the world of automotive but as well are accepted by other types of manufacturing industry and even adopted by certain services industry such as education (Isaksson, Garvare, Johnson, Kuttainen & Pareigis, 2015; Waterbury, 2015; Jørgensen et al., 2007; Comm & Mathaisel, 2005b; Martin, 1993) and healthcare (Wilson, Jayamaha & Frater, 2018; Stelson, Hille, Eseonu & Doolen, 2017; Aij & Teunissen, 2017; Lindskog et al., 2016; Lam et al, 2015; Curatolo, Lamouri, Huet & Rieutord 2014; Burgess & Radnor, 2013). “Lean practice for improved sustainability is the use of excess capabilities or core strengths to generate new sources of revenue, including the use of excess physical plant phase, services, network bandwidth and professional expertise” (Comm & Mathaisel, 2005b). In terms of human resource practices, “the foundation of Lean brings to light the gifts and talents of each person to the extent that people would be more focused, interested and able to achieve goals as Lean principles focus on people’s abilities with customers, improvements, involvement, processes, problem solving, measurements and leadership” (Jekiel, 2011, pp. 7-8).

The implementation of Lean often brings positive impacts and high growth in a company’s productivity during the initial phase as it significantly eliminates waste thus improve business performance when the costs reduced and value created. Lewis (2000) case study found out that the outcome of Lean production has a significant impact on business performance. The author further explained that cost reduction as a result of Lean manufacturing is expected to improve the productivity of an organization, which eventually boosted the firm’s financial performance (Lewis, 2000). However, over emphasis on cost reduction especially through budget cut in the area of investment for the development of

human resources are foreseeable to cause adverse impact across time. Therefore, this study took a step further to understand the factors which could lead to the sustenance of positive Lean outcome. Lean sustainment might be difficult especially with traditional companies' practices which cause the people within the organization to develop high resistance towards changes (Bakar et al., 2017; Zahraee, 2016; Manzouri, Rahman & Saibani, 2013; Sahwan et al., 2012; Papadopoulos, 2011). The problems of Lean sustainability are becoming a global concern by Lean companies (Zahraee, 2016; Glover et al., 2013; Zubir, Habidin, Conding, Jaya & Hashim, 2012). Noticing the strong positive implication of Lean in today's businesses together with the challenges in sustaining the Lean aspect of continuous improvement, this study finds it worthwhile to explore the dimensions that affect Lean sustainability from the perspective of workplace learning.

2.3 Concepts and Models

2.3.1 Models for Human Resource Development (HRD) Practice

Both Adult Education and Human Resource Development (HRD) overlap in a sense that both fields "address questions related to the practice of helping adults learn" (Watkins & Marsick, 2013, p. 42). The focus of HRD is shifting from the humanistic purposes of adult education to pay more attention to the more practical aspect of economic interest and organizational performances (Watkins & Marsick, 2013). Since this study is focusing more on humanistic aspect of Lean instead of perceiving Lean as an instrumental or mechanistic tool that is stringent on merely its economic roots, this study also focusses on the principle of adult learning. Furthermore, "adult learning occurs wherever and whenever adults learn, irrespective of the source, and, thus, obviously must include workplace learning" (Watkins

& Marsick, 2013, p. 45). Adult learning is one of the technical competencies presented in McLagan's (1989a) Models for HRD Practice. American Society for Training Directors (ASTD) has played a "significant role in defining the field of human resource development, particularly through competency studies" (Watkins & Marsick, 2013, p. 46). According to McLagan (1989b), HRD is defined as "the integrated use of training and development, organizational development, and career development to improve individual, group, and organizational effectiveness" (p. 6). The aims of human resource studies are to achieve improvement in the area of "productivity, quality, innovation, HR fulfilment and readiness for change" which is consistent with the focus of this study (McLagan, 1989b, p. 6). McLagan's (1989a) Models for HRD Practice recognized that the development of workforce will drive the changing needs of an organization by generating and acting on ideas for continuous improvement oriented towards a more customer focused approach. This point of view is supported from the perspective of Lean Thinking to create value for the customers through waste elimination. System approach and information technology will become more important for the changing organization (McLagan, 1989a; McLagan & Suhadolnik, 1989). This study proposed the same concept to be proven empirically that embedded systems will sustain Lean implementation. Active interaction between the organization and its environment such as through partnership or active collaboration across the supply chain, covered under the dimensions of system connections, are also perceived by McLagan (1989a) to be one of the driving forces for workplace development in the contemporary business setting. Increased participation from the workforce that places a higher expectation on meaningful work is also believed to be building on the changing organization (McLagan, 1989a; McLagan & Suhadolnik, 1989). This situation motivated the current study to identify the relationship between employee empowerment and the sustainability of Lean

implementation. From an ethical point of view, McLagan (1989a) maintained that “high-quality HRD work is ethical work” (p. 58). However, HRD evolution has moved beyond training and development and paid more attention to sharing other functions with its sister field, Human Resource Management (HRM) (Watkins & Marsick, 2013). However, as observed in the Human Resource Wheel (McLagan, 1989a; 1989b; McLagan & Suhadolnik, 1989), although the author recognized that development is important in other areas covered under Human Resource Management (HRM) studies, it is not the main direction for HRD. HRM has been subjected to critique in the field of Business Ethics. The name human “resource” itself contradicts Kant’s Theory of Ethics “so act as to treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as means only” (Kant, trans. 1949, p. 46). “HRM, however, does exactly treat humans as an important resource, and in most cases the most costly resource as well” so as when to view “human resource” from economic point of view, “are nothing more than a resource, next to and often competing with other resources” such as replacing human with technology or seek for cheaper human resource from developing countries (Crane & Matten, 2016, p. 258). As an example, Sisson (1994) pointed out that there is an ethical gap between “the rhetoric HRM policies” and the “reality” in HRM. Table 2.1 shows some examples of such ethical gap.

Table 2.1: Rhetoric Policies and Reality in HRM Practice

Rhetoric Policies	Reality in HRM Practice
Total quality management	Doing more with less
Lean production	Mean production
Flexibility	Management ‘can do’ what it wants
Empowerment	Making someone else take the risk and responsibility
Training and development	Manipulation
Teamworking	Reducing the individual’s discretion

Source: Crane & Matten, 2016; 2010; Legge, 1998; 1995; Sisson, 1994

The same evidence has been observed by Aminuddin (2014) who claimed that employers need a flexible workforce as a result of efforts to develop Lean organization. For instance, due to the changes in the business environment, “employers want to be able to hire workers on short-term contracts” which enable them “to dismiss workers as and when required without paying them any retrenchment benefits” (Aminuddin, 2014, p. 9). Besides, due to globalization, employers seek to outsource work to developing countries for cost reduction which caused labour related problems such as exploitation of workers through poor working conditions (Crane & Matten, 2016; Aminuddin, 2014). Other than looking for “workers whose service can be terminated easily” and “whose terms and conditions of service can be readily changed” such as in terms of employee compensation which can be flexibly altered according to the company’s financial position, employers are also looking for employees that are able to multi-task and without any issues (Aminuddin, 2014, p. 9). These situations have proven that misunderstanding of Lean concept is happening in the real working conditions. Therefore, this study acknowledged that there is a need to rectify all these misconceptions towards the real meaning behind Lean implementation.

The original Lean principles are consistent with Kantian ethics which emphasized that employees need to be treated with respect (Womack et al., 1990; Monden, 2012; Averill, 2011; Hines et al., 2004). According to McLagan (1989a), HRD is “moving into an era of systems solutions where the concern is to resolve issues or make real changes, not just implement the program” (p. 51). The current study agreed that human resource practitioners should emphasize more on sustaining positive changes and continuously improve the individual employees to solve problems that block organizational growth and development, where the part of continuous improvement and sustainment of Lean implementation are seemingly the best answer at this point of time. However, management and leaders should

not just adopt any continuous improvement or “Kaizen” program merely for economic purpose, implement the program and leave it to run on its’ own while relinquish the humanistic aspect of Lean. Consistent support from leaders is crucial in ensuring that sustained competitive advantage is achievable from such implementation.

2.3.2 Workplace Learning

Workplace according to Marsick and Watkins (2003) involves the psychological contracts among organizational members and the perceived needs of every employee in learning to execute business functions at all level. The workplace condition is experiencing a massive paradigm shift. Workplace learning extends the importance of knowledge acquisition process from the adult level in meeting the life-long learning needs to fulfil the demand at the higher organizational level for the development of human capital. “Despite strong contributions provided by workplaces, individuals’ participation in and learning from workplace experiences are not wholly situation determined because individuals’ agency also influences how they elect to participate in work activities as well as interpret and respond to the affordances of the workplace” (Billet, 2002, p. 38). One of the core competencies needed by an organization to effectively and efficiently gain control over limited resources and capabilities is through their productive human capital to leverage the capabilities of attaining sustainable competitive advantage. Productive human assets increased the likelihood of securing superior return attainable from major capital investment. Therefore, in order to maximize long-term productivity through the application of sustainable Lean interventions, organizations need to provide a higher level of support in workplace learning in order to

enhance employee's contribution in continuous improvement or "Kaizen" activities in the long run.

According to Billet (2002), workplace learning exists through structured and unstructured learning activities at work which enhance the development of new competencies needed for effective work practices. Training and other formal learning activities that are planned are some examples of structured learning which is designed for the purpose of equipping the employees with necessary competencies to accomplish their job assignment in the most productive manner. Training is, therefore, defined by Noe (2017) as "a planned effort by a company to facilitate learning of job-related competencies, knowledge, skills, and behaviors by employees" (p. 8). In contrast, unstructured learning requires more willingness from the learners to participate and leader's involvement in freeing the resources to support the learning process. Unstructured learning often involves voluntary effort from the individual employees to seize more learning opportunities with the support from their immediate superior in identifying area needed for further advancement and to leverage their current potential. The presence of unstructured workplace learning is often evidenced in a working environment which workload is arranged for the purpose of encouraging and facilitating employee's learning. Such an environment is characterized by a working arrangement which seeks to lessen the interruption that potentially hinders informal or incidental learning process to take place among employees at work. Work arrangement that enables employees to pursue their own learning is expected to results in a positive effect especially in employee's transfer of learning through the application of the knowledge gained into their actual work assignment.

2.3.3 The Learning Disciplines

Senge (1990) is acquainted with his work, “The Fifth Discipline” as “the art and practice of the learning organization” (p. ii). The author established five disciplines that serve as the foundation of learning organization, namely “systems thinking”, “mental models”, “personal mastery”, “shared vision” and “team learning” (Senge et al., 1994; Senge, 1990). The five learning discipline can be categorized into three different levels. The first level is the “practices”. It is believed that at this level, practitioners pay attention to learning by focusing on their time and energy. The second level is the underlying “principles”. This level involves the understanding and use of theories. The third level is the “essences” or the “state of being”. In order to achieve the third level, the individual learner must be aware of their learning purpose in order to achieve a sense of satisfaction from their learning.

Senge (1990) introduced systems thinking as the fifth discipline in the art and practice of learning organization. Systems thinking enables employees to think in complex conditions with the presence of system connections as the structure of interaction within the learning environment itself, which influences the learner’s behaviour. System thinking can be strengthened by having embedded systems in place to support wider coverage and access to information. This is because exposure to a matured system that enables retention of quality information will provide more flexibility in information acquisition and facilitation of knowledge sharing that will encourage “interconnectedness” which encourages the employees to think from a wider perspective during problem-solving processes. The aim of establishing systems thinking is to facilitate a workplace learning culture which requires learners to generate their ideas by considering other’s view and by evaluating the consequences of certain actions during the decision-making process. It is worth mentioning that no blaming culture should be practised together with this learning discipline.

Mental models are the processing of input obtained through learning from experience. Before further elaboration on this principle is to be carried out, it is important to note that there is a chance in the learning process where mental models could “systematically flawed because it misses the critical feedback relationship, misjudge time delays and often focus on variables that are visible” (Senge, 1990, p. 203). The formulation of imagery in learner’s mind can be fostered through reasoning. Effective dialogue inquiry can help learners to better relate and reflect on their previous actions and knowledge, thus, generating new and better ideas for continuous improvement. Respect and trust are important when sharing information. Evaluating and analysing the situation to construct effective mental models and avoid misjudging a solution to a specific problem is of equal importance. Respect for people is the basic foundation in Lean Thinking that will encourage active participation among employees to sustain Lean efforts. The “personal vision” or the state of “awareness of being part of rather than apart from the world” is known as a personal mastery (Senge, 1990, p. 375). It is the willpower of learners to develop and expand their own potential in achieving the desired results once they are aware of their potential. Hence, the role that they play as part of the contributor is important for the success in the systems they are operating with. The absence of opportunity for continuous learning is seen as a potential barrier for an employee to pursue their learning needs and negatively affect their commitment towards organizational success in the workplace.

“The discipline of building a shared vision and team learning differ from the other three in that they are inherently collective in nature” (Senge, 1990, p. 375). Development of shared visions required the influence of leaders and delegation of power from top management to encourage sharing of the ultimate vision through enrolment, commitment and compliance. The shared visions will later serve as a powerful tool in the establishment of guiding

practices, principles, standards and procedures which the entity seeks to achieve. Leaders need to listen besides guiding their subordinates to mutually achieve the common direction and purpose. Supportive leadership is important to encourage employees in committing to achieve alignment of vision across different organizational levels and work groups to pursue one direction. As mentioned by Senge (1990), team learning also means “functioning as a whole” (p. 375). In order to promote learning within a team, the effective communication system must be made available by “encouraging team members to raise the most difficult, subtle and conflictual issues essential to the team’s work” (Senge, 1990, p. 260). The main focus in team learning is to treat everyone with fairness regardless of any difference be it in terms of positional ranking or cultural background.

2.3.4 The Learning Process

Boud and Griffin (1987) proposed a sequence of the learning process which concentrated on self-directed learning. The sequence begins with describing a learner as an individual who initiates the learning process due to exposure towards a new outlook or application on a “much less emotional intensity while undergoing preconceived involvement with others”. These potential triggers challenged the state of “equilibrium” prior to entering the first phase of “disconfirmation” (p. 190). This is a phase where major inconsistency exists between the learner’s expectation and the actual situation experienced by the learner. Thus, creating a sufficient level of confusion within the subject’s mind to take further action. Due to such curiosity, learners begin to actively seek for an answer through dialogue inquiry to understand the complexity of such situation.

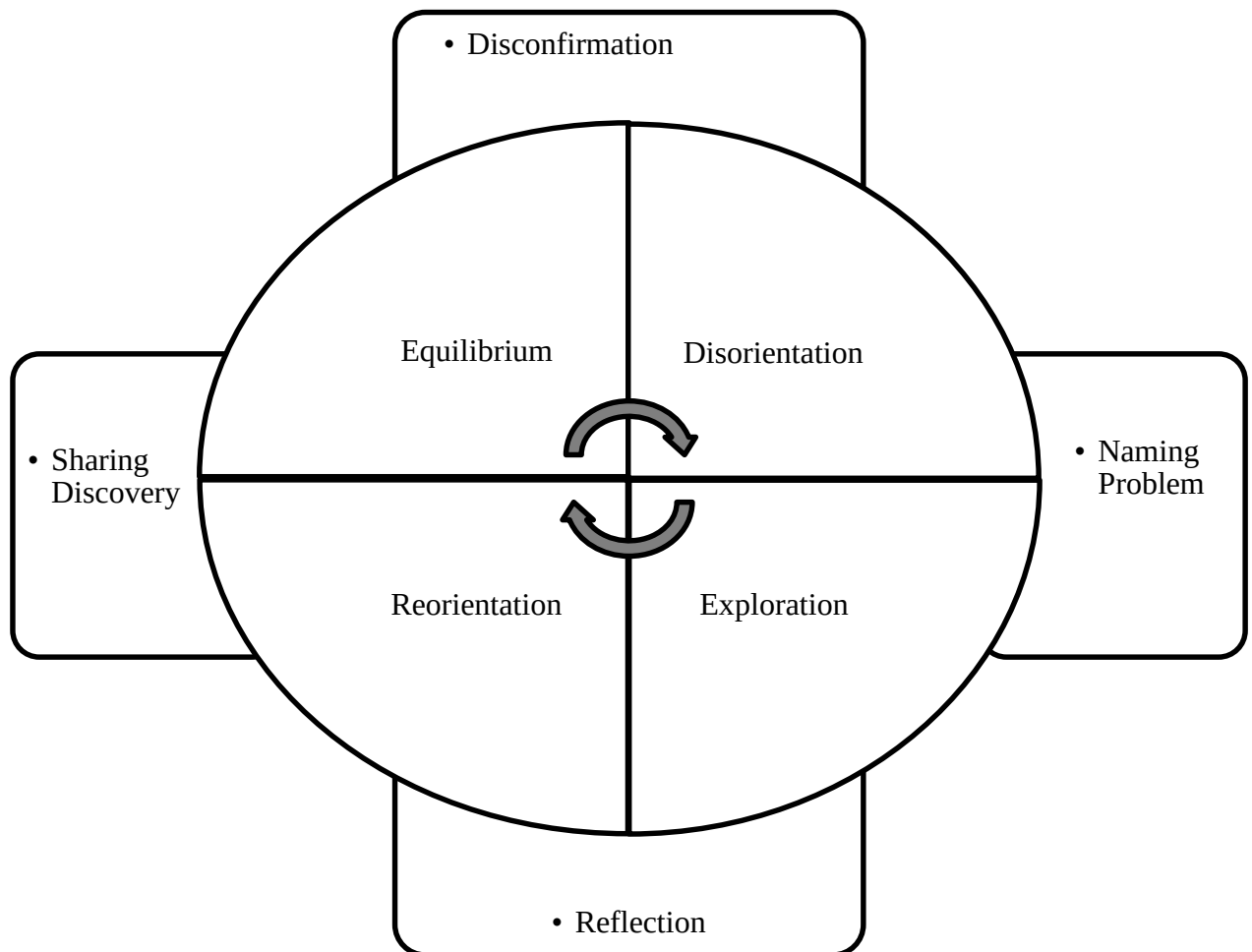


Figure 2.2: Learning Process Sequence

Source: Adapted from Boud and Griffins (1987)

Learners enter into the “disorientation” phase upon the attempt to communicate their available information with others in order to search for confirmation and verification. During disorientation, “the learner’s experience diverges from his or her existing assumptions, expectations and preconceptions” (pp. 184-185). It is normal for learners to struggle with confusion during this stage as such a condition will trigger the learner to think critically in order to relate and make sense out of the new information and their challenged assumptions. “Naming the problem” is the next transitional phase upon disorientation (p. 186). Learners begin to identify the problems that have caused them to experience confusion through reasoning. During this transitional phase, the learner will highlight the problems through their own assessment before entering the next stage of learning known as “exploration” (p. 186). In order to fulfil the learning needs, learners will find ways to discover more about their unresolved issues.

Upon information gathering, learners will review their new knowledge and previous mental models leading to private “reflection” to attain deeper insights on other’s perception before making assumption or interpretation based on their current interest (p. 187). Successful reflection will then lead the learners to the next stage of “reorientation”. Learners experiencing reorientation will start to make sense out of their learning process. Those who reach this phase of learning will “experience the major insight by enacting their agency as learners” (p. 189). Prior to settling into equilibrium as a phase that marks the beginning of the self-directed learning process, adult learners will experience the last transitional phase which is accomplished by “sharing the discovery”. Learners confirm their new knowledge by “testing out the new understanding with others” and to confirm their new beliefs and theoretical stance (p.183) through verification and agreement by others.

2.3.5 Informal and Incidental Learning Model

The learning theory by Marsick and Watkins was updated based on the research extended by Cseh et al. (1999, cited in Marsick & Watkins, 2001) which further explained the process involved in learning, to understand the basis of knowledge. The model showed that a learner begins his or her learning process with the presence of environmental or situational “triggers”. This is the phase that arouses the learner’s interest on a particular issue. Most of the time, the environmental stimulus that could trigger the learning orientation are those that challenged the learner’s initial beliefs. The learners then perform an assessment on the triggers in the next phase by “interpreting the experience”. Interpretation or situational assessment is carried out to enrich the learner’s current state of knowledge to better understand the phenomena. Learners begin to reflect on their experiences and painting vivid mental imagery to understand the situation. The authors pinpoint a noteworthy consideration to reflect on when interpreting the experience. Marsick and Watkins (2001) emphasized that “interpreting the context is a greater challenge when social norms and expectations are in a state of flux or when the person himself or herself is learning something new” (p. 30).

Successful interpretation of the experience will result in several alternatives for the learners. Effective understanding of the situation will lead the learner to different possibilities and these available options indicate to the learners that they have to make choices. The process of settling with alternatives require the learners to “examine alternative solutions” before anticipating to the appropriate “learning strategies”. In most instances, a learner who is facing a problem that needs answers will figure out alternatives of solutions to be considered. Learning strategies are deployed at the later stage for knowledge acquisition through a series of processes involving information gathering and interpretation. Learners apply different learning strategies to identify a set of criteria needed to evaluate each alternative.

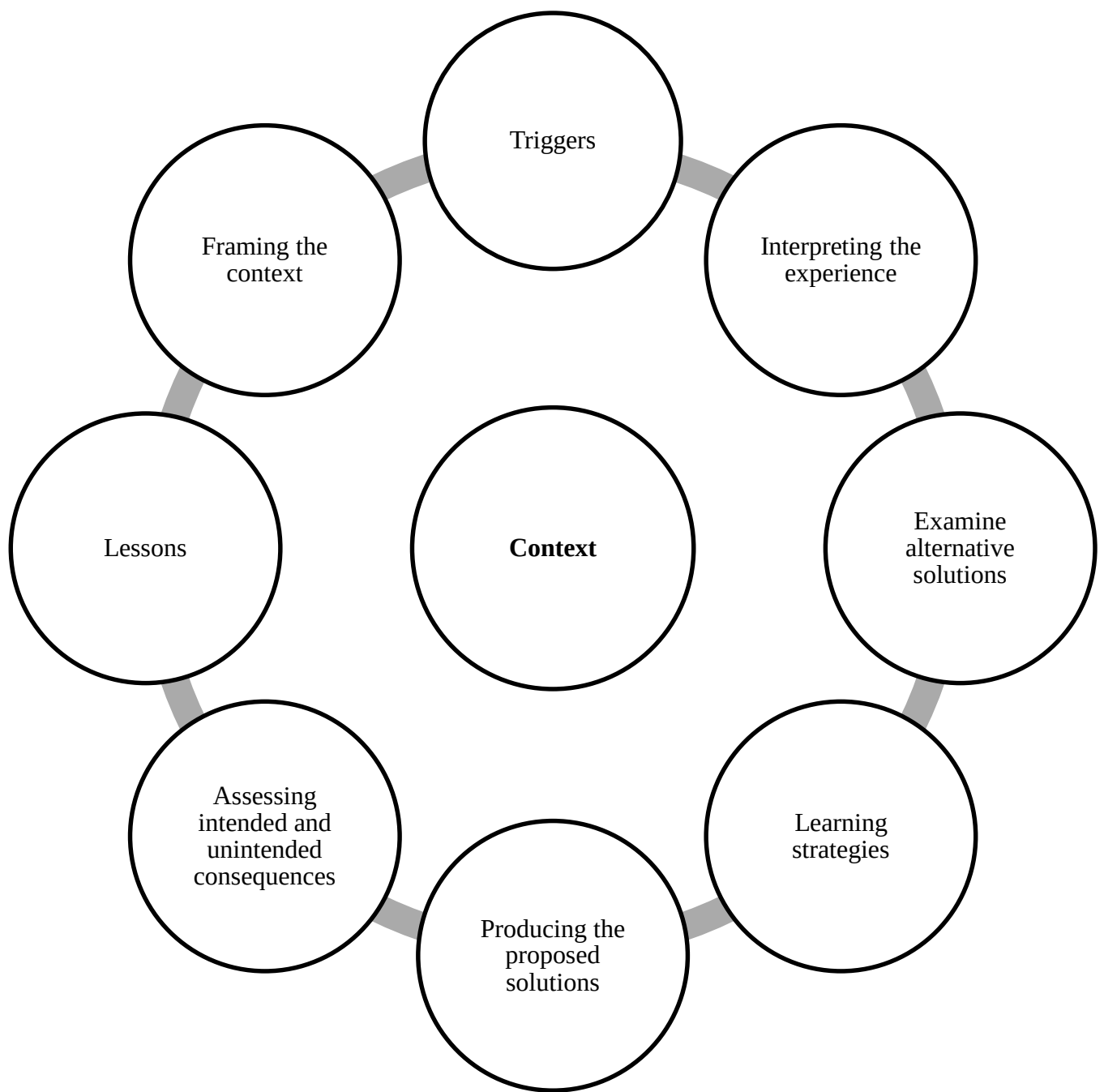


Figure 2.3: Marsick and Watkins' Informal and Incidental Learning Model as Adapted with Cseh

Source: Adapted from Marsick and Watkins (2001)

Upon identification, learners examined the alternatives against the established standards. The learner will then be “producing the proposed solutions”. Successful implementation of the desired solution is highly associated with the effectiveness and quality of the learning strategies such as “resources availability, willingness and motivation to learn and the emotional capacity to take on new capabilities in the middle of stressful challenge” (p. 30). Upon acting on the solutions, learners will learn about the outcome from the implementation of their proposed solutions. Forecasting of the learning outcome by “assessing intended and unintended consequences” will heighten the learner’s readiness in facing upcoming challenges. By confirming the learning objectives, learners will then be able to depict the “lessons” learned. “These concluding thoughts are the new understandings or framing of context that the learners will bring when encountering a new situation which brings back full circle to the beginning of the cycle” (Marsick & Watkins, 2001, p. 30).

2.3.6 Shewhart Model of Plan-Do-Check-Act (PDCA) a.k.a. the Deming Cycle

The “Plan-Do-Check-Act (PDCA) Cycle” is one of the important planning tools used in Lean organizations for continuous improvement or “Kaizen” projects (Eaidgah et al., 2016; Imai, 1986). The original idea was proposed by Shewhart (1986) before Deming “called it in Japan in 1950 which went into immediate use upon introduction under the name of the Deming Cycle” (Deming, 1982, p. 88). The intention of the model is to facilitate immediate “action in accomplishing the transformation” where “every activity, every job is considered as a part of a process” which can be divided into stages when illustrated in the flow diagram (Deming, 1982, p. 87).

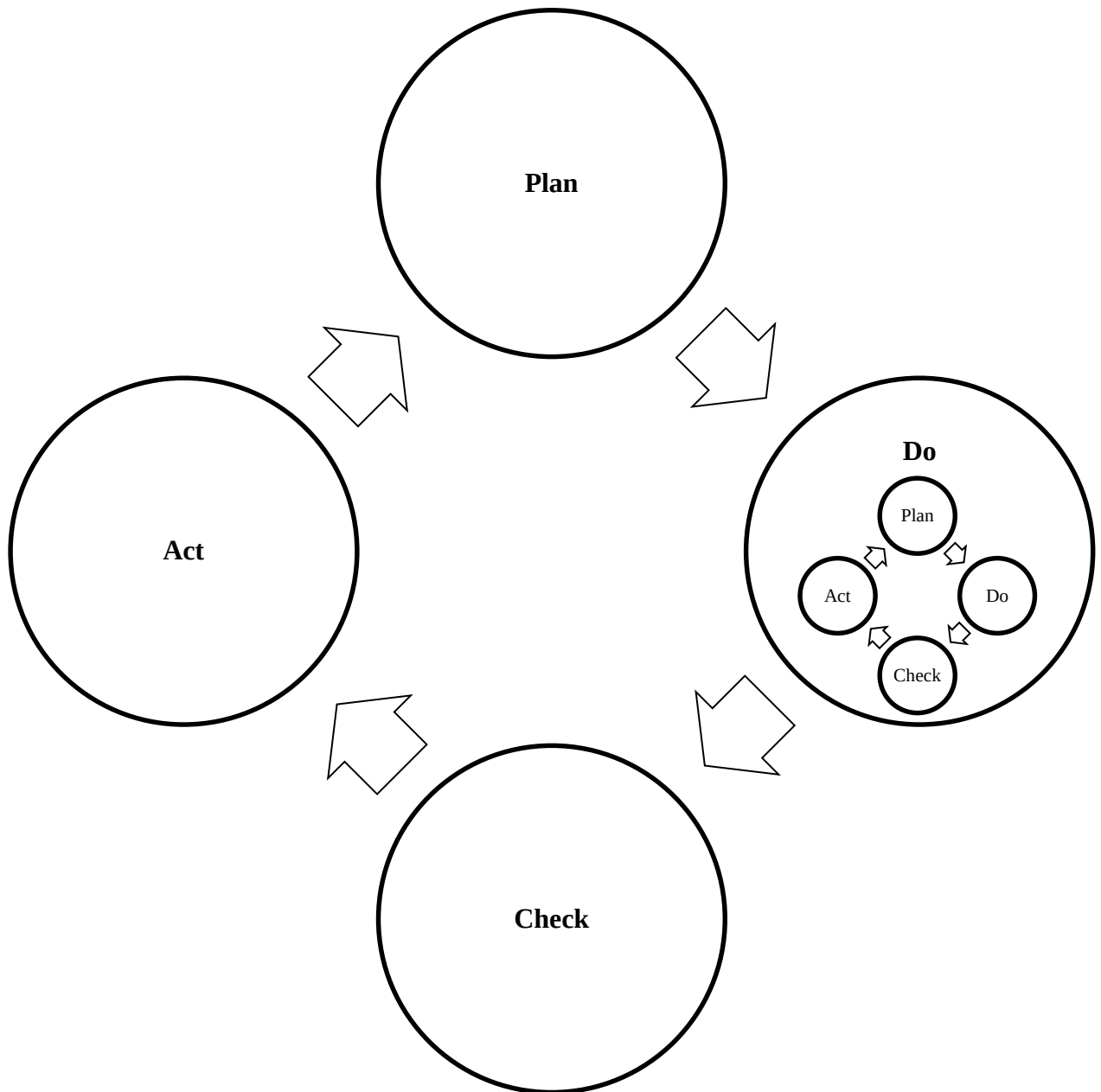


Figure 2.4: Revised PDCA Cycle

Source: Adapted from Imai (1986)

The cycle represents continuous improvement of methods and procedures with each stage of work are interconnected as a flow targeted at ensuring user's satisfaction during the following stage (Deming, 1982). The first step in the PDCA cycle is "plan". Deming (1982) believed that planning needs forecasting. Therefore, during the planning phase, information is accumulated at which the objectives need to be set, identification of desirable changes is a must and data collection method should be determined accordingly for the purpose of generating improvement plan. The next step is "do". The second step will involve execution of pilot study or carry out changes that are finalized during the planning phase. The following step is to "check" by "observing the effect of change or test" before moving on to the last step which is "act" (Deming, 1982, p. 88). The final step will lead to "improvement of any stage and to better satisfy the customer for that stage" (Deming, 1982, pp. 88-89). Deming (1982) also elaborated that "any step in Shewhart cycle may need the guidance of statistical methodology for the economy, speed and protection from faulty conclusions from failure to test and measure the effect of interactions" (p. 89). Upon adaptation, Japanese executive recast the Deming wheel and called it the PDCA wheel, to be applied in all phases and situation (Imai, 1986, p. 60). The author argued that the PDCA cycle should be "a series of activities pursued for improvement" and criticized the Western situation that takes a quick solution of firing workers or managers as the author called it a PDCF cycle where "F" represents "fight" and "fire" (Imai, 1986, pp. 60-62). This is an important argument as continuous improvement or "Kaizen" initiatives are supposed to be more humanistic in its' original purpose to create value instead of treating it as a mechanistic tool merely for the purpose of cost reduction. Imai (1986) introduced the revised version of PDCA cycle with a more comprehensive elaboration on each step. The author suggested that statistical tools such as the seven quality control tools should be used during the planning stage. In the

permanent approach, Imai (1986) claimed that the “members of group-oriented Kaizen will go through the problem-solving and decision-making processes which serve as a reason the PDCA cycle is said to have its own PDCA cycle at the do stage” (pp. 94-95). Work to perfection to ensure quality at source by eliminating defects during the implementation stage is crucial to avoid any shortcoming from reaching the final production stage. Following the implementation stage is “check” for “desired improvement” and “action” which represents the prevention on the recurrence of the error or problem solved while at the same time “institutionalizing the improvement as a new practice to improve upon” through “standardization to ensure the new methods introduced will be practised continuously for sustained improvement” (pp. 61-62). By setting the new method as a standardized work instruction, it is expected that the process will be stabilized with reduced variations. The author further clarified that the “Japan’s PDCA practitioners view standards as the place to start for doing a better job the next time instead of treating it as a fixed goal” which derived at the concept of continuous improvement (p. 63).

2.3.7 Toyota Production System

Lean production was known as “Toyota Production System” (TPS) at the beginning of its introduction by Eiji Toyoda and Taiichi Ohno in Tokyo (Womack et al., 1990, p. 49). “Toyota has been moving through the Lean journey for 50 years and some of their lessons were learnt over 100 years ago” (Bhasin, 2013, p. 136). Since then, “Toyota had fully worked out the principles of Lean production by the early 1960s” (Womack et al., 1990, p. 68). The development of “Toyota Production System” is intended to “eliminate various kinds of wastes lying concealed within a company through improvement activities” (Monden, 2012,

p. 3). TPS followed Taylor's (1911) Principles of Scientific Management and Ford's (1913) Mass Production (Monden, 2012). TPS is a system that not only emphasized profits through cost reduction, waste elimination, Just-in-Time (JIT) and Autonomation, but the framework also stressed on quantity control, quality assurance, respect for humanity, flexible workforce as well as originality and ingenuity in its goal establishment (Monden, 2012; Jadhav et al., 2014a). Monden (2012) further elaborated on the TPS that every worker's ideas for improvement encouraged through the suggestion system allowed for improvements through "standard operations routine to changes in takt time, preventing recurrence of defective works and machines besides allowing each worker to participate in the production process" (p. 17). TPS also aims at nurturing continuous improvement or "Kaizen" mindset among the employees to develop their problem-solving abilities. In order to develop a culture of continuous improvement among the employees "a leader should become charismatic people on whom others can rely" (Monden, 2012, p. 400). In addition, TPS also respect humanity through several ways such as job enrichment, promoting open communication in the workplace, empowerment and ergonomics investments such as "incorporating worker-compatible machines, improving working conditions and work strain avoidance" (Monden, 2012, pp. 436-437).

2.3.8 Lean Thinking

Lean production at first was called Toyota Production System (TPS) where it is the combination of both the benefits of craft production and mass production (Womack et al., 1990). Womack et al. (1990) in their publication "The Machine That Changed the World" explained the origins of Lean by introducing the International Motor Vehicle Program

(IMPV) researcher, John Krafcik, who coined the term “Lean” because it “requires less use of resources compared to mass production while at the same time keeps far less inventory, results in fewer defects and produces greater and ever-growing variety of products” (p. 13). Although Lean Thinking focuses on waste elimination to create value for the customer, it is also viewed as “human fulfilling” as it “provides workers with skills they need to control their work environment and the continuing challenge of making the work go more smoothly” (Jørgensen et al., 2007; Womack et al., 1990).

Originally, Lean Thinking was named “Respect for Humanity System”, while others called it “The Thinking Way” (Jadhav et al., 2014b, p. 132). Leadership, empowerment, teamwork and communication through visual management and several others such as the integration of embedded systems as well as system connections are among the key factors to sustain Lean gains. The effective operating system will leverage effective continuous learning endeavour to build expertise through the implementation of continuous improvement or “Kaizen” projects at the workplace. Therefore, Lean should be viewed as a way of thinking which creates new work that assists the organization to effectively perform their operations instead of destroying jobs. Some critics may have perceived the documentation of the Japanese automaker’s dominance in productivity through the book “The Machine That Changed the World” as an “exaggeration and a bit of oversimplification, but it was an epochal account of the strengths that the Japanese automakers had built in manufacturing, purchasing, product development and other phases of the automobile business” (Fujimoto, 2007, p. 80).

There are five principles in Lean thinking. The first principle of Lean is to define value from the customer’s point of view. Any production of effort which does not generate value desired by the customer is perceived as a waste. The second important principle in Lean is the

mapping of the value stream. Mapping all the steps, value-added and non value-added activities in each stage to bring a product or service to the customers will enable Lean practitioners to better identify wastes in each process. The following principle is to establish flow and create stability. Ensuring continuous flow of materials, services, or information within the supply chain is another guiding principle in Lean Thinking that emphasized variation reduction. The next key principle in Lean implementation is to execute a pull system instead of a push system. The pull system required nothing to work on the current process until the user in the next process signals the need. This is to avoid excess in inventory level. The final guiding principle in Lean is work to perfection. It concludes the process by continuing the cycle through continuous improvement projects until all waste are eliminated and all activities create value to the customer which is termed as “zero defects” goal (Womack et al., 1990, p. 152).

According to Jekiel (2011), there are five causes which lead to a waste of talent. The first reason is the design of the work roles itself that limits employee’s capabilities and productivity. The second rationale to talent waste is the authorization or power which is only limited to a few people that restrict other employee’s talent and abilities. The next cause is “people are reluctant to do more work without realizing that improvement might make their life easier” (pp. 5-6). The following problem is “channelling abilities creates new work” (p. 6). These situations happen when people are afraid of workload that arise upon problem identification such as an evaluation of possible solutions, development of plans and implementation that need to be accomplished upon idea generation.

The fifth hidden cause is that management team is not aware of the unused capacity of the workforce when assessing the business’s assets while it is actually “an essential element of Lean or continuous improvement culture” (p. 7). However, the authors believed that the

challenges of shifting people from these attitudes into a fresh outlook are possible through Lean because the principle is aiming at synergy between employee's problem-solving capabilities and the vision for continuous improvement to achieve better performance over time.

Consequently, Jekiel (2011) suggested seven Lean principles as the solution to talent waste by discovering the employee's true capabilities in sustaining Lean implementation. Jekiel (2011) suggested that elimination of waste which results from neglecting peoples' capability is achievable by having the employees to practice the first principles of Lean which is to be more customer focused besides keeping in mind that the company's purpose is their main priority. Secondly, "Lean cultures, by definition, are devoted to continuous improvement, which inherently requires people to actively learn", thus, suggesting that employees need continuous "learning to improve" (p. 9). Next, is encouraging employees in "generating ideas" through knowledge sharing or dialogue inquiry (p. 10). The fourth capability is to encourage employees to see the big picture through system connections. Collaboration across the supply chain will leverage the understanding of the entire process and trigger the need for change. Next, is to provide employees with empowerment for more freedom in problem-solving (p. 11). The sixth capabilities are related to a shared vision to meet common goals. According to Jekiel (2011), "continuous improvement cultures almost always measure progress for all to see" (p. 12). This is done through visual management where employees will be able to keep track of their Lean goals and be more aware of their progress. Then, the final suggestion is to demonstrate support leadership that is able to motivate and inspire employees (p. 13).

2.4 Theories

2.4.1 Resource Based Theory (RBT)

The basis underlying Resource Based Theory (RBT) is the work published by Penrose (1959, cited in Pitelis, 2009) on “The Theory of the growth of The Firm”. Penrose suggested that “the size of the firm is best gauged by some measure of the productive resources it employs” (Pitelis, 2009, p. 21). This is because Penrose believed that “heterogeneity in the services available from the material resources with which a firm works gives the firm its unique character that permits the same resources to be used in different ways and for different purposes if the people who work with them get different ideas about the way they can be used” (Pitelis, 2009, p. 67). Furthermore, the author explains the interaction between material and human resources by indicating that “increases in knowledge can always increase the range or amount of services available from any resource” (Pitelis, 2009, p. 67). Penrose’s basic idea was then extended by Barney (1991) as the framework to clarify the paradox between services or capability and resources which contributes towards long-term value creation. Barney, Wright and Ketchen (2001) revisited the resource-based view of the firm where the authors claimed that individual HRM practices might be imitable but when these practices are view collectively over time as complex systems and routines, it is firm-specific and is a source of creation for unique human capital skills. The author also suggested that “if a firm possesses valuable resources and capabilities that few other firms possess and if these other firms find it too costly to imitate these resources and capabilities, the firm that possesses these tangible and intangible assets can gain a sustainable competitive advantage” (Barney & Hesterly, 2010, p. 67).

Sustainable competitive advantage in RBT as defined by Barney and Clark (2007) is “to increase the willingness of its customers to pay and/or reduce its costs to a greater extent than at least some other firms in this firm’s industry” that last a long period (p. 253). This framework is consistent with Lean studies as both principles are pursuing the same goal, which is to create value for the customers. The authors also explained four organizational capabilities, namely, culture, trust, human resources and information technology as a source of sustained competitive advantage in detail. Barney and Clark (2007) then developed “The VRIO Framework” that suggest the determinants which determine resource or capability’s potential with the assumption that the organizational resources might be heterogeneous and immobile. Table 2.2 summarizes the VRIO framework for resource-based analysis.

Table 2.2: VRIO Framework for Resource-based Analysis

Valuable	Rare	Costly to imitate	Exploited by organization	Competitive implications
No	-	-	No	Competitive disadvantage
Yes	No	-	No/Yes	Competitive parity
Yes	Yes	No	No/Yes	Temporary competitive advantage
Yes	Yes	Yes	Yes	Sustained competitive advantage

Source: Barney & Clark, 2007, p. 70

Figure 2.5 shows the relationship between resource heterogeneity and resource mobility, Value-Rareness-Imitability-Organization (VRIO) and sustained competitive advantage (Barney & Clark, 2007). The first determinant found in the VRIO framework is “value” (p.57). A firm’s competitive advantage is influenced by the worth of the resources they owned from the perception of the price willing to be paid in the market. Barney and Hesterly (2010) proposed that maximizing value helps an entity to “exploit the external opportunity and neutralize external threat” (p. 69). Without value, the firm will not be able to achieve competitive advantage because competitive parity is only achievable when the value is present.

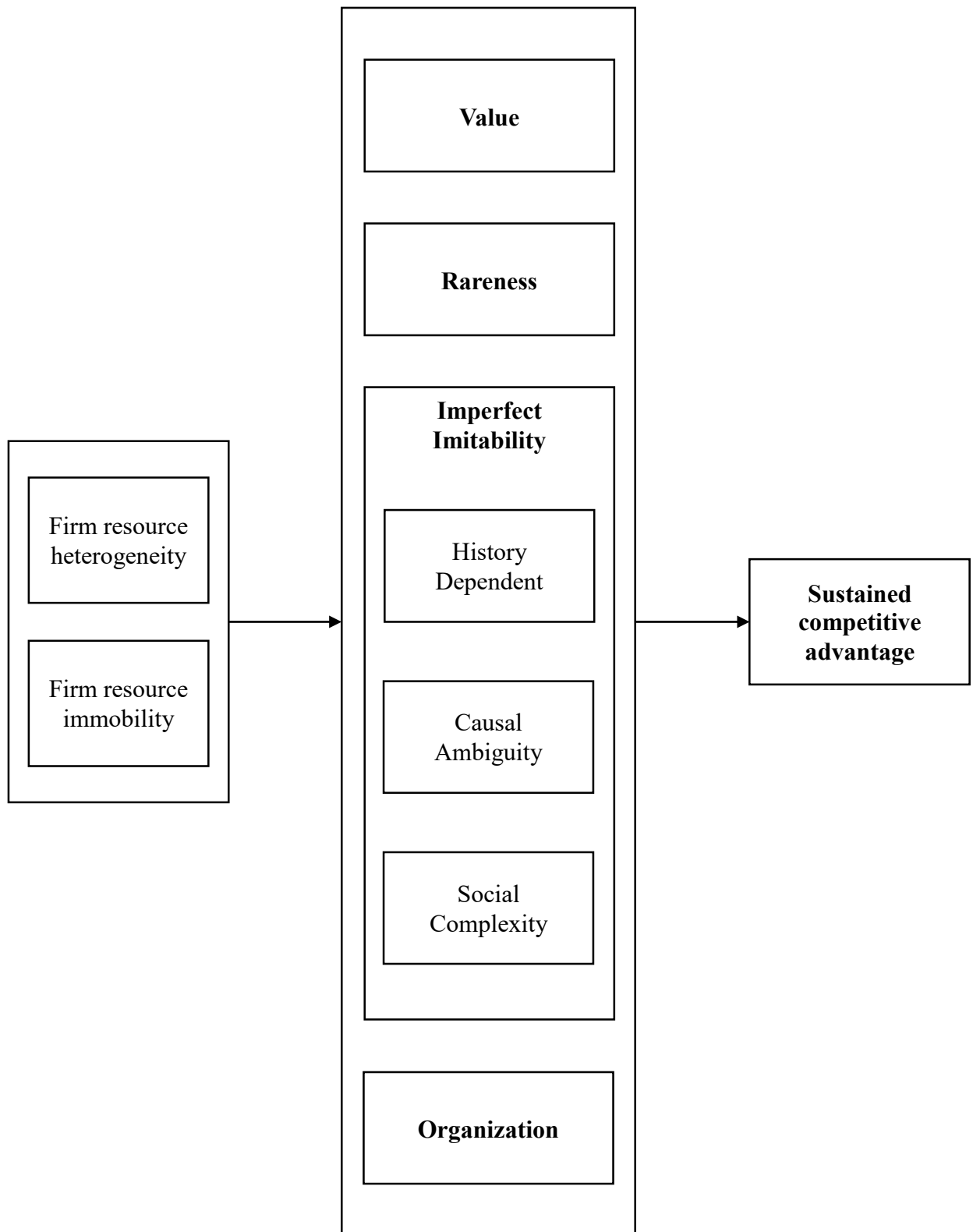


Figure 2.5: The VRIO Framework.

Source: Adapted from Barney and Clark (2007)

The second determinants that impact a firm's source of competitive advantage are "rarity" of the resources (Barney & Clark, 2007, p. 58). The authors defined the rareness of a particular resource or capability happens under the situation where "the number of firms that possess a particularly valuable resource or capability is less than the number of firms needed to generate perfect competition dynamics in an industry" (Barney & Hersterley, 2010, p. 76). Having access to scarce, few or widely spread resources will allow an entity to outperform its competitors. Lean firms that are able to produce more with less, will pose a competitive advantage over their rivals for being capable of utilizing their rare resources productively. Therefore, temporary competitive advantage is achieved through prolonged Lean implementation that is driven through valuable human capabilities, provided that these human competencies are rare and not easily available to its rival.

The following determinant is "imitability" (Barney & Clark, 2007, p. 59). It is an important determinant that determines whether the resource is a source of sustained competitive advantage. Should the firm's resources be imperfectly imitable due to its uniqueness or distinctiveness, others might find it impossible to copy or duplicate due to high costs or other consequences. There are three reasons that justify a firm resource are costly to imitate which is identified as "unique historical conditions, causal ambiguity, social complexity and patents" (Barney & Hesterley, 2010, pp. 77-81). From the perspectives of RBT, the resource "unique historical condition" enables the firm to pursue firm-specific strategies which could not be perfectly imitable by other organizations without such history (Barney & Clark, 2007). Secondly, "causal ambiguity" as explained by Barney and Clark (2007) is a situation where imperfect imitability exists due to lack of knowledge in understanding the link between resources and the firm's sustained competitive advantage. Lastly, "social complexity" involves socially complex interactions among the stakeholders of the firm

which is unique in the sense that it is imperfectly imitable by the rivals (Barney & Clark, 2007).

The final determinants that measure a firm's potential source of competitive advantage in the model are the organization's complimentary resources and capabilities which involves "structure, control system and policies" that "enables a firm to realize its full potential for competitive advantage when combined with other resources and capabilities" (Barney & Hesterley, 2010, p. 81). The characteristics of the organization are often represented through the infrastructure and the work culture itself that strengthen the purpose of its existence in the market. Therefore, RBT's significant on this study is undeniable as it acknowledges "organizational attributes such as employee empowerment, organizational culture and teamwork are economically valuable and are sources of sustained competitive advantage" (Barney & Hesterly, 2010, p. 94). Sustainment of Lean implementation that is achieved through human resources that are organized for synergy are difficult to be imitated by the competitors thus, will sustain long-term competitive advantage and secure a better market positioning in the industry.

2.4.2 Adult Learning Theory: Principles of Adult Learning

Malcolm Knowles (1984) founded the adult learning theory which contributed to the art of science in helping adults to learn. Knowles (1984) mentioned that "business and industry are among many kinds of organizations that seems most consistently open to new ideas and approaches in order to be competitive to keep up with rivals in the marketplace where in the case of productivity and sales, the effectiveness of personnel is at least as critical as machinery and advertising which made them among the most innovative in applying modern

concepts of adult learning in their human resource development programs” (p. 23). The adult learning theory is closely related to this study as it is more feasible and realistic to explain adult’s learning at the workplace as compared to Freire’s (trans. 1972) pedagogical model that focused more on learning among children and youth. The framework underlying the “Andragogical” model is also practical to explain the characteristics of the respondents for this study which involves adult learners in the workplace setting. The theory assumed that “there are many resources other than the teacher, including peers, individuals with specialized knowledge and skills in the community, a wide variety of material and media resources as well as field experiences” that may as well, contributes towards learning at the workplace (p. 14).

The “Andragogical” model depicted seven significant elements for the breadth of this study to explain employee’s perception towards workplace learning. The first element is the “climate setting” (p. 14). The element of “climate setting” is more readily adaptable by practitioners in this field of study. The environment that is conducive to accommodate learning at the workplace can be classified into “physical environment” and “psychological atmosphere” (p. 15). The physical environment is referring to the learning infrastructure and design of materials that assist learning. Access to information technology is one of the examples of such facilities which provide learners with a quick and convenient search for their learning resources. Learners in the contemporary workplace need access to constantly updated information system that is made available through technological advancement. Development of technology has enriched communication system in the workplace for active sharing of information that encourages learning to take place. Effective embedded systems will also enable an updated database of employees’ skills and competencies. Besides, an updated information system also allows for a better visual management where employees,

as well as team leaders, are able to keep track of their progress and be accountable to their continuous improvement or “Kaizen” initiatives.

On the other hand, Knowles (1984) pointed out that “psychological climate” generates higher impact on learning by promoting values of “mutual respect, collaborativeness, mutual trust, supportiveness, pleasure, humanness, openness and authenticity” (pp. 15-17). An environment which is created for the purpose of continuous learning and improvement will create a more productive culture that sustains Lean implementation. Opportunities for active dialogue inquiry which are encouraged through the establishment of positive psychological climates such as mutual trust and respect will unleash employee’s openness to generate ideas for continuous improvement. A teamwork culture also enables workplace learning in the sense that a high level of cohesiveness among team members to achieve common goals will also contribute to better problem-solving initiatives. A higher level of autonomy as well as a freedom of choice is another aspect of psychological climate which encourages employees to engage in a more meaningful work. The employee empowerment will create a sense of ownership in accomplishing their work tasks. More importantly is the perceived support from the leaders. A psychological climate that is positive for the sustainment of Lean needs consistent support from the top management.

The second element that serves as the foundation for Knowles (1984) andragogical model is to engage the adult learners in the planning process to enhance the sense of ownership of their own learning. The third element is to assist the learners in assessing their own learning needs. This element is proposed with the intention to surge the awareness of an individual learner towards their own desires for new knowledge. Next is “involving learners in formulating their learning objectives” (Knowles, 1984, p. 18). Getting the learners to set their own learning objectives is expected to create a sense of accountability in preserving

their commitment towards the learning initiatives. The following elements as proposed by Knowles (1984) are to assist the learners in designing and carrying out their own learning plans. These elements are put into action in order to develop the learner's determination in achieving their learning objectives. The last element is to involve the learner in the evaluation process so that they are aware of their own performance in achieving their own learning objectives. This step is crucial for the learners to identify the potential gaps to be fulfilled through continuous self-improvement when assessing for their future learning needs.

The first core assumption of Knowles (1989) adult learning suggested that adults have "the need to know" (p.83). Adults need to understand the reasons for their learning before committing themselves in any learning process. An adult will willingly invest their resources in learning and be self-directed to achieve their learning objectives only when they find their learning purpose. In this sense, leaders play an important role in setting clear learning goals which are mutually agreed upon with the employees by building alignments of visions across different level of workgroups. Leaders in Lean organization need to make use of this principle in order to develop a full understanding of the reason behind Lean implementation among the employees. Besides, the openness for discussion is promoted through active dialogue inquiry and accessibility to well-develop embedded systems that enable a two-way communication is crucial to develop employee's awareness of the benefits of Lean. Employees who understand the benefits of Lean are expected to perform willingly and provide a better result from an increased effort, thus, commitment towards the sustainment of Lean implementation is better secured.

Next, in order to enhance "learner's self-concept", empowerment is crucial to make learners be responsible for their own learning. A learner will "develop a deep psychological need to

be seen and treated by others as being capable of self-direction” upon achieving the phase of self-concept (Knowles, 1989, p. 83). Employee empowerment will enhance employee’s sense of ownership towards Lean implementation that they are engaging in. The encouragement that keeps an employee to continuously learn from their experience and later, use it to strive for more continuous improvement or “Kaizen” projects and be rewarded is some sort of reassurance for the attainment of sustainable Lean implementation.

“The role of the learner’s experience” is another assumption of the “Andragogical” models that focus on “experiential techniques” which tap into learner’s reflection of their previous experience such as involvement in dialogue over “transmittal techniques”, the backbone of the pedagogical model (p.84). Continuous learning can only be facilitated through unremitting interaction between learners which involved a two-way communication and collaboration in knowledge sharing of work-related experience. Learners are expected to gain new knowledge while at the same time reflecting on their previous encounter when new information is interpreted. Therefore, the focus on creating a conducive environment for workplace learning will provide enrichment for learner’s learning experience. Active interaction through dialogue inquiry and team learning, as well as system connections, are several enablers which support adult employees to learn from their own experience as an outcome of such involvement. Active participation in discussions, teamwork and collaboration with external parties are believed to be able to generate industrious insights to be acted upon through series of continuous improvement or “Kaizen” initiatives and eventually sustain Lean gains.

In terms of preparing learner in accepting new ideas, Knowles (1989) suggested that “sensitivity training, value clarification, meditation and dogmatism scales are among other techniques to tackle the problem of mental habits, biases and presuppositions that may cause

learners to close their minds to new ideas, fresh perceptions and alternative ways of thinking” (p. 84). Adult’s “readiness to learn” is triggered by the “needs to know or to be able to do in order to cope effectively with their real-life situation” (p. 84). The sense of purpose towards learning at the transition stage of personal development is an important foundation that stimulates adult’s awareness and responsiveness to the importance of pursuing their learning effort. Adults prompt to participate at their own will, only if they realized that there is a course to fulfil their gaps in achieving self-improvement besides enriching their level of expertise. Once again, consistent support from leaders to equip employees with sufficient quality information to act upon the problem, are expected to increase employee’s level of confidence when dealing with task difficulties. Employees are also better prepared to respond to the needs for growth and development opportunities when they are presented with various forms of support which reduced their fear of uncertainty.

“In contrast to pedagogy assumption of a subject-centered orientation of learning, adults are life centered in their orientation to learning” (Knowles, 1989, p. 84). Adult learners learn best under the situation when they are able to relate their learning to real-life experience such as problem-solving. The degree of empowerment granted to the employees such as control over resources is expected to affect employee’s learning capacity. Organizations must get feedback from employees on the training that they need to improve their working method and identify learning opportunities that are beneficial for their work. Employees as adult learners are aware of the challenge that exists within the tasks that they are performing and are more interested to learn about specific knowledge and skills which enable them to achieve higher effectiveness and efficiency when applying to their current work.

“Motivation to learn” is the final assumption proposed by Knowles (1989, p. 84). According to Knowles (1989) “adults are responsive to both intrinsic and extrinsic motivators” which

triggers their self-determination in sustaining long-term learning effort (p. 84). For instance, employee's locus of control, self-esteem or self-confidence, and job satisfaction are some examples of intrinsic motivators while extrinsic motivators include perceived fairness in distributive and procedural justice, prospective career development as well as the job characteristics. Management should consider these factors when making a decision on creating learning opportunities for the employees. Employees that are rewarded for their achievement in continuous improvement or "Kaizen" programme will have a higher chance to repeat such effort for the sustainment of Lean initiative.

2.5 Empirical Evidence

There is little empirical evidence found in the local context which clarified sustainment of Lean implementation, although there are several papers presented that showed interest in this particular area of study. Most of the papers are found to be proposing the models on the indicator for Lean implementation but many have failed to acknowledge the long-term sustainability of its implementation. Besides, most of the research interests on Lean implementation in Malaysia are focusing on the automotive industry. One of the literature that proposed there is a need to conduct an empirical study on sustaining Lean improvements in Malaysian automotive industry is the paper by Habidin, Zubir, Conding, Jaya and Hashim (2013). Habidin et al. (2013) proposed a model that looks at sustainable manufacturing practices from the environmental, economic and social point of views for sustainable performance among the automotive companies in Malaysia. Although the proposed model is focusing on John Elkington's "triple bottom line" concept of sustainability (Crane & Matten, 2016; 2010) instead of sustainable Lean implementation which is the main focus of

the current research, the paper by Habidin et al. (2013) is worth mentioning in this section because they highlighted two important dimensions adopted in the current study which are the factors of employee involvement and continuous improvement and its effect on sustainable manufacturing practices.

Although little evidence from local research could be found on Lean sustainability, studies on Lean sustainability practices have been carried out abroad. One of the case studies which looked into the application of Lean sustainability concept is the research paper by Comm and Mathaisel (2005a). The researchers observed that most of their participants agreed that “training, communication and employee empowerment somewhat encourages Leanness in their organization” (p. 140). In another research paper on Lean sustainability practices by Comm and Mathaisel (2005b), the researchers recognized the needs to explore the successful implementation of Lean sustainability effort in higher education. The result of an in-depth qualitative approach showed that “there are some common best sustainability themes and opportunities such as open communication and dialogue to communicate different initiatives and their progress, effective and efficient management of the physical plant, consistent goals and leadership philosophy, understanding of employee-institutional relationship through loyalty and employee participation in collaborative efforts, development of training and learning, refocus on core competencies, long-range planning, strategic partnership, Gemba walk and last but not least is the centralization of budget, purchasing, vendor management and information technology besides streamlining the human resources systems” (pp. 233-234). The findings of this research are one of the major contributors for the current study in defining the extent where Lean implementation is considered sustainable in the manufacturing system.

2.5.1 Continuous Learning and Lean

In a Western study by Comm and Mathaisel (2005a), the researchers criticized that most of their participants had a misconception of the real Lean principles as most of them would consider that their organization were doing well in Lean simply because they have achieved substantial financial saving and cost reduction. Comm and Mathaisel (2005a) also urged that there is a need for optimization of capability and utilization of people. The researchers explained that “with more members of the organization capable of handling their own and other positions, schools take a significant step forward in becoming Lean and sustainable” (p. 142). Therefore, the researchers suggested that opportunities should be created to encourage continuous learning environments such as the development of training and learning centre. In another case study, Comm and Mathaisel (2005b) again, suggested that employee training and development as very important for a successful implementation of Lean.

Most of the non-Western papers does not emphasize on sustainment of Lean initiatives. One of the papers presented on the identification of barriers in Lean manufacturing implementation is the survey research by Sahwan et al. (2012). The researchers managed to present their findings based on a total of 53 responses (20.8% response rate) out of a total of 250 companies involved in their study. The study identified most of the barriers to the implementation of Lean manufacturing in Malaysia are human-related factors. The obstacle that registered the highest ranking is lack of skilled people. The second barrier identified in Sahwan et al.’s (2012) study is a deficiency of awareness and understanding of the application of Lean tools and methods, followed by the company culture, where the researchers pointed out employee’s resistance to change. Costly consultancies and training programme are the next barriers that negatively affect Lean implementation in the studied

organizations. The researchers also highlighted another important barrier which is lack of understanding of Lean concept, principles and thinking. The finding by Sahwan et al. (2012) is an important indication of the problem faced by most of the companies operating in the developing country which is cost-concerned, as well as the mindset, that undermined the importance to develop the human capital. These problems must be acknowledged due to its' potential effect on other concerns such as lack of skilled human resources, low level of awareness and understanding of the real purpose behind Lean introduction that results in creating a company culture which is not productive for the sustainment of Lean implementation. Besides, the researchers also found out that there is a difference between the size of companies and some barriers from the aspects of "financial, culture and understanding" that hinder Lean implementation (Sahwan et al., 2012, p. 109). The researchers observed that these barriers are lower among large manufacturing companies in the automotive industry as compared to SMEs.

Another Lean study focusing on the automotive industry in Malaysia is the exploratory research conducted by Nordin et al. (2010) on sixty Malaysian automotive components manufacturing firms. The researchers collected the data for the purpose of their research by utilizing the survey questionnaire as the instrument of their study. Data were collected from a sample purposely chosen for their intended study across automotive components manufacturing firms regardless of the organization was actually implementing Lean or not. The organizations were later clustered into "Lean, in-transition towards Lean and non-Lean organization" (Nordin et al., 2010, p. 379). It was found that the majority of the firms involved in their study are still in-transition phase of Lean implementation (p.374). Similar as the current research, the sample chosen to participate in their study are "those who are directly involved with Lean manufacturing practices" (p. 374). Interestingly, the research

also showed that Lean practices under “human resources group achieved the highest mean of Lean manufacturing adoption in Malaysian automotive industry” instead of manufacturing planning and control or those within the process and equipment groups (p. 378). “Group problem-solving, training, cross-functional teams, employee involvement and workforce commitment” are several practices studied under human resource groups (p. 378). The research also identified the stumbling block that hampered Lean implementation in those firms which included the “lack of understanding Lean concepts” and “shop floor employees’ attitude” which led to the researchers to suggest that “Lean manufacturing requires new knowledge and cultural change during transition” (p. 379). From the empirical evidences reviewed from Nordin et al. (2010) paper, continuous learning effort is needed by employees involved in Lean to acquire new knowledge and understanding of Lean practices. Therefore, the current study is interested to investigate the presence of opportunities for continuous learning at work and the relationship of such opportunities with the sustainment of Lean implementation.

2.5.2 Dialogue Inquiry and Lean

From the Western perspective, open communication is being perceived as one of the important aspects to promote Lean practices across the institutions (Comm & Mathaisel, 2005a). Another qualitative research paper that aimed to identify the conditions affecting the sustainability of Lean implementation from the Western perspective is the study conducted by Lindskog et al. (2016) in Sweden. The researchers approached this issue from the perspective of the socio-technical principles. The researchers collected their data through longitudinal focus group interviews with 24 first-line managers within Swedish psychiatric

healthcare (Lindskog et al., 2016). Based on the findings found in this study, communication, in the form of active dialogue inquiry was absent between employees from different hierarchical level as a result of boundaries that hinders effective transfer of information (Lindskog et al., 2016). As a result, Lean effort was unsustainable.

Similarly, under the non-Western context, communication is also one of the factors highlighted by Nordin et al. (2010) in their research which is believed to have an influence on Lean implementation. Besides, the findings reported in Jayaraman et al. (2012) study have proven that active dialogue inquiry, effective Lean training programme and effective visual management are also positively related to both operational as well as organizational performance in Lean organization. Therefore, the current study find that it is crucial to acknowledge the importance of looking into the relationship between dialogue inquiry and the success of sustaining Lean implementation under the scope of Malaysia manufacturing sector.

2.5.3 Team Learning and Lean

The study on Lean implementation by Nordin et al. (2010) also found out that cross-functional teams which is one of the several practices studied under human resource groups reported the highest mean in terms of Lean adoption. Besides that, Roslin et al. (2012) also suggested that teamwork is one of the key factors of successful Lean implementation in their case study. However, previous literature has not been paying much attention on generating empirical support that justify the interconnection between team learning and the sustainment of Lean implementation. Reviewing previous literature motivate the intention of the current

study to find out if there is any association between team learning and the sustainability of Lean in Malaysia manufacturing sector.

2.5.4 Embedded Systems and Lean

From the Western perspective, the study by Comm and Mathaisel (2005b) suggested that embedded systems such as “streamlined online Human Resource (HR) system, centralized Information Technology (IT) helpdesk functions and convergence of one IT network” for easy access to information are seemingly important to ensure successful implementation of Lean in higher education (p. 233). Lindskog et al. (2016) also propose similar view, claiming that without a proper system to enhance a two-way communication and a good database which would provide employees access to quality information when needed, employees are unable to understand organizational goals. Moreover, the researchers further address the implication of such issue by indicating that consequently, employees with a lack of information and knowledge on the implementation of Lean find it difficult to understand their role. This situation will have adverse impact on the sustainment of Lean given that the employees are unaware of the management’s expectation towards the way they could contribute to the organization’s vision (Lindskog et al., 2016).

Besides, Habidin and Yusof (2013) also found out that quality information and analysis is another important factor for Lean implementation in the local context. This is an important discovery that is needed to sustain Lean implementation. A Lean organization needs to develop and maintain its database to keep quality information which is up-to-date. Employees in their learning process need sufficient information for problem-solving in their

continuous improvement or “Kaizen” initiatives. Besides, analysis of reliable and valid information is crucial for decision making in any situation.

2.5.5 Empowerment and Lean

Reviewing the empirical evidences from Western study, empowerment is perceived as one of the important sustainability concepts for Lean implementation (Lindskog et al., 2016). Lindskog et al. (2016) study is focusing more on goal clarity, role clarity besides participation and learning in their Lean sustainability study. The results found that unclear goals, role and responsibilities among first-line managers have made follow-ups difficult and resulted in perceived lack of power and authority, which consequently resulted in negative impacts on participation and the learning processes in the Lean implementation (Lindskog et al., 2016). Participation and learning were the only workplace learning dimensions being discussed in Lindskog et al. (2016) study. No comprehensive study was found on other dimensions of workplace learning and continuous improvement in Lean sustainability study by Lindskog et al. (2016).

From the non-Western perspective, Habidin and Yusof (2013) did mention about the importance of employee empowerment for Lean implementation. However, although Habidin and Yusof (2013) recognized the importance of employee involvement in Lean implementation, the researchers acknowledged that they did not include this factor in their study. Other Lean study that did look into employee empowerment is the study by Nordin et al. (2010). Still, the current research observed that the existing empirical support wasn't sufficient due to the reason that “employee involvement and workforce commitment” are only one of the several practices studied under human resource groups in Nordin et al. (2010,

p. 378) study. Hence, the current research observes that this there an empirical gap worth further investigation in this particular area of study.

2.5.6 System Connections and Lean

Apart from the study conducted in the automotive and electronics industry, Manzouri et al. (2013) conducted a study in the Halal food supply chain to examine the extent of Lean implementation and to identify the barriers on Lean practices. However, one of the setbacks of this research is the low response rate from the targeted respondents where there is only approximately 20 per cent usable gain out of a total of 300 distributed questionnaires. Out of these numbers, the researchers found out that 70 per cent of these responses indicated that the implementation of Lean supply chain has not started within their company. The major problem with non-Lean firms is lack of customer awareness which acts as a barrier for the implementation of the Lean supply chain. As for the Lean firms, market competition and uncertainty has become the barrier to Lean implementation. The researchers also highlighted several important insights such as lack of skilled workers in the food industry as one of the problems which have caused lack of understanding about the Lean culture which eventually elevates employee resistance towards continuous improvement. Several other barriers highlighted from Manzouri et al. (2013) study that is noteworthy to be paid high attention to for the purpose of this study is in terms of lack of transparency and sharing of information by the organizations across the supply chain, besides, the lack of managerial support.

Similarly, active participation in collaborative efforts such as strategic partnership outside common channel is also identified as a sustainable Lean practice from the Western perspective (Comm & Mathaisel, 2005b, p. 233). The empirical findings from Manzouri et

al. (2013) research paper also gained attention among researchers from Greece in a more recent study. Psomas et al. (2018) study reported that the outcome found from their study among Greek food SMEs are different from the findings reported by Manzouri et al. (2013) about the Malaysian food SMEs. According to the result obtained by Psomas et al. (2018), the study found out that a high adoption of Lean principles has been achieved by Greek food SMEs which enables the companies to outperform their rivals in the challenging and competitive environment. The results showed significant insight that it is worthwhile to benchmark and monitor the progress of Lean implementation in the various industry across different geographical boundaries from time to time for continuous improvement and better sustainment.

2.5.7 Support Leadership and Lean

Review from previous literatures also emphasized that support leadership and consistent leadership are among several most prominent practices which are a must for a sustainable change to occur in the Lean organization. According to Comm and Mathaisel (2005a), a “mandate from top leadership is absolutely critical in order for Lean sustainability to succeed” (p. 146). This claim is evidenced in Lindskog et al. (2016) study that lacking in the area such as embedded systems, and support from leaders serve as a barrier for employee empowerment in Lean organization. As a result, Lindskog et al. (2016) concluded that “the Lean implementation for their case study was not sustainable due to a weak level of ownership, a shifting strategy from Lean to balance scorecards, traditional power structures and the dissolution of Lean support group” (p. 63). Therefore, the main idea that can be synthesized from Lindskog et al. (2016) study is that leaders played an important role in

making a Lean effort sustainable because they need to empower the employees to commit to the organizational vision by building alignment of visions across different level of work groups.

Habidin and Yusof (2013) on the other hand recognized Lean as a multidimensional approach and thus, combined Lean and six sigma practices in their study. The study addressed the critical success factor of Lean Six Sigma for the Malaysian automotive industry targeting the top management's responses. The author believed that integrating Lean and Six Sigma will "assist organizations to achieve high level continuous improvement activity and better saving in terms of operation and quality cost" (p. 61). Out of 400 distributed questionnaires, the authors successfully gained 63 per cent of response rate from the industry players in the Malaysian automotive industry. The findings of Habidin and Yusof (2013) research showed that "leadership and customer focus have been shown to be the extremely important factors for Lean six sigma implementations in the Malaysian automotive industry" (p. 60). These discoveries are noteworthy as they represent the majority perception of the Malaysian automotive industry towards their commitment to Lean implementation.

There are also other research papers which studied the critical success factors of Lean Six Sigma. The earlier research by Jayaraman et al. (2012) integrated Lean and six sigma practices to evaluate the impact of critical success factor on six multinational company's performances for the electronic manufacturing services industry in Malaysia. Similar to this study, the participants of the quantitative research conducted by Jayaraman et al. (2012) are selected among practitioners or experts who are familiar with Lean across six electronic manufacturing services industries with a total of 138 (53% return rate) responses. Management engagement and commitment is significantly proven as the most critical to both

operational and organizational performance in a Lean organization. Surprisingly, the findings further revealed that the competency of Lean Six Sigma practitioner “does not significantly contribute to the operational performance of a company but is found to be significant in its relationship with organizational performance” (p. 440). Reviewing past literatures, the current research is interest to further extend the study in this area by identifying the association between leader’s support for learning and the sustainment of Lean implementation.

2.5.8 Mediating Effect of Continuous Improvement

Review from previous literature suggested that there are several areas that need further empirical support in order to clarify the relationship between workplace learning, continuous improvement and sustainment of Lean initiatives. One of the most recent empirical evidence found on Lean studies in Malaysia that highlighted some issues which make it worthy to investigate the mediating effect of continuous improvement is the research paper by Minh et al. (2018). The researchers conducted a survey research on 20 Lean manufacturing companies in Malaysia which focus more in the area of job satisfaction. The survey yields 206 responses out of a total of 1000 distributed questionnaire (20.6% response rate). The result of data analysis found out that certain Lean manufacturing practices such as process and equipment categories have negatively impact job satisfaction. Minh et al. (2018) explained that process and equipment practices restrict employee’s autonomy and limit employee’s participation resulting in a high level of pressure considering related factors such as strict deadline, and standardization of work. Interestingly, standardization of work is supposedly one of the important practices in continuous improvement. In order to maintain

consistent results obtained through continuous improvement or “Kaizen” activities, systematic documentation and training are required to enable and ensure all employees follow the new revised Standard Operating Procedures (SOPs). Therefore, standardization is the last step in any continuous improvement effort. In addition, Habidin and Yusof (2013) also emphasized that a structured improvement procedure is one of the success factors for Lean implementation. Similar findings can be derived from Nordin et al. (2010) study which reported that the “desire to focus on customers” and “to achieve the organization’s continuous improvement” are the factors that drive the implementation of Lean manufacturing (Nordin et al., 2010). In contrast to the findings by Habidin and Yusof (2013) as well as Nordin et al. (2010), Lantz et al. (2015) make a similar claim as that of Minh et al. (2018) that high standardization is referred to as one of the aspects that potentially limit innovation and teamwork. The only important difference is that Lantz et al. (2015) did mentioned that this problem could be solved by promoting a high level of decision-making authority and job autonomy to explain the paradox between standardized work and promoting innovative teamwork. On the other hand, Lean practices such as customer relation practices, human resource practices and product design practices significantly affect employee’s job satisfaction through job characteristics in a positive direction (Minh et al., 2018). The researchers explained that these practices promote job characteristics that are highly linked to job satisfaction. According to Minh et al. (2018), Lean manufacturing practices that promote a higher level of job autonomy, a greater appreciation and better chances for skill utilization are expected to induce a higher level of job satisfaction. The findings from Minh et al. (2018) are important for the current study as the results have proven that human resource practices such as cross-functional training, empowerment, participation and involvement in continuous improvement activities as well as establishment of problem-

solving teams among shop-floor employees are found to be the key element that promotes continuous improvement in Lean manufacturing.

Another recent paper presented on the Lean study in Malaysia has shown that there is a sign of shift in terms focus from manufacturing to the public sector. Bakar et al. (2017) conducted a study on Lean management practices by the Malaysian local government. The researchers surveyed nine city councils in Peninsular Malaysia and obtained a response rate of 73.3% when 198 usable questionnaires were successfully collected from a total of 270 distributed questionnaires. The study by Bakar et al. (2017) found out that 5S is the most common practice followed by Value Stream Mapping (VSM) and interestingly, unlike most of the findings on Lean manufacturing, “Kaizen” or continuous improvement was found to be the least popular practice in Lean management among the Malaysian public sector institution. Bakar et al. (2017) explained that the established and ruled programmes such as 5S and VSM are more popular in the public sector due to the organizational culture which tends to expect the employees to follow rigid rules, policies and procedures. This type of work culture also suppresses the development of continuous improvement initiatives due to resistance from the employees to contribute improvement ideas (Bakar et al., 2017). The result signifies that the real understanding of the Lean concept is still lacking among public sector institution in Malaysia. The researchers also claimed that the real concepts of Lean Thinking are crucial for quality improvement as well as productivity. The study also found that Lean management practices are positively correlated to both organizational productivity and service delivery respectively.

Another study in Malaysia that focused on Lean is the research conducted by Salleh et al. (2015). The researchers surveyed 30 automotive companies in Malaysia with a 12.3% response rate. The main purpose of the survey is to identify the level of implementation for

Lean and TQM leadership management practices among the studied companies. The study found out that Lean manufacturing is the most practised systems as compared to Total Quality Management (TQM) due to the declining popularity of TQM. According to Salleh et al. (2015), most of the studied organizations were still implementing TQM in the form of ISO9000 and ISO/TS16949 for the purpose of global certification. However, these companies have quality objectives in place but are reported to have a low implementation in having Lean policy and objectives. Besides, the studied companies also have a low implementation in terms of “reviewing and monitoring lean team progress” and “making costing based on value stream projects” (Salleh et al., 2015, p. 4). These findings signify that a potential problem with continuous improvement initiatives which is critical for sustaining Lean exists among the studied organization. As mentioned by the researchers, their study has presented a preliminary insight. Leaving Lean team projects unattended without tracking and following up is the major impediment that hampers the sustainment of Lean implementation when the positive results and benefits of Lean implementation are not captured and communicated. Success stories that are not shared will not induce further continuous improvement and can result in misunderstanding of the real Lean concepts besides poor commitment from the employees to sustain the Lean effort.

On the other hand, Jayaraman et al. (2012) initially believed that organizational belief and culture of sustainable and proactive improvement will moderate the relationship between the studied critical success factors and the operational as well as organizational performance. However, the empirical findings from further hypothesis testing found out that the relationship between the independent variables and the dependent variables in their study is not moderated by organizational belief and culture. Although continuous improvement was found to be significantly associated with Lean implementation in several other studies

(Angelis & Fernandes, 2012; Chauhan & Singh, 2012) empirical evidences from the Malaysia perspective reported considerable differences in terms of the findings under this particular area of concern. Nonetheless, most of the paper only takes the impact of Lean implementation on the organizational performance into consideration without further acknowledgement of whether the implementation or the outcome of Lean initiative was sustainable. Such alarming situation suggested that more effort should be placed in Lean related studies especially the mediating effect of continuous improvement among Lean manufacturing firm in Malaysia to ensure a better foundation for a long-term sustainment of Lean initiatives.

2.6 Summary

Overall, Chapter 2 summarized the literature proposed by previous scholars that is related to the intention of this study. This chapter provided insights to research carried out in the past by abstracting the gaps and limitations besides highlighting several schools of thoughts that centred on the development of workplace learning and sustainment of Lean implementation. The review on previous findings and discussions in related literature also put forward greater impending ideas to promote further understanding of the evolution of adult learning. The following chapter, Chapter 3, will provide more details of the methodological design of this study in order to achieve the objectives of this study which is to identify the presence of mediation effect exerted by continuous improvement on the relationship between workplace learning and sustainability of Lean implementation.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter addresses the research method used in this study to achieve the research objective. The procedures used throughout the process of data collection and analysis for hypothesis testing are explained in this chapter. Chapter 3 further clarifies the data analysis technique in processing data into information to obtain reliable research findings that are pertinent to the validation of the research hypothesis formulated to meet the aim of this study.

3.2 Philosophy of the Research

Epistemology is one of the branches of philosophy that involves the study of knowledge. Epistemology is the philosophy of “knowledge” and justification which is concerned with the way one attempts to reason his or her action, belief and in setting an acceptable standard of proof in the quest for facts and understanding of the realities about the world and the socially complex interaction between humans and their environment (Ahmad et al., 2014; Audi, 1998; Burrell & Morgan, 1979). Put it simply as, “epistemological beliefs are fundamental assumptions about the nature of knowledge and learning” (Bauer, Festner, Gruber, Harteis & Heid, 2004, p.284).

Audi (1998) also described knowledge as a “justified true belief; that one knows something only if one believes it, it is true, and one’s belief of it is justified” (p. 215). According to Ahmad et al. (2014), this approach attains logical knowledge. Therefore, in search for the

answer to explain the mediation effect of continuous improvement on the relationship between workplace learning and sustainable Lean implementation within the context of Lean manufacturing companies in Malaysia, this study seeks to provide justification through support from empirical evidence. According to Audi (1998), perception is “a source of knowledge and justification mainly by virtue of yielding beliefs that constitute knowledge or are justified” and “if we knew nothing through perception, we would have no scientific knowledge or even everyday observational knowledge” (pp. 14-250).

Statistical evidence obtained through data collection and analysis of responses representing the perception of the selected samples from the respondents is presented to support the formulated hypotheses which are developed based on the review of past literature. Hence, “scientific knowledge does not develop simply by inferential extension of what we already know but it emerges only after we formulate questions and frame the hypotheses to answer them” (Audi, 1998, p. 252). This study follows a positivist approach to systematically discover the truth on the relationship between variables involved in this study because “positive facts produce valid evidence from which generalizations can be made” (Holder, 2016; Ahmad et al., 2014). In addition, “positivism is a research philosophy that views reality as something that can be objectively ascertained and described through research” (Hair, Celsi, Money, Samouel & Page, 2011, p. 277). The positivist approach is based on “objective methods such as questionnaires which provide data that can be graded statistically” (Holder, 2016). This study believed that a quantitative approach is a reliable method to understand objective reality.

“Ontology is the science which, from the fleeting phenomena within us and around us, infers the existence of things permanent” (Ramsay, 1870, p. 1) and to put it simply, ontology “defines the fundamental categories of reality” (Ahmad et al., 2014, p. 4). Consistent with

the position of positivist ontology, this study holds to the belief that the world is operating in a systematic manner with foreseeable pattern within the standard sets of consequence following an event. This study applied a systematic approach to achieve the research objectives by searching for the ontological truth, which explains the reality of the existence of such a relationship. Methodologically, this study follows the objectivist approach to understand the social problems at the workplace through a cross-sectional survey which:

1. assumes that social problem conditions exist in the real world,
2. concerns with how the world is,
3. categorizing a condition as a problem because it violates a theoretical belief about how the world should work,
4. making claims about how the world should be set up, leading to a series of questions to understand what causes social problems and what should be done to eliminate these conditions (Loseke, 2003, pp. 165-166).

Therefore, this study intended to explore universal laws to explain reality and the relationships between the elements of workplace learning, continuous improvement and sustainable Lean implementation in Lean manufacturing companies (Burrell & Morgan, 1979). In line with the positivist approach, this study pursues the search for more explanation and prediction on the potential mediation effect of continuous improvement in affecting the relationship between workplace learning and sustainment of Lean implementation in the real work setting by searching for patterns through the development and testing of hypotheses (Burrell & Morgan, 1979). This research approached the research argument through deductive thinking patterns where the development of the hypothesis to be tested are derived from general theory or principles which would lead down to the specific truth. The hypothesis testing approach in this study is planned to study the mediating effect of

continuous improvement in explaining the relationship between the dimensions of workplace learning, as the independent variable, and sustainable Lean implementation, as the dependent variable.

Paradigm is defined as “a model or framework for observation and understanding which shapes both what we see and how we understand it” (Babbie, 2017, p. 31). “Structural functionalist views the society as a social system, then looks for the functions served by its various components” (Babbie, 2017, p.37). The theoretical framework has been developed to frame the research problems that this study seeks to answer by justifying the rationale behind the reason for this study to approach issues in the sustainment of Lean implementation from the perspective of workplace learning. According to Burrell and Morgan (1979), the functionalist paradigm is the “primary paradigm for organizational study and assumes rational human action and believes one can understand behavior through hypothesis testing” which is consistent with the methods designed in this study to explore the defined truth.

3.3 Design of the Study

The main purpose of this study is to search for more evidence which explains the mediation effect of continuous improvement on the relationship between employee’s perception towards workplace learning and sustainable Lean implementation in the context of Lean manufacturing companies in Malaysia. Methodologically, this study is designed to analyze the relationship between different variables in a sample group (Ahmad et al., 2014). Hypothesis testing is deployed to investigate the mediation effect of continuous improvement on the direct effect of the dimensions of workplace learning as the independent

variables and Lean sustainability as the dependent variable. This study deployed a cross-sectional study design in examining the relationship between the independent variables, mediator and dependent variable which provide clarification to the research problem that the researcher intended to answer. “One shot or status studies are best suited to studies aimed at finding out the prevalence of a phenomenon, situation, problem, attitude or issue by taking a cross-section of the population and are comparatively cheap to undertake besides easy to analyze” (Kumar, 2005, p. 93) “at a particular time” (Saunders, Lewis & Thornhill, 2009, p. 155).

Following a quantitative research approach, this study also utilized the survey questionnaire as the instrument to gather the required information. Zikmund, Babin, Carr and Griffin (2013) recommended that “surveys provide a quick, inexpensive, efficient and accurate mean of assessing information about a population” (p. 186). Hair et al. (2011) suggested that survey research design is the best approach to economically obtain a considerable huge amount of data from a significant sample size and is suggested by Saunders et al. (2009) as one of the common deductive approaches, especially in exploratory and descriptive business management research. Besides, the self-report study also permits a large amount of data to be collected which strengthen the representation of the research findings.

Furthermore, this approach can reduce the potential that “bias might be present regarding the subjective assessment of the adoption of Lean principles” (Psomas et al., 2018, p. 76). Impartial and objective information can be gathered through the use of standardized response items to generate a high degree of practical transferability into the actual work setting. Other point of view supportive of the current research design to be replicated for business and management studies also proposed that “survey research does not set up an artificial situation

like an experiment, it is easier to generalize findings to real-world settings as this is where the research takes place” (Muijs, 2004, p. 44).

3.4 Variables and Measures

All demographic items in the survey instrument are designed in the form of single direct questions. A five-point Likert Scale is used to ease participants in providing their responses by indicating their degree of agreement to the items representing workplace learning, continuous improvement and sustainable Lean implementation in the research instrument. The items representing workplace learning used in the instrument of this study are adopted from Marsick and Watkins’ (2003) Dimensions of Learning Organization Questionnaire (DLOQ). Besides, “workplace learning is closely related to the concept of organizational learning and learning organization” (Jönsson & Schölin, 2014, p. 1010). Jönsson and Schölin (2014) also adapted DLOQ as part of the measures for their workplace learning questionnaire.

DLOQ has been well-tested in terms of its reliability by previous researchers that have carried out the research related to learning at the workplace under various business and management context with an acceptable range of overall reliability score exceeding the minimum 0.7 (Jönsson & Schölin 2014; Awasthy & Gupta, 2012; Song, Joo & Chermack, 2009; Nafukho et al., 2009; Basim et al., 2007; Lien, Hung, Yang & Li, 2006; Yang et al., 2004; Ellinger et al., 2003; Hernandez, 2003). The results are dependable indications which supported the supposition that DLOQ is a widely accepted instrument due to its reliability and consistency across application among diverse research dimensions conducted under a different setting. The independent variables are developed based on seven dimensions

representing workplace learning, which are continuous learning, dialogue inquiry, team learning, embedded systems, empowerment, system connections and support leadership.

The construct of continuous improvement items is adopted from several sources (Bhasin, 2015; 2011; Ingelsson & Mårtensson, 2014; Chauhan & Singh, 2012; Sun et al., 2008). The reason is that continuous improvement is dynamic in nature and most practitioners would focus on a different aspect of continuous improvement based on different organizational needs. In order to cover a wider range of items with better representation of continuous improvement variable, this study would have to carefully incorporate continuous improvement activities from various studies. The selection of items for the purpose of this study is based on a few criteria as proposed by the original author, Imai (1986). This study is focusing more on quality and human aspect of continuous improvement.

The items adopted from Bhasin (2015; 2011) covered a certain area of continuous improvement (Kaizen) such as “Total Quality Control activities, Quality Control circles and small group activities, as well as, cooperative labor-management relations” (Imai, 1986, pp. 3-4). The items developed based on Ingelsson and Mårtensson (2014) study are more employee-oriented and approached continuous improvement from “discipline in the workplace, labor relations and quality improvement” point of view (Imai, 1986, pp. 3-4). The items adopted from Chauhan and Singh (2012) are representing continuous improvement practices in the area of “zero defects, productivity improvement and Total Productive Maintenance” (Imai, 1986, pp. 3-4). The last set of items was adopted from Sun et al. (2008). The continuous improvement items that are developed based on Sun et al. (2008) study are representing areas of “Quality Control circles, suggestion system and quality improvement tools” (Imai, 1986, pp. 3-4). The items have been tested for reliability test with an acceptable result of Cronbach coefficient 0.72 (Sun et al., 2008).

Although there are a lot of studies on Lean implementation, however, little has been found on instruments that are developed to monitor the sustainment of Lean implementation. Lean sustainability items that are adapted for the construction of a research instrument for this study are referred from Bhasin (2015; 2012; 2011). The reason behind the adaptation of the questionnaire items from Bhasin (2015; 2012; 2011) is due to the close attention that the author has developed over the issue of sustaining Lean journey. This study agreed with Bhasin (2015) that most of the performance indicator employed by existing Lean studies are constructed based on a limited perspective which is inadequate and lacking in terms of “sustainability, respect for people and the need to embrace Lean as an ideology” (p. 213). Some previous scholars perceived sustainability from the socio-technical point of view (Birkie et al., 2017; Lindskog et al., 2016), while others, through the triple bottom line of corporate social responsibilities (Longoni & Cagliano, 2015; Piercy & Rich, 2015; Averill, 2011). Therefore, Bhasin (2015) proposed a set of Lean assessment tool for “Lean Sustainability Audit” that set a standard for the Lean organization to measure their Lean maturity. Considering the extent to which Lean implementation is considered sustainable in the manufacturing system, this study adapted the measures which also focus on the capability development rather than the aspect of merely cost reduction from ecological preservation or economic stability point of view.

Jørgensen et al. (2007) proposed that Lean assessment tool must include both aspect of technical perspective and organizational perspective due to the important development of Lean from “singular practices such as teamwork, multi-tasking, autonomy over to human resource practices, involvement and empowerment that contribute to establishment of a learning environment” (pp. 374-375). Savolainen and Haikonen (2007) also suggested that “future research is needed to find out how the technical approach develops into the social

type of learning enabling sustainable capability development” (p. 15). Therefore, this study took both operational and humanistic Lean measures into account when selecting the items to represent the dependent variable of this study.

3.5 Location, Sample and Population of the Study

The targeted population of this research includes employees currently working with Lean manufacturing companies in Malaysia. The reason for the interest of this study to explore Lean under manufacturing sector is derived from the consideration that the adoption of Lean in Malaysia is still at an early developmental phase and from the sustainability perspective, the Lean initiative was assumed to be challenging. Thus, it is most suitable to approach this area of study from the sector which has a close connection to the origin of Lean. Therefore, this research decided to target the manufacturing sector in order to gain more meaningful information to answer the issues found in this study. Psomas et al. (2018) also suggested that future research should focus only on the manufacturing sector to confirm or refute the findings of past studies. Besides, the manufacturing industry also plays an important role in the development of Malaysia economy both in terms of income generation as well as providing employment opportunities to the locals.

According to the latest population census carried out by the Department of Statistics Malaysia for the year 2016, 16.3% of the total employment in Malaysia is involved in the manufacturing sector (DOSM, 2017). However, there is no indication that differentiates these employers from those applying Lean and those who do not. Comm and Mathaisel (2005b) pointed out that “although Lean initiatives were not implemented with the knowledge that they were called Lean practices, their application has eliminated waste,

improved operational efficiency as well as contributed to sustainability and these companies and institutions appear to embrace many of the concepts of Lean Thinking without actually calling it Lean” (pp. 228-229). Several other literature (Mohd-Zainal et al., 2011; Nordin et al., 2010) also maintained that Lean organizations varied in terms of the names they used for the application of Lean principles besides focusing on different aspects of Lean techniques. For instance, global vehicle manufacturers developed their own Scania Production System (SPS) (Jönsson & Schölin, 2014) and Volvo Production System (VPS) (Lantz et al., 2015; Netland & Aspelund, 2013) that is based on Toyota Production System (TPS) respectively.

Out of the total population of potential respondents dispersed throughout various location in Malaysia, employees from different Lean manufacturing companies listed by Malaysia Productivity Corporation (MPC) are invited to participate in this study. Overall, there are eight Lean manufacturing companies in Malaysia that have agreed to participate in this study. Hair et al. (2011) mentioned that in a non-probability sampling, “inclusion or exclusion of sample” are based on the researcher’s discretion to select a reasonably “representative” sample, which also means the researcher’s judgement of what is needed for the research based “on a number of theoretical and practical issues” (p. 167). Under the situation where “it may either not be possible to specify the probability that any case will be included in the sample or appropriate at answering the research question”, Saunders et al. (2009) proposed that the most appropriate means would be to approach the research target using non-probability sampling. Saunders et al. (2009) made further clarification that for “all non-probability sampling techniques the issue of sample size is ambiguous and unlike probability sampling, there are no rules to deciding on a suitable sample size” (p. 233).

Although there are no specific rules of deciding on a representative sample size from a given population which is unidentified, especially under the situation where the conditions

involved limited information to be obtained on the studied population to clearly project the actual number of participants in Lean effort, this study took a step further to decide on a minimum sample size. This study followed the guidelines by Krejcie and Morgan (1970) which did not require any user's calculation. Based on the "Table for Determining Sample Size from a Given Population" by Krejcie and Morgan (1970), the required sample size to be the representative of the perceptions of an estimated population size, N=680, is 248 (p. 608). According to Krejcie and Morgan (1970), the determination of the "minimum sample" size according to their published guidelines is "applicable to any defined population" (p. 607). As a result, this study distributed a total of 400 sets of research questionnaires with 65.5% of return rates and 54.8% usable gains. The following table summarized the estimated population distributed across eight different manufacturing companies respectively:

Table 3.1: Summary of Data Collection Process

Company	Types of Manufacturing	Estimates of employees engaging in Lean	Distributed	Returned	Usable Gains
A	Solar Panel	±150	120	112	110
B	Electronic Parts	±50**	50	50	37
C	Cement	±250	50	50	32
D	Electronic Parts	±20	20	20	12
E	Pharmaceutical	±10	10	9	9
F	Chlor-alkali	±100	50	10	9
G	Automotive	±50**	50	6	6
H	Metal Parts	±50**	50	5	4

Notes. **Certain private companies volunteered in this study maintains their Private and Confidential Policies, others reported that the Human Resource Department did not keep track of employees involved in Lean. Under these situations, the estimation is based on the number of distributed questionnaires voluntarily accepted by the respective organizations.

The sampling technique applied in this study is purposive sampling. Under purposive sampling, the sample is selected by experience individual based on their specific objective (Zikmund et al., 2013, p. 393). According to Lindskog et al. (2016), there is variation in

terms of the progress in Lean implementation by each distinct department within the same Lean firm. The study by Lindskog et al. (2016) found out that some the units participated in their study did apply “Kaizen” or continuous improvement in their tasks while a few others were found to adopt the 5S principles. On the other hand, there also certain units which had not started with Lean implementation although the studied firm had been implementing Lean since year the 2009 (Lindskog et al., 2016). Therefore, this study has a strong reason to believe that the current technique of data gathering are able to gain better access to the targeted samples of respondents to collect meaningful data. The sample targeted for the purpose of this study are employees who are currently working in Lean manufacturing companies in Malaysia, attended Lean training, exposed to Lean experience at the workplace or those involved in continuous improvement or “Kaizen” projects. The sampling procedure used in this study is closely comparable to Habtoor (2016) study on quality improvement practices and Lantz et al. (2015) study on participative work design in Lean production, which participation was voluntary.

3.6 Instrument of the Study

In order to achieve the objective of this study, the research selected survey questionnaire as the instrument of data collection. The design of this study confirms with Saunders et al. (2009) standpoint which suggests that research questionnaire is the most commonly used instrument accompanying the survey strategy within business and management research. The research intention of this study is to collect impartial response that reflects the respondent’s true perception on the issues under investigation. Therefore, this research observed that self-administered questionnaire is the most appropriate to collect the

quantitative type of data without the intervention of the researchers, besides, enabling standardization of responses which permits comparison and eases data collection processes from a pool of large sample size (Saunders et al., 2009, p. 144). The ethical aspect of protecting the respondent's confidentiality is also one of the major considerations of this study and is supported by the proposition made by Kumar (2005) that questionnaire provides better anonymity which has higher abilities to generate frank and honest responses. The design of the questionnaire used in this study is in the form of close-ended questions which offers greater convenience for the respondents to provide their response during their working hour as it requires minimal writing. The response format for Part B, C, D, E, F, G, H, I, and J are based on a Five-Point "Likert-style rating scale" (Saunders et al., 2009, p. 378). The questionnaire requires the respondents to indicate their degree of agreement with each item representing the variables to be tested in this study as summarized in Table 3.2.

Table 3.2: Likert Scale

Scale	Levels
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Source: Adapted from Saunders et al. (2009)

Zikmund et al. (2013) mentioned that "the original developmental research on the semantic differential indicated that five to eight points scale categories are optimal" (p. 327). Five-point Likert scale is selected because it is appropriate for the purpose of this research to avoid unnecessary confusion among respondents if provided with too many choices of scale categories. Furthermore, Hair et al. (2011) also mentioned that rating scales which require respondents to indicate their degree of agreement with a given item has become customary in business research to measure perceptions and justified that this type of scale can, therefore,

“handle more sophisticated calculations such as Pearson’s product-moment correlation coefficient” (p. 220).

Table 3.3: Summary for the Questionnaire

Variables		Number of Item	Source of References
Part A:	Demographic Characteristics	8	
Part B:	Continuous Learning	8	Marsick & Watkins (2003)
Part C:	Dialogue Inquiry	7	
Part D:	Team Learning	7	
Part E:	Embedded Systems	8	
Part F:	Empowerment	7	
Part G:	System Connections	6	
Part H:	Support Leadership	9	
Part I:	Continuous Improvement	27	Sun et al. (2008) Bhasin (2011) Chauhan & Singh (2012) Ingelsson & Martensson (2014) Bhasin (2015)
Part J:	Sustainable Lean Implementation	23	Bhasin (2011) Bhasin (2012) Bhasin (2015)

3.7 Pilot Study

Prior to further testing of the instrument during the pilot study, proofreading of the questionnaire was carried out. It is important to enhance the representativeness of the data, by designing and pre-testing the research instrument besides making effort to obtain good response rate (Ahmad et al. 2014; Kumar et al., 2013; Hair et al., 2011; Saunders et al., 2009). The number of respondents for pilot study need not be large but they must be representative in terms of the characteristics similar to the sample targeted for the main study (Kumar et al., 2013; Hair et al., 2011). Hair et al. (2011) suggested that the range of sample

size for pilot study ranges from four to twenty individuals is sufficient as a large sample does not provide “substantial incremental information for use in revising the questionnaire” (p. 268). For the purpose of this study, 30 questionnaires are being prepared for the purpose of reliability testing before the actual distribution to the targeted respondents for hypothesis testing. Pre-testing of the research instrument provided this research with “at least some ideas of whether the questionnaire appears to make sense by confirming with the respondent’s agreements that a question, scale or measure appears logically to reflect accurately what it was intended to measure” (Saunders et al., 2009, pp. 394-592). Saunders et al. (2005) also mentioned that the purpose of the pilot study is to improve the questionnaire in order to ensure that respondents will not be facing any problem when responding to the questions and to avoid any problem during data entry. One of the control measures used in this study is to ensure that the respondents who participated in the pilot study are not partaking during the actual study. During the pilot study, respondents are invited to provide their feedback on the selected format and language used in the development of the research questionnaire. The feedback from the participants in the pilot study agreed that the items used for the construction of questionnaire in this study were appropriate to meet the purpose of this study and would be able to provide relevant answers applicable for the objectives that this study intended to achieve. The demographic characteristics of the respondents involved in the pilot study are summarized in Table 3.4.

Table 3.4: Demographics Characteristics of Pilot Study Respondents

Demographic	Characteristic	Frequency	Percentage
Age Group	20 to 29 years old	11	36.7
	30 to 39 years old	12	40.0
	40 to 49 years old	4	13.3
	50 to 59 years old	3	10.0
Gender	Male	20	66.7
	Female	10	33.3

Table 3.4 continued

Job Classification	Management Staff	10	33.3
	Supervisory Staff	10	33.3
	Supporting Staff	10	33.3
Tenure	Less than two years	12	40.0
	Two to five years	10	33.3
	Six to ten years	6	20.0
	More than ten years	2	6.7
Highest Academic Qualification	Sijil Pelajaran Malaysia	1	3.3
	Higher School Certificate / Diploma	12	40.0
	Bachelor Degree	17	56.7
Lean Training	Yes, externally	7	23.4
	Yes, internally	10	33.3
	Yes, both externally and internally	10	33.3
	No	3	10.0
Years of Lean Exposure	Less than two years	15	50.0
	Two to five years	11	36.7
	Six to ten years	4	13.3
Kaizen Involvement	Yes	29	96.7
	No	1	3.3

Most of the respondents who volunteered in the pilot study are between 20 to 39 years old which represented 76.7% of the overall pilot study respondents, followed by 13.3% from the age ranging from 30 to 39 years old and 10.0% ranging from 40 to 49 years old. The number of female respondents (10 people or 33.3%) is half the number of male respondents (20 people or 66.7%). The questionnaire for the purpose of the pilot study is distributed evenly among three job classification level. Ten respondents (33.3%) from each level of job classification responded for the purpose of the pilot study. This is to test the ability of respondents from a different level of job positions within the studied group to provide their feedback on the comprehension and relevancy of the research instrument prior to distribution for the actual study. Majority of the respondents (40.0%) participated in the pilot study reported that they have less than two years of tenure, followed by two to five years (33.3%), six to ten years (20.0%) and only two respondents (6.7%) reported that they have more than

ten years of service. More than half of the respondents contributed to the pilot study are Bachelor degree holders (17 people or 56.7%), while another 12 persons (40.0%) are those with Higher School Certificate or Diploma holders and only one participant (3.3%) with Sijil Pelajaran Malaysia. 90% of the respondents reported that they have attended Lean training be it internal, external or both internal and external training while the remaining 10% or 3 persons reported that they have never attended any Lean training. Most of the participants (15 people or 50%) in the pilot study reported that they have less than two years of experience in Lean, while 11 respondents or 36.7% reported that they have been experiencing Lean for two to five years and those who reported that they have six to ten years of Lean experience consists of only 4 persons (13.3%). 96.7% or 29 pilot study respondents reported that they have been involved in continuous improvement or “Kaizen” events and only one respondent (3.3%) has never been involved in any continuous improvement or “Kaizen” activities.

3.8 Reliability and Validity

3.8.1 Reliability

Fraenkel, Wallen and Hyun (2012) defined reliability as the “consistency of the scores obtained” (p. 154). The importance of conducting the reliability test for the purpose of this study is to ensure that the information gathered is trustworthy in representing the findings of this study. According to Muijs (2004) reliability refers to “the extent to which test score are free of measurement error” (p. 71). This study used Cronbach’s alpha to measure the reliability of the instrument. Saunders et al. (2009) described Cronbach’s alpha as “one of the most frequently used methods to calculate consistency” (p. 374). Muijs (2004) also

suggested that in order to claim that the reliability test can be said as “internally consistent”, Cronbach’s alpha should be set at a standard of not less than 0.70. In addition, “any items that are weakly related to the test should be removed from the instrument” (Muijs, 2004, pp. 73-74). Therefore, the items in the questionnaire will be retained should the Cronbach alpha’s value achieve a minimum alpha coefficient of any value greater than 0.70. According to Coakes, Steed and Ong (2010), the removal of items that do not meet the minimum alpha coefficient of 0.70 from the research instrument is considered appropriate to enhance the overall reliability. Table 3.5 shows the Cronbach’s alpha of the pilot study result obtained through reliability analysis in this study.

Table 3.5: Pilot Study Results

Variables	Cronbach’s Alpha
Continuous Learning	0.855
Dialogue Inquiry	0.845
Team Learning	0.857
Embedded Systems	0.915
Empowerment	0.895
System Connections	0.774
Support Leadership	0.915
Continuous Learning	0.946
Sustainable Lean Implementation	0.946
Overall Reliability (N=30)	0.974

The results showed that all alpha coefficient exceeded the minimum standard of 0.70. Furthermore, the current research also found significant information on the result of reliability testing performed by other researchers on the Dimensions of The Learning Organization Questionnaire (DLOQ). The results of the pilot study obtained from the past research showed that the instrument has achieved a considerable level of reliability. The established reliability estimates of DLOQ among different studies are summarized in Table 3.6.

Table 3.6: Cronbach's Alpha Values

Dimension	Watkins and Marsick (1997)	Yang et al. (2004)	Song et al. (2008)	Lien et al. (2006)	Awasthy and Gupta (2012)
Continuous Learning	0.82	0.79	0.70	0.72	0.76
Dialogue Inquiry	0.87	0.85	0.80	0.89	0.69
Team Learning	0.86	0.84	0.80	0.86	0.75
Embedded Systems	0.85	0.79	0.70	0.71	0.78
Empowerment	0.85	0.82	0.76	0.75	0.78
System Connections	0.85	0.75	0.79	0.89	0.76
Support Leadership	0.83	0.86	0.83	0.91	0.85

Source: Adapted from Awasthy & Gupta (2012)

3.8.2 Validity

Fraenkel et al. (2012) defined validity as “the appropriateness, correctness, meaningfulness, and usefulness of the specific inferences researchers make based on the data they collect” (p. 148). Factor analysis is applied in this study for validity testing of the items adopted in the formulation of a complete set of the research questionnaire. Coakes et al. (2010) suggested the use of factor analysis as an “exploratory technique when a researcher wishes to summarize the structure of a set of variables” (p. 133).

Validity is an association that is linked to the concept of linearity that established the features such as relatedness and applicability of the research items used for the development of the research questionnaire. Therefore, validity testing is important to ensure that the construct and its designated measurement fits the objective of this research and that the results of the data analysis at a later stage may truly be the representative of the framework, idea and groundwork underpinning the main issues under study. The minimum value for the factor loading is set at 0.40 (Hair, Anderson, Tatham & Black, 1995).

On the other hand, the information provided by Habtoor (2016) also supported the criteria which indicated that should the value of factor loading exceeded that of 0.50, the variables are considered to be practically significant. Furthermore, in order to allow certain items to be retained in the research instrument, “the most common rule is to base the number of factors on the number of Eigenvalues greater than 1.0” (Zikmund et al., 2013, p. 596). Moreover, the acceptable significant value for Bartlett’s Test of Sphericity should be less than 0.05 whereas the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) should not fall below the minimum value of 0.60 (Coakes et al., 2010).

3.9 Data Collection Procedure

The data collection began with contacting the Human Resource Manager of respective Lean manufacturing companies to obtain their permission in carrying out this study. An explanation was provided to encourage their willingness to participate in this study. Furthermore, during the request for consent to conduct this study with the respective companies, the Human Resource Managers were informed about the confidentiality of the information gathered for the achievement of the research objective which would be used for academic purposes only. Upon obtaining their verbal consent through a phone conversation, consent letters were distributed on December 19th, 2016 to get the formal approval from the top management to conduct the study at their respective organizations. Important information such as the date to collect the distributed questionnaires back was communicated together with the consent letter. Prior to questionnaire distribution, a brief description of the data collection procedures was communicated to the respective person in charge appointed to administer and assist the data collection process from the respective organization.

Questionnaire distribution began across targeted Lean manufacturing companies upon brief explanation on the instructions and confidentiality statement was made clear to the employees involved. Each questionnaire was distributed with a sealable envelop, a pen and a coaster as gifts of appreciation for their precious responses. The researcher's contact information was provided to the respondents in case they needed further clarification or explanation pertaining to the answering of items in the questionnaire. As a contingency measure, extra sets of questionnaires were prepared for any unanticipated events during the fieldwork. Follow up calls to the person in charge of the questionnaire administration were made before the due date as a reminder. The collection of the completed questionnaire from the respondents took approximately two weeks. Questionnaires were returned in the sealed envelopes signifying the completion of fieldwork on January 13th, 2017. The questionnaires were screened to achieve the objective of this study. A total of 219 usable questionnaires were successfully collected from the overall 400 sets of the distributed questionnaires.

3.10 Research Ethics

The ethical consideration in this study is primarily emphasizing on the value of respect for the targeted respondents of this study. Kantian ethics claimed that human rights is the universal standard and this study is carried out based on these maxims, "so act as to treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as means only" (Kant, trans. 1949, p. 46). Therefore, the most important ethical aim of this study is to ensure no one, particularly referring to the respondents, is harmed (Hair et al., 2011) or suffered any negative consequences (Kumar et al., 2013) from this study. Kumar et al. (2013) maintained that the targeted respondents of a research are the most vulnerable

group and the researchers are obligated to protect them. The ethical aim for this research is to treat the respondents with respect and not to be mistreated in achieving the objective of this study.

One of the main ethical obligations that the researcher of this study commits to protect is to ensure confidentiality of the information provided by the respondents. As an example, the researcher ensures that their response is anonymous even to the researcher's own knowledge where respondents are not required to provide any information that reflects their true identity such as their name and the questionnaires are returned in a sealed envelope. Besides, no one other than the researcher "should have access to the information provided by the respondents" (Kumar et al., 2013, p. 11). All the replies will only be used for academic purpose considering the implication that the information gathered is of "commercial importance" to the organizations (Kumar et al., 2013, p. 10). Another practice is providing the organizations involved with the official consent letter specifying the use of the gathered research information as well as additional consent on the questionnaire cover page to reassure the respondents that their responses will be treated with confidentiality. Hair et al. (2011) supported these ethical practices as a form of respect towards respondent's right to privacy.

This study also ensures that all participation is voluntary and free from any element of coercion (Ahmad et al., 2014; Hair et al., 2011). No participants are forced to participate in this study. Besides recognizing the participant's rights to stop participating in this study at any point of time, the response to the items in the questionnaire is designed in a way which allows the employee to indicate their perception as neutral. This study used a five-point Likert Scale in the questionnaire which did not practice forced answer from the employees like the even-numbered scale. It is agreed that "the researcher is better off with no response

than with an inaccurate response” (Hair et al., 2011, p. 66). The researcher also provides all respondents with contact information should they need further clarification on any part of the questionnaire. Token of appreciation in the form of pen and a coaster are presented to each participant together with the questionnaire in a sealable envelope.

3.11 Data Screening

Statistical Package for Social Science (SPSS) software program is used for data screening. Skewness and Kurtosis were interpreted to test the normality of the data. According to Coakes et al. (2010) “Skewness and Kurtosis refer to the shape of the distribution and were used with interval and ratio level data” (p. 42). “Skewness measures the departure from a symmetrical or balanced distribution” and “Kurtosis is a measure of a distribution peakedness or flatness” which is in this study, the data that exist in between Skewness value range of ± 1 and Kurtosis value of ± 1 is assumed to be approximately normal (Hair et al., 2011, pp. 314-315).

3.12 Data Analysis Procedure

This study applied descriptive statistics and statistical inferential analysis to convert quantitative data into meaningful information which utilized the Statistical Package for Social Sciences (SPSS) Version (22.0). According to Ahmad et al. (2014) “descriptive statistics are used to describe the basic features of the data in a study” whereas inferential statistics are used to “make inferences from our data” (pp. 119-124). Further explanation on both approaches of statistical analysis is discussed under the following sections.

3.12.1 Descriptive Statistics

Descriptive statistics are used in this study to describe the demographic characteristics of employees involved in this study. Data are transformed into meaningful information which is presented in the form of frequency, percentage, mean and standard deviation. In addition, cross-tabulation of the data is carried out to describe employee's perception towards sustainable Lean implementation based on their current job position. This is important to address differences in perception among various levels of employees in Lean manufacturing companies. Bhasin (2012) found out that "there was some disagreement between senior and middle management with shop floor operators when there is a need to admit that the prevailing culture poses an issue in Lean progress" (p. 451). The respondents are required to rate 23 items in Section J of the questionnaire. Based on the rating, the minimum score from the response obtained from the respondents is supposed to be 23 (23×1) whereas, the maximum score is expected to be 115 (23×5).

Runyon, Haber, Pittenger and Coleman (1996) proposed the following steps to allocate the range of scores to a different level of Lean sustainability:

- Step 1: Identify the total number of scores by calculating the difference between the highest and the lowest score plus 1 ($115 - 23 + 1 = 93$). Hence, the total number of scores is 93.
- Step 2: In order to describe the level of Lean sustainability, the range of scores are classified into 3 groups. Then, divide the total number of scores with the number of classes in order to get an equal number of scores in each class ($93 / 3 = 31$). Hence, there will be 31 scores in each class.

Step 3: The minimum score for the lowest class is 23 and the maximum score for the lowest class is calculated by adding $(31-1=30)$ to the lowest score of the lowest class $(23+30=53)$. Hence, the highest score for the lowest class is 53.

Step 4: The minimum score for the succeeding class is the next digit of the highest score of the preceding class. In this study, the lowest score of the second highest class would be 54. The maximum score of the second highest class is calculated based on Step 3 $(54+30=84)$. Hence, the highest score for the second highest class is 84.

Step 5: The minimum score for the highest class is determined based on Step 4. Therefore, the lowest score of the highest class would be 85. The maximum score of the highest class is calculated based on Step 3 $(85+30=115)$. Hence, the highest score of the highest class is 115, which is also the maximum score.

Table 3.7 summarized the range of scores within each level of Lean sustainment.

Table 3.7: Level of Lean Sustainment with Range of Scores

Level of Lean sustainment	Range of scores
Low	23-53
Moderate	54-84
High	85-115

3.12.2 Inferential Statistics

The “measure of association is a general term that refers to a number of bivariate statistical techniques used to measure the strength of a relationship between two variables” (Zikmund et al., 2013, p. 561). One of the measures of association deployed for hypothesis testing purposes in this study is the Pearson Product Moment Correlation Coefficient because it is deemed to be the most popular and appropriate technique for indicating the relationship between independent and dependent variables (Zikmund et al., 2013). “The probability of

correlation coefficient having occurred by chance alone that is very low is considered statistically significant whereas if the probability is greater than 0.05 then the relationship is not statistically significant” (Saunders, Lewis & Thornhill, 2009, p. 459). The correlation coefficient, r , can be either “positive or negative depending on the direction of relationship” between the independent variable and the dependent variable (Hair et al., 2011, p. 352). The following Table 3.8 summarizes the strength of correlation based on the differing values of the correlation coefficient.

Table 3.8: Strength of Correlation

Pearson’s Product Moment Correlation Coefficient, r	Narrative
$r = 0$	Perfect interdependence
$0 < r < 0.3$	Weak positive
$0.3 \leq r < 0.7$	Moderate positive
$0.7 \leq r < 1$	Strong positive
$r = 1$	Perfect positive

Source: Saunders et al., 2009, p.459

Mediation effect occurs when mediator as the intervening variable is conceptualized as the mechanism through which the predictor as the independent variable influences the dependent variable (Hayes, 2013, p. 7).

According to Baron and Kenny (1986) in order “to test for mediation, one should estimate the three following regression equations which provide the tests of the linkages of the mediational model:

1. regressing the mediator on the independent variable,
2. regressing the dependent variable on the independent variable,
3. regressing the dependent variable on both the independent variable and on the mediator,

where separate coefficients for each equation should be estimated and tested. There is no need for hierarchical or stepwise regression or the computation of any partial or semi-partial correlations” (p. 1177).

Therefore, this study conducted the Simple Linear Regression to test each regression equation in order to test the effect of the mediator variable (continuous improvement) in this study, which is located causally between the independent variable (workplace learning) and the dependent variable (sustainable Lean implementation).

In order “to establish mediation, the following condition must be met:

1. the independent variable must affect the mediator,
2. the independent variable must affect the dependent variable,
3. the mediator must affect the dependent variable.

If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the mediation model than in the direct model. Perfect mediation holds if the independent variable has no effect when the mediator is controlled” (Baron & Kenny, 1986, p. 1177).

Should there is a significant effect between the independent variable and the dependent variable, but the effect shrinks with the presence of continuous improvement in the mediation model, the condition indicates that partial mediation exists. In order to test if the mediation was significant, the statistical inference for indirect effect used in this study is the normal theory-based Sobel Test which is generated through SPSS PROCESS application (Hayes, 2013, p. 430). According to Hayes (2013), “Sobel test or The Normal Theory Approach is widely used in the social sciences” (p. 102). SPSS PROCESS is a “computational tool for path analysis-based mediation analysis as well as their integration

in the form of a conditional process model” (Hayes, 2013, p. 419). PROCESS can estimate over 70 models (Hayes, 2013, p. 426). Path diagram used under this study is “Model 4” as recognized by the SPSS PROCESS in the model specification (Hayes, 2013, p. 445). According to Hayes (2013), “PROCESS generates 95% bias-corrected bootstrap confidence intervals for all indirect effect” by default, “in any model that involves a mediation component” including Model 4 (p. 430). Furthermore, “various measures of effect size for indirect effects are generated along with bootstrap confidence intervals for effect size inference” (Hayes, 2013, p. 420).

Table 3.9: Summary of Data Analysis Procedure

Research Hypothesis	Test Performed
H _{a1} : There is a relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient
H _{a2} : There is a relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a3} : There is a relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia	
H _{a4} : There is a relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a5} : There is a relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a6} : There is a relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a7} : There is a relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a8} : Continuous improvement mediates the relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test

Table 3.9 continued

H _{a9} : Continuous improvement mediates the relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test
H _{a10} : Continuous improvement mediates the relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a11} : Continuous improvement mediates the relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a12} : Continuous improvement mediates the relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a13} : Continuous improvement mediates the relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	
H _{a14} : Continuous improvement mediates the relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	

3.13 Summary

As a summary, Chapter 3 revealed the philosophical consideration behind the selection of research methodology for this study in order to systematically carry out the research process which is designed to meet the purpose of this study. Overall, the procedures that are followed throughout this research for the purpose of hypothesis testing are based on quantitative research method. This research applied both descriptive statistics and inferential statistics for data interpretation to derive at meaningful information which is statistically significant to meet the overall research objective in this study.

CHAPTER 4

ANALYSIS AND EVALUATION

4.1 Introduction

Upon data screening, this study presents the description of the respondent's characteristics in the form of descriptive statistics. Next, is the findings of statistical analysis which are interpreted to explain the relationship between the studied variables. Further discussions are generated based on the results of the statistical test to clarify the relationship between the mediator variable, independent variables and the dependent variable in this study.

4.2 Data Screening Test Results

Table 4.1: Data Screening Test Results

Variables	Skewness Value (± 1)	Standard Error	Kurtosis Value (± 1)	Standard Error
Continuous Learning	-0.062	0.164	-0.408	0.327
Dialogue Inquiry	-0.378	0.164	0.249	0.327
Team Learning	-0.363	0.164	0.227	0.327
Embedded Systems	-0.180	0.164	-0.294	0.327
Empowerment	-0.322	0.164	0.168	0.327
System Connections	-0.113	0.164	-0.365	0.327
Support Leadership	-0.566	0.164	0.746	0.327
Continuous Improvement	-0.014	0.164	-0.186	0.327
Sustainable Lean Implementation	0.037	0.164	-0.233	0.327

The data collected for this study represented a total of nine variables, seven (continuous learning, dialogue inquiry, team learning, embedded systems, empowerment, system connections and support leadership) of which belongs to the same category, which is

workplace learning (the independent variable) apart from continuous improvement (mediator variable) and sustainable lean implementation (dependent variable). All the data was tested on the normality distribution. According to Hair et al. (2011), the values for Skewness and Kurtosis are the typical measures to look at the nature of the distribution. Skewness is the “symmetry” of the distribution and Kurtosis is the “peakedness” or “flatness” of a distribution (Hair et al., 2011; Asthana & Bhusnan, 2007; Runyon et al., 1996). The results of data screening in Table 4.1 shows that the data representing each variable tested in this study falls within a range of ± 1 for both Skewness and Kurtosis value (Hair et al., 2011). Therefore, the data representing the variables are considered normally distributed.

4.3 Demographic Characteristics of Respondents

Table 4.2: Descriptive Statistics of Respondents

Demographic	Characteristic	Frequency	Percentage
Age Group	19 years old and below	1	0.5
	20 to 29 years old	83	37.9
	30 to 39 years old	77	35.1
	40 to 49 years old	39	17.8
	50 to 59 years old	18	8.2
	60 years old and above	1	0.5
Gender	Male	107	48.9
	Female	112	51.1
Job Classification	Management Staff	58	26.5
	Supervisory Staff	89	40.6
	Supporting Staff	72	32.9
Tenure	Less than two years	59	26.9
	Two to five years	64	29.2
	Six to ten years	57	26.0
	More than ten years	39	17.8
Highest Academic Qualification	Lower Secondary Assessment	1	0.5
	Sijil Pelajaran Malaysia	20	9.1
	Higher School Certificate / Diploma	68	31.1
	Bachelor Degree	122	55.7
	Master Degree	8	3.7

Table 4.2 continued

Lean Training	Yes, externally	28	12.8
	Yes, internally	93	42.5
	Yes, both externally and internally	47	21.5
	No	51	23.3
Years of Lean Exposure	Less than two years	93	42.5
	Two to five years	80	36.5
	Six to ten years	33	15.1
	More than ten years	13	5.9
Kaizen Involvement	Yes	161	73.5
	No	58	26.5

The respondents participated in this study are from different generations of working adults. Majority of the respondents (83 people, 37.9%) are people aged between 20 to 29 years old followed by respondents aged between 30 to 39 years old with a number of 77 people (35.1%). Next, 39 respondents (17.8%) are within the age range from 40 to 49 years old, 18 (8.2%) respondents are within the age range from 50 to 59 years old. The youngest respondent is 19 years old whereas the oldest employee participated in this study is 60 years old which constitute 0.5% of the overall 219 sample in each age group respectively. The result of this study showed that most of the working adults actively engaging in Lean activities within manufacturing companies in Malaysia are between the age of 20 to 39 years old.

Results of data analysis also showed that more female employees (112 people or 51.1%) participated in this study compared to male respondents (107 people or 48.9%). This result surprisingly showed that the participation from female employees is relatively significant within Lean manufacturing companies in Malaysia.

Most of the respondents (89 people or 40.6%) are identified to be holding supervisory job position, followed by supporting staff (72 people or 32.9%) and the smallest group of people

is represented by those holding managerial position (58 people or 26.5%). These numbers are worrisome because Lean initiatives need more input from the shop floor employees which the researcher initially expected to see, more representatives from the supporting staff groups of employees.

Respondents are grouped into four categories based on their tenure. Most of the employees involved in this study (64 people or 29.2%) are reported to have served for at least two to five years, followed by employees with less than two years of tenure (59 people or 26.9%). 57 respondents (26.0%) reported that they have stayed with the organization for six to ten years, whereas, a group of employees who stayed for more than ten years comprises of 39 people (17.8%). Results showed that the number of respondents is evenly distributed across different level of seniority.

More than half of the total 219 respondents, 122 people (55.7%) are the Bachelor Degree holders followed by 68 people (31.1%) hold the Diploma level of education and equivalent. The results signify that most of the employees selected for Lean initiatives among Lean manufacturing companies in Malaysia are those with Diploma and Bachelor Degree. Table 4.2 also shows that 20 people (9.1%) of the respondents have SPM qualification and 8 people (3.7%) are Master Degree holders. There is only one employee with PMR qualification and equivalent responded to this study.

Out of 219 respondents selected for the purpose of this study, 47 people (21.5%) reported that they have attended both external and internal Lean training. Only 28 respondents (12.8%) reported that they attended only external Lean training. A majority of the respondents (93 people or 42.5%) attended in-house Lean training only. However, 51 people (23.3%) stated that they have never attended any Lean training.

As expected, a majority of the respondents, 93 people (42.5%) are exposed to Lean activities in less than two years as Lean implementation is still new in terms of the introduction among the Lean manufacturing companies in Malaysia. The second highest number of respondents (80 people or 36.5%) responded that they have been experiencing Lean activities for two to five years. The results showed that the number of respondents reportedly declined as the years of exposure to Lean activities increases. 33 people (15.1%) responded that they have been introduced to Lean for six to ten years. Only 13 respondents (5.9%) reported that they have experienced Lean for more than ten years.

Out of a total of 219 respondents, a majority of the employees, 161 respondents (73.5%) reported that they participated in the continuous improvement or “Kaizen” activities whereas 58 respondents (26.5%) claimed that they have never been involved in any of such continuous improvement or “Kaizen” events. The figure suggested that not all participants who attended Lean training contribute back to the organization through involvement in continuous improvement activities. Table 4.3 illustrates the difference in the level of sustainable Lean implementation based on the perception reported by employees from a different level of the job position.

Table 4.3: Level of Sustainable Lean Implementation Based on Employee’s Current Job Position

		Job classification			Total
		Management	Supervisory	Supporting	
Lowly sustainable	Count	0	1	2	3
	Percentage	0.0%	0.5%	0.9%	1.4%
Moderately sustainable	Count	37	41	30	108
	Percentage	16.9%	18.7%	13.7%	49.3%
Highly sustainable	Count	21	47	40	108
	Percentage	9.6%	21.4%	18.3%	49.3%
Total	Count	58	89	72	219
	Percentage	26.5%	40.6%	32.9%	100%

From the overall response, most of the employees reported that their organization is achieving moderate to high level of sustainable Lean implementation. A majority of management level respondents (37/58 or 63.8%) responded that their organization achieved a moderate level of sustainment in terms of Lean implementation. However, most of the supervisory (47/89 or 52.8%) and supporting staff (40/72 or 55.6%) reported that their organization achieved a high level of sustainment in terms of Lean implementation. The result is consistent with Bhasin (2012) findings which claimed that “there was some disagreement between senior and middle management with shop floor operators when there is a need to admit that the prevailing culture poses an issue in Lean progress” (p. 451). This study found that most of the supervisory and supporting staff have more favourable impression towards the level of Lean sustainment if compared to management level staff. As mentioned by Comm and Mathaisel (2005b), people may believe that their organizations to be “Leaner and more sustainable than they perhaps actually are” (p. 144). This could happen when supervisory and supporting staff have a different level of involvement in different sets of Lean activities as compared to management level staff, leading to differences in terms of their expectation towards the progress of Lean journey in their organization. In another study by Manzouri et al. (2013), a different result was obtained in the Malaysia Halal food industry. The researchers claimed that Lean implementation was not successful in the Halal food industry. On the other hand, a study by Nordin et al. (2010) on Lean manufacturing implementation in Malaysian automotive industry reported that the majority of the firms are in-transition towards Lean. The empirical evidence of the current research and past research provides enlightening information which could be utilized for the purpose of benchmarking and monitoring of Lean progress for different industries operating in Malaysia.

4.4 Reliability and Validity of the Instrument

4.4.1 Item Validity

Table 4.4: Factor Analysis Results

Variables	Items	Factor
Continuous Learning	In my organization colleagues openly discuss mistakes in order to learn from each other.	0.777
	In my organization colleagues identify skills they need for future work tasks.	0.749
	In my organization colleague help each other learn.	0.746
	In my organization colleagues can get money to support their learning.	0.838
	In my organization colleagues can get other resources to support learning.	0.822
	In my organization colleagues are given time to support learning.	0.717
	In my organization colleagues view problems in their work as an opportunity to learn.	0.569
	In my organization colleagues are rewarded for learning.	0.697
Dialogue Inquiry	In my organization colleagues give open feedback to each other.	0.749
	In my organization colleagues give honest feedback to each other.	0.836
	In my organization colleagues listen to others' views before speaking.	0.846
	In my organization colleagues are encouraged to ask "why" regardless of rank.	0.783
	In my organization whenever colleagues state their view, they also ask what others think.	0.846
	In my organization colleagues treat each other with respect.	0.786
	In my organization colleagues spend time building trust with each other.	0.818
Team Learning	In my organization teams/groups have the freedom to adapt their goals as needed.	0.862
	In my organization teams/groups treat members as equals, regardless of rank, culture or other differences.	0.786
	In my organization teams/groups focus on the group's task.	0.832
	In my organization teams/groups focus on how well the group is working.	0.856

Table 4.4 continued

Team Learning	In my organization teams/groups revise their thinking as a result of group discussions or information collected.	0.799
	In my organization teams/groups are rewarded for their achievements as a team/group.	0.751
	In my organization teams/groups are confident that the organization will act on their recommendations.	0.760
Embedded Systems	My organization uses two-way communication on a regular basis, such as suggestion systems, electronic bulletin boards or town hall/open meetings.	0.685
	My organization enables employees to get needed information at any time quickly.	0.858
	My organization enables employees to get needed information at any time easily.	0.842
	My organization maintains an up-to-date database of employee's skills.	0.820
	My organization creates systems to measure gaps between current and expected performance.	0.827
	My organization makes its lessons learned available to all employees.	0.796
	My organization measures the results of the time spent on training.	0.822
	My organization measures the results of the resources spent on training.	0.803
Empowerment	My organization recognizes employees for taking initiative.	0.817
	My organization gives employees choices in their work assignments.	0.731
	My organization invites employees to contribute to the organization's vision.	0.800
	My organization gives employees control over the resources they need to accomplish their work.	0.828
	My organization support employees who take calculated risks.	0.851
	My organization builds alignment of visions across different levels.	0.878
	My organization builds alignment of visions across different work groups.	0.835
System Connections	My organization helps employees balance work and family.	0.777
	My organization encourages employees to think from global perspective.	0.822
	My organization encourages everyone to bring the customers' views into the decision making process.	0.855
	My organization considers the impact of decisions on employee's morale.	0.804

Table 4.4 continued

System Connections	My organization works together with the outside community to meet mutual needs.	0.867
	My organization encourages employees to get answers from across the organization when solving problems.	0.760
Support Leadership	In my organization leaders generally support requests for learning opportunities.	0.835
	In my organization leaders generally support requests for training.	0.885
	In my organization leaders share up-to-date information with employees about competitors.	0.847
	In my organization leaders share up-to-date information with employees about industry trends.	0.832
	In my organization leaders share up-to-date information with employees about organizational directions.	0.803
	In my organization leaders empower others to help carry out the organization's vision.	0.866
	In my organization leaders mentor and coach those they lead.	0.850
	In my organization leaders continually look for opportunities to learn.	0.835
	In my organization leaders ensure that the organization's actions are consistent with its values.	0.861
	In my organization annual percentage scraps show declining trend.	0.739
Continuous Improvement	In my organization labor productivity shows rising trend over the passage of time.	0.838
	In my organization machine productivity shows rising trend over the passage of time.	0.798
	In my organization efforts towards implementation of Total Quality Management (TQM) are sincere.	0.580
	In my organization efforts towards implementation of continuous improvement (Kaizen) are sincere.	0.544
	In my organization training programs for latest techniques and methods are held frequently.	0.658
	In my organization up gradation of machines and tools are done regularly.	0.694
	In my organization whole organization responds during the process of change implementation.	0.744
	In my organization whole organization requests for support during the process of change implementation.	0.588
	In my organization most personnel have authority and responsibility to implement change.	0.515
	In my organization impact of change is tracked.	0.668

Table 4.4 continued

Continuous Improvement	In my organization results of change are clearly communicated.	0.663
	In my organization results of change are measured objectively.	0.691
	In my organization operators have weekly meetings with office personnel.	0.553
	In my organization continuous improvement (Kaizen) team exists.	0.691
	In my organization continuous improvement (Kaizen) team following established rules with quantifiable results.	0.533
	In my organization we are constantly working on getting better in everything we do.	0.667
	In my organization we have time to work with improvements in everyday work.	0.753
	In my organization there is a standardize way of working with improvement in everyday work.	0.662
	In my organization we focus on how we can improve things, not on who made a mistake.	0.557
	In my organization training programs for personnel in problem solving tools are held frequently.	0.554
	In my organization established measures for monitoring the improvement activities exists.	0.736
	In my organization follows-up to monitor the improvement activities exists.	0.708
	In my organization supportive leadership for improvement exists.	0.529
	In my organization we work in teams or work groups for improvement.	0.572
	In my organization a suggestion scheme for improvement exists.	0.444
	In my organization we follow a general problem solving format such as Plan-Do-Check-Act (PDCA) or Define-Measure-Analyze-Improve-Control (DMAIC).	0.599
Sustainable Lean Implementation	My organization apply six or more timely Lean tools simultaneously. (e.g. 5S, Kaizen, PDCA, Standard Work, Takt Time, SMED, Muda (Waste), Kanban, FIFO, JIT, Gemba, TPM, VSM etc.)	0.884
	My organization apply six or more relevant Lean tools simultaneously. (e.g. 5S, Kaizen, PDCA, Standard Work, Takt Time, SMED, Muda (Waste), Kanban, FIFO, JIT, Gemba, TPM, VSM etc.)	0.871

Table 4.4 continued

Sustainable Lean Implementation	My organization apply six or more appropriate Lean tools simultaneously for three or more years. (e.g. 5S, Kaizen, PDCA, Standard Work, Takt Time, SMED, Muda (Waste), Kanban, FIFO, JIT, Gemba, TPM, VSM etc.)	0.873
	My organization apply six or more relevant Lean tools simultaneously for three or more years. (e.g. 5S, Kaizen, PDCA, Standard Work, Takt Time, SMED, Muda (Waste), Kanban, FIFO, JIT, Gemba, TPM, VSM etc.)	0.847
	My organization apply Lean across the whole value chain.	0.576
	My organization spread Lean application to suppliers.	0.690
	My organization improve the performance of supply chain management.	0.750
	My organization improve delivery records.	0.743
	My organization carry less stock (e.g. finished product, Work in Progress (WIP), raw materials).	0.743
	My organization reduce downtime.	0.551
	My organization reduce resources waste (e.g. motion, waiting, defect, intellectual, etc.).	0.569
	My organization lower manufacturing costs.	0.678
	My organization allocate over seventy per cent (70%) of the organizations cost operating under Lean conditions.	0.649
	My organization improve customer service.	0.699
	My organization increase competitiveness.	0.578
	My organization constantly secure new markets.	0.610
	My organization generate over fifty per cent (50%) sales from new products in less than five years.	0.551
	My organization generate high profitability.	0.597
	My organization improve productivity.	0.810
	My organization increase efficiency.	0.869
	My organization improve employee performance.	0.712
	My organization strengthen teamwork.	0.683
	My organization recognize Lean sustainability as combinations of value streams.	0.702
Notes:	Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization.	

The results of factor analysis as reported in Table 4.4 above shows that all tested items exceeded the minimum standards for validity which are set at 0.4 (Hair et al., 1995). Hence, none of the above-listed items in Table 4.4 is removed for the purpose of this study.

4.4.2 Goodness of Data

Table 4.5: Goodness of Data

Variables	Items	Factor Loading	KMO	Bartlett's Test of Sphericity	Eigen Value	Variance Explained	Cronbach's Alpha
Continuous Learning	8	0.569–0.838	0.830	699.723 (p=0.000)	3.979	63.474	0.851
Dialogue Inquiry	7	0.749–0.846	0.881	954.893 (p=0.000)	4.590	65.568	0.911
Team Learning	7	0.751–0.862	0.909	901.895 (p=0.000)	4.566	65.234	0.908
Embedded Systems	8	0.685–0.858	0.877	1234.814 (p=0.000)	5.224	65.297	0.923
Empowerment	7	0.731–0.878	0.880	1091.141 (p=0.000)	4.720	67.422	0.917
System Connections	6	0.760–0.867	0.894	721.099 (p=0.000)	3.986	66.432	0.897
Support Leadership	9	0.803–0.885	0.921	1776.363 (p=0.000)	6.446	71.618	0.950
Continuous Improvement	27	0.444–0.838	0.934	4623.602 (p=0.000)	14.034	66.131	0.963
Sustainable Lean Implementation	23	0.551–0.884	0.920	4785.864 (p=0.000)	12.713	69.445	0.963
Overall Reliability							0.988

Table 4.5 summarizes the goodness of data test results. The results showed that all Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy values exceeds the absolute minimum of 0.6 and Bartlett's Test of Sphericity is significant with $p < 0.05$. In addition, the results also reported that the data representing each variable achieved Eigenvalue above 1 and the factor

loading also surpasses the minimum value of 0.40 (Hair et al., 1995). Moreover, reliability test results also showed that the Cronbach's alpha for all the variables is greater than the minimum 0.70 (Coakes, Steed & Ong, 2010). Therefore, the results justified that the instrument is reliable and can be used for the purpose of hypothesis testing in this study (Muijs, 2004).

4.5 Hypothesis Testing

4.5.1 Results of Correlation Analysis

The Relationship between Continuous Learning and Sustainable Lean Implementation

Table 4.6: Results of Correlation between Continuous Learning and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
Continuous Learning	0.698**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

Table 4.6 shows that the correlation between continuous learning and sustainment of Lean implementation is $r = 0.698$, indicating a positive relationship between the two variables tested. The result ($\text{Corr}(x,y) = +0.698$, $p=0.000$) also provides a statistically significant evidence that continuous learning is moderately related to sustainment of Lean implementation. Therefore, we accept the first hypothesis in this study as follows:

H_{a1} : There is a relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

The result of data analysis showed that employees perceived the opportunities for continuous learning which are being made available at their workplace are alleviating the struggle towards sustainment of Lean initiatives. In another study by Habtoor (2016), human factors which include training and education, reward and recognition, employee involvement, leadership, customer focus, as well as quality improvement practices, are found to be significantly related to organizational performance. Besides, this study also supported several other previous literature (Lindskog et al., 2016; van Dun & Wilderom, 2016; Jadhav et al., 2014a; 2014b; Mohd-Zainal et al., 2011; Comm & Mathaisel, 2005b; Hines et al., 2004) which claimed that workplace learning is somehow related to sustainable Lean implementation. Lack of opportunities being created for continuous learning is also believed to be one of the factors that slow down the progress of developing more skilled workers. Sequentially, lack of skilled workers (Manzouri et al., 2013; Jayaraman et al., 2012) are believed to be one of the barriers that caused the situation where employees have lack of understanding (Manzouri et al., 2013; Nordin et al., 2010; Comm & Mathaisel, 2005a; 2005b) about Lean concept and eventually resist to take part or be involved in Lean transformation (Bakar et al, 2017; Zahraee, 2016; Sahwan et al., 2012; Papadopoulos, 2011).

This finding is consistent with the adult learning principles that employees as adult learners have the need to know before getting themselves engaged. Optimization of employee capabilities and effective utilization of human resource in a Lean organization are believed to be one of the success factors for the sustainment of Lean initiatives (Barney & Clark, 2007; Comm & Mathaisel, 2005a). Some studies also suggested that the development of training and learning centre will create opportunities for employee learning, which is also one of the recommended Lean sustainability practices in their study (Waterbury, 2015; Comm & Mathaisel, 2005b). Therefore, the opportunities for employee learning, training

and development are an important dimension to be considered in order to sustain Lean gains. Thus, this finding is also consistent with Resource Based View (RBV) that successful development of human resource capability will sustain competitive advantage in the long run. Continuous learning environment at the workplace is a culture that creates the source of sustainable competitive advantage as skilled workforce enables efficient development of firm's resources to create values and achieve higher productivity which meets the standards reaching, above and beyond customer's expectation in a firm-specific way.

The Relationship between Dialogue Inquiry and Sustainable Lean Implementation

Table 4.7: Results of Correlation between Dialogue Inquiry and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
Dialogue Inquiry	0.668**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

Table 4.7 shows that employee's perception of dialogue inquiry is positively correlated with the sustainment of Lean implementation ($r = +0.668$). The result ($\text{Corr}(x,y) = +0.668$, $p = 0.000$) indicates a moderate positive relationship between the two variables which is statistically significant with a p-value smaller than the level of significant ($\alpha = 0.05$). Thus, we have sufficient empirical support to accept the following hypothesis:

H_{a2}: There is a relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Hence, when perceived communication and information sharing is high, the sustainability of Lean implementation is also expected to be high. The findings obtained in this study

extended previous findings (Waterbury, 2015; Jayaraman et al., 2012) which showed that communication is one of the critical success factors that enhance performance in Lean organizations. The result of this study had shown that active dialogue inquiry will not only induce the kickoff of Lean initiatives but will facilitate sustainment of Lean implementation as well. Comm and Mathaisel (2005a; 2005b) also shared the same findings which suggested that open communication is perceived as a channel which is crucial for a successful Lean implementation. The findings of the current study also provided an imperative empirical support for the theoretical concept proposed by Jadhav et al. (2014a; 2014b) which stressed a lot of attention on the communication of goals between manager and employees to gain more involvement and support from each level of the organization for a successful implementation of Lean. According to Jadhav et al. (2014b), Lean success stories such as effective cost reduction effort that is not made known across organization caused many employees to be unaware of Lean benefits. As a result, employees are unable to identify any Lean gains from continuous improvement or “Kaizen” events and feel that there is little need to contribute towards an effort that is perceived as not resulting in any positive outcome. Lack of communication is likely to result in absence of perceived recognition and mutual trust between managers and employees. Jadhav et al. (2014a) believed that effective labour relations are the foundation for conducive learning environment which will enhance sustainment of Lean implementation. Sufficient information sharing will reduce employee’s sense of uncertainty, which, also reduce their resistance towards participating or committing to any improvement effort. Therefore, successful dialogue inquiry that builds on trust and respect must be emphasized by the Lean practitioners to ensure successful Lean implementation for a long-term sustainment of competitive advantage.

The Relationship between Team learning and Sustainable Lean Implementation

Table 4.8: Results of Correlation between Team Learning and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
Team Learning	0.659**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

Table 4.8 shows that there is a positive relationship between team learning and employee's perception towards sustainment of Lean implementation ($\text{Corr}(x,y) = +0.659$, $p = 0.000$) where the p-value is smaller than the significant level ($\alpha = 0.05$). The correlation coefficient ($r = 0.659$) indicated a moderate positive relationship between the independent and the dependent variable. Therefore, we have empirically supported evidence to accept the following hypothesis:

H_{a3}: There is a relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

The result in this study showed that when employees have a positive perception towards their involvement and participation in teamwork, their joint effort contributes towards sustainment of Lean initiatives. A survey on Lean manufacturing implementation by Nordin et al. (2010) found that "group problem solving and cross functional teams which are clustered under the human resource Lean categories have shown the highest mean of Lean manufacturing adoption" among their studied population (p. 378). Besides, Jadhav et al. (2014a) also included teamwork as one of the human-centric clusters which is believed to be one of the major Lean domains and claimed that these clusters address the fundamental issues that must be understood by Lean practitioners for a successful Lean implementation.

The findings of a case study conducted by Roslin et al. (2012) suggested that teamwork is one of the key factors of successful Lean implementation. However, not much attention has been paid by previous research on team learning aspect of workplace learning and discussions on the interconnection between team learning with sustainable Lean implementation are limited. This area is addressed in this study because successful Lean is actually a result of Quality Control circle where a Lean team works together to achieve continuous improvement. Thus, it is believed that the empirical findings of this study have enlightened certain area that has not been paid much attention to when looking into the factors that would increase the chance of Lean sustainment upon its implementation at the workplace.

The Relationship between Embedded Systems and Sustainable Lean Implementation

Table 4.9: Results of Correlation between Embedded Systems and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
Embedded Systems	0.729**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

Table 4.9 shows that there is a strong positive relationship ($\text{Corr}(x,y) = +0.729$, $p = 0.000$) between embedded systems and employee's perception of the sustainability of Lean implementation. The p-value is smaller than the level of significant ($\alpha = 0.05$) indicating that the correlation is statistically significant. Therefore, we accept the following hypothesis:

H_{a4}: There is a relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

This study had shown a result which opposed the belief by Yang et al. (2004) fourteen years ago. Yang et al. (2004) underestimated the influence of information technology on business performance back then. The authors claimed that embedded systems appeared to be less important as compared to other learning dimensions such as system connections. Yang et al. (2004) explained that “connecting the organization to its environment may be much more important than creating systems to capture and share learning in an ever-changing world” (p. 50). Surprisingly, this study proved that the significant role of information technology in today’s business should not be taken too lightly. The result of data analysis provided empirical evidence that employees in Lean manufacturing companies recognized the increasing importance of technology and information systems and its positive impact on sustaining Lean implementation.

According to Habidin and Yusof (2013), a quality information and analysis contributes to Lean implementation. Waterbury (2015) also identified information technology (IT) resources as one of the success factors for Lean implementation. This study extended the previous findings and proved that embedded systems are necessary, not only to the extent of implementation but in sustainment of Lean implementation as well. From the perspective of Resource Based View (RBV), a well-maintained information system is also a valuable resource that helps an organization to achieve a competitive advantage. Therefore, it is important for a Lean organization to consider the aspect of the development of information technology as a supporting tool which is vital for the enhancement of employee’s capabilities at the workplace. Comm and Mathaisel (2005b) have listed several practices that supported the importance of the information system in sustaining Lean. Among several initiatives to optimized the power of information system which is found to be important for Lean sustainability as mentioned by the Comm and Mathaisel (2005b) include “streamlined online

HR system, convergence of one IT network and centralized IT helpdesk and functions” (p. 233). Embedded systems are needed to maintain quality information which is up-to-date in a Lean organization. Lean practitioners are able to identify problematic area more accurately when quality information on operational performance are available. Sufficient information will enable Lean practitioners to make a detailed analysis and accurate decision which can contribute towards better sustainment of Lean initiatives.

Moreover, Jayaraman et al. (2012) study also found that visual management is one of the significant critical success factors which contributes towards both operational performance as well as organizational performance in the Lean manufacturing organization. Visual management, made available to all employees through embedded systems is a powerful Lean tool to encourage accountability because it is a method to measure, keep track and communicate the latest progress of all continuous improvement or “Kaizen” projects involving each employee and their team respectively. Therefore, management especially in manufacturing organization need to set their yearly budget to maintain and upgrade their information system as it is proven in this study that embedded systems strongly affect the success of Lean organization.

The Relationship between Empowerment and Sustainable Lean Implementation

Table 4.10: Results of Correlation between Empowerment and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
Empowerment	0.688**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

Table 4.10 shows that the sustainment of Lean implementation is induced by empowerment in the same direction. The result of data analysis ($\text{Corr}(x,y) = +0.688$, $p = 0.000$) exhibits a somewhat moderate positive relationship between empowerment and sustainability of Lean implementation which is statistically significant with a p-value lower than the level of significant ($\alpha = 0.05$). Therefore, we have a statistically valid reason to accept the following hypothesis:

H_{a5}: There is a relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

The results showed that the perceived autonomy, freedom of choice and trust granted to the employees to learn and perform their work positively affect the sustainability of Lean implementation. This statistical finding supported the theoretical concept proposed by Jadhav et al. (2014b) that lack of employee empowerment is one of the barriers identified in Lean implementation. Lindskog et al. (2016) also found out that weak participation and ownership in terms of goal clarity has led to unsuccessful Lean implementation. This result by Lindskog et al. (2016) is consistent with the current findings which proved that employee empowerment is positively related to the sustainment of Lean implementation in Lean manufacturing companies. In a study by Comm and Mathaisel (2005a) all participated institution agreed that “employee empowerment somewhat encourages Leanness” (p. 140). The reason for the establishment of such relationships can be explained from the perspective of adult learning. Employee as an adult learner “needs to be seen and treated by others as being capable of self-direction” at the workplace (Knowles, 1989, p.83). This is a form of support that encourages the employees when they found their “self-concept” by performing meaningful work. Employee empowerment enhances the employee’s sense of ownership on their Lean tasks and makes them feel that they are accountable for their achievement in

sustaining Lean gains. Therefore, employee empowerment must be made available in Lean manufacturing organization due to its potential in encouraging employee's engagement to channel their efforts towards sustainment of Lean implementation.

The Relationship between System Connections and Sustainable Lean Implementation

Table 4.11: Results of Correlation between System Connections and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
System Connections	0.676**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

Table 4.11 shows that there is an interconnection between systems connections and sustainable Lean implementation. The results ($\text{Corr}(x,y) = +0.676$, $p = 0.000$) illustrated a relatively clear pattern between the two variables where system connections positively affect the initiative to sustain Lean implementation. The correlation coefficient is within the range of moderate positive relationship ($0.3 \leq r < 0.7$) and the hypothesis testing result is significant where p-value is found to be lower than $\alpha = 0.05$. Therefore, the following hypothesis is accepted:

H_{a6}: There is a relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Employees in Lean manufacturing companies are aware that developing good relationships with all the stakeholders across the value chain is vital for the sustainability of Lean implementation. The perceived importance of interaction with people outside of the organization such as partnership and collaborations are believed to benefit the organization

in terms of information exchange. Manzouri et al. (2013) reported that one of the barriers that could lead to failure in terms of Lean implementation in the Halal food industry is due to lack of willingness in terms of information sharing across the supply chain. This study has proven that it is important to encourage employee's learning by taking into consideration the customer's feedback besides collaborating with other external stakeholders, be it the supplier or distributor, for a quality improvement across the supply chain. Strategic partnership and collaboration with the external stakeholders are vital to achieve mutual benefits and sustain the Lean implementation. Besides, active employees' involvement in collaborative efforts and strategic partnership across the supply chain are the alternative forms of employee learning which are believed to be a sustainable practice in the Lean organization (Comm & Mathaisel, 2005b). Feedback from external environment also allows employees to think holistically when seeking for a better solution in responding to the needs of various stakeholders. From the adult learning point of view, employees gain enrichment in terms of learning from their experience when interacting with outside communities. The result of such learning will serve as the inputs for the problem-solving initiative which focuses on the bigger picture. Consistent with Lean objective, system connections enable employees to be more customer-focused when pursuing successful Lean initiatives.

The Relationship between Support Leadership and Sustainable Lean Implementation

Table 4.12: Results of Correlation between Support Leadership and Sustainable Lean Implementation

Variable	Sustainable Lean Implementation	
	r	p
Support Leadership	0.685**	0.000

Notes. **Correlation is significant at the 0.01 level (2-tailed)

As a result of hypothesis testing, Table 4.12 shows that the correlation coefficient between support leadership and sustainable Lean implementation to be within the range of positive moderate relationship ($\text{Corr}(x,y) = +0.685$, $p = 0.000$). Since the relationship is significant where the p-value is less than the α -value of 0.05, there is a sufficient statistical evidence to accept the following hypothesis:

H_{a7}: There is a relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

The results showed that Lean manufacturing employees are referring to their leaders as an information and resource provider in the course of supporting their learning initiatives towards sustainment of Lean implementation. The result as shown in Table 4.12 is imperative with the supporting findings from Jayaraman et al. (2012) which found out that management engagement and commitment is one of the most influential critical success factors in the implementation of the Lean programme in the electronic manufacturing service industry. However, the significance of the result of the current research extends the findings extracted from the previous research (Habidin & Yusof, 2013; Manzouri et al., 2013; Jayaraman et al., 2012; Roslin et al., 2012). The finding of this study had proven that leader's support not only contributes towards positive effect on the implementation of Lean in the manufacturing industry but also ensure a long-term sustainability in terms of achieving consistent and reliable results.

The empirical evidence obtained in this study have validated the theoretical concept proposed by Jadhav et al. (2014b) and Mohd-Zainal et al. (2011) that support from leaders are important for Lean transformation to take place. The researcher has a strong reason to believe that adequate support from top leaders serves as the foundation of well-planned Lean

initiatives which lead to a sustainable outcome. Habidin and Yusof (2013) also shared the same point of view indicating that “without leadership from the aspect of commitment, involvement and active support, a sustainable improvement program will never be realized” (p. 70). The justifications behind the finding of this study are further strengthened by the claim made in several other research (Kregel & Coners, 2018; Comm & Mathaisel, 2005a; 2005b) which found that consistent leadership in terms of communicated vision and philosophy are critical for Lean sustainability to succeed.

Therefore, Lean leaders must be aware that their influence is very important to encourage employee’s performance, providing support in terms of disseminating quality and up-to-date information and allocating resources efficiently to support any activities that add sustainable value to the company. From the perspective of Resource Based View (RBV), a Lean organization that is championed by a strong management team will be able to sustain their Lean gain and achieve long-term competitive advantage in the industry.

4.5.2 Results of Regression Analysis

Regression analysis is one of the common approaches used by researchers (Zahraee, 2016; Jönsson & Schölin, 2014) for hypothesis testing involving mediation (van Dun & Wilderom, 2016; Lam et al., 2015) in Lean studies. Hypothesis testing for mediation effect of continuous improvement on the relationship between workplace learning and sustainable Lean implementation was carried out based on Baron and Kenny (1986) criteria with linear regression analysis, bootstrapping and Sobel Test.

The Relationship between Workplace Learning and Continuous Improvement

Table 4.13: Results of Regression Analysis between the Dimensions of Workplace Learning and Continuous Improvement

Dimensions	Unstandardized Coefficient		Standardized Coefficients	p
	β	SE	Beta	
Continuous Learning	0.721	0.044	0.747	0.000
Dialogue Inquiry	0.644	0.040	0.737	0.000
Team Learning	0.672	0.040	0.752	0.000
Embedded Systems	0.741	0.031	0.850	0.000
Empowerment	0.650	0.034	0.796	0.000
System Connections	0.661	0.039	0.758	0.000
Support Leadership	0.650	0.035	0.781	0.000

Table 4.13 shows that continuous learning ($\beta = 0.721$, $p < 0.05$), dialogue inquiry ($\beta = 0.644$, $p < 0.05$), team learning ($\beta = 0.672$, $p < 0.05$), embedded systems ($\beta = 0.741$, $p < 0.05$), empowerment ($\beta = 0.650$, $p < 0.05$), system connections ($\beta = 0.661$, $p < 0.05$) and support leadership ($\beta = 0.650$, $p < 0.05$) are found to be significant predictors of continuous improvement respectively. Therefore, we can conclude that there was a significant positive relationship between all dimensions of workplace learning and continuous improvement. This result is relatively consistent with Sraun and Singh (2017) study which found that leadership, a system supporting core work and people's total involvement are significant for the success of continuous improvement strategies in the manufacturing system process. Support from leaders and employee's perceived empowerment contribute towards sincere effort in continuous improvement instead of blaming culture in problem-solving.

The result of this study confirmed the claim made by Lam et al. (2015) that "management support and employee commitment are key components of a continuous improvement project implementation" (p. 201). Employees who are not resisting to pursue innovation through experimentation is the drivers towards continuous improvement initiatives. In

another study by Habtoor (2016), human factors which include “leadership, customer focus, supplier relation, employee involvement, training and education as well as reward and recognition” are also found to be significantly related to quality improvement practices (p. 464). This study yields similar findings that continuous support to establish learning opportunities through training and sufficient time given to employees to work on transferring their knowledge into work practices also positively impact continuous improvement.

Besides, frequent communication of measurable and updated results also significantly produced positive continuous improvement outcome. Moreover, brainstorming and sharing of ideas contribute towards innovative suggestions for continuous improvement implementation (Seaker & Waller, 1996). This finding of this study supported the notion that effective dialogue inquiry positively affect continuous improvement initiatives.

An organization with a positive learning culture that constantly provides learning opportunities for employees is significantly proven to enhance employee’s enthusiasm and perseverance to channel their knowledge and expertise back to their work which ultimately contributes towards continuous improvement or “Kaizen” initiatives. Therefore, this study supported previous literature (Hirzel et al. 2017; Lam et al., 2015; Ali et al., 2013; Gao & Low, 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005) which claimed that there is a significant relationship between workplace learning and continuous improvement. Therefore, the first condition to identify the effect of mediator as proposed by Baron and Kenny (1986) that “the independent variable must affect the mediator” has been met.

The relationship between workplace learning, continuous improvement and sustainable Lean implementation

Table 4.14: Results of Regression Analysis between the Dimensions of Workplace Learning, Continuous Improvement and Sustainable Lean Implementation

Dimensions	Unstandardized Coefficient		Standardized Coefficients	p
	β	SE	Beta	
Continuous Learning	0.671	0.047	0.698	0.000
Dialogue Inquiry	0.582	0.044	0.668	0.000
Team Learning	0.587	0.045	0.659	0.000
Embedded Systems	0.633	0.040	0.729	0.000
Empowerment	0.559	0.040	0.688	0.000
System Connections	0.587	0.043	0.676	0.000
Support Leadership	0.568	0.041	0.685	0.000
Continuous Improvement	0.853	0.035	0.856	0.000

Table 4.14 shows that continuous learning ($\beta=0.671$, $p<0.05$), dialogue inquiry ($\beta=0.582$, $p<0.05$), team learning ($\beta=0.587$, $p<0.05$), embedded systems ($\beta=0.633$, $p<0.05$), empowerment ($\beta=0.559$, $p<0.05$), system connections ($\beta=0.587$, $p<0.05$), support leadership ($\beta=0.568$, $p<0.05$) and continuous improvement ($\beta=0.853$, $p<0.05$), contribute significantly towards sustainable Lean implementation. The findings showed that all the dimensions of workplace learning and continuous improvement significantly affect sustainment of Lean implementation. The findings confirmed Jørgensen et al. (2007)'s believe that learning and knowledge sharing enable the institution of a sustainable Lean implementation. This result is also evident in the study by Zahraee (2016) which found that human resources are significantly related to Lean manufacturing.

Continuous support in employee's workplace learning facilitates employee's readiness to accept and implement change in Lean manufacturing. These findings have proven that learning at the workplace enhances employee's performance and productivity through waste

elimination, cost reductions and efficient utilization of resources which helped Lean firms to generate higher profitability. Long-term sustainment of these Lean benefits which is built upon positive values such as high level of respect and trust among improvement teams or work groups will eventually lead to a higher chance of increased market competitiveness.

The findings also revealed the fact that continuous improvement is one of the predictors of sustainable Lean implementation which is parallel with the previous findings (Angelis & Fernandes, 2012; Chauhan & Singh, 2012). The findings of this study suggested that Lean organization must pursue more continuous improvement or “Kaizen” activities to ensure sustainment of Lean gain. In addition, organizations must not carry out continuous improvement activities simply for cost reduction in order to reap short-term financial gain but must be able to understand the main concept behind the continuous improvement in order to achieve sustainable competitive advantage. Continuous improvement or “Kaizen” is one of the most essential element when implementing Lean that can create a productive working culture if embraced successfully. The reason is that continuous improvement initiative accentuates creativity and innovative practice to leverage the core competencies that move the organization forward and portrays an ideal representation of Resource Based View (RBV) application in practice (Jadhav et al., 2014a). The most successful example is the Toyota way of developing the culture of continuous improvement or “Kaizen” mindset which enhances their employee’s problem-solving capabilities (Monden, 2012; Wong & Wong 2011). Therefore, the second and the third conditions which require both independent variable and mediator must affect the dependent variable as proposed by Baron and Kenny (1986) to test the presence of mediator has been fulfilled.

4.5.3 Results of Mediation Analysis

Continuous Improvement Mediates the Relationship between Continuous Learning and Sustainable Lean Implementation

Table 4.15: Results of Mediation Test for Continuous Improvement on the Relationship between Continuous Learning and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R2=0.488)		
Continuous Learning $\rightarrow$ Sustainable Lean Implementation	0.671	0.000
Mediation Model (R2=0.740)		
Continuous Learning $\rightarrow$ Sustainable Lean Implementation	0.129	0.011
Continuous Learning $\rightarrow$ Continuous Improvement	0.721	0.000
Continuous Improvement $\rightarrow$ Sustainable Lean Implementation	0.753	0.000

The result in Table 4.15 shows that continuous improvement partially mediates the relationship between continuous learning and sustainable Lean implementation. It is observable that the effect of continuous learning on sustainable Lean implementation shrink upon the addition of continuous improvement as a mediator into the mediation model ($\beta=0.129$, $p=0.011$) as compared to before the presence of continuous improvement as a mediator into the analysis in the direct model ($\beta=0.671$, $p=0.000$). According to Baron and Kenny (1986), a variable can be considered to functions as a mediator when a previously significant effect of predictor variable in the direct model is reduced in terms of effect size after the inclusion of mediator variable into the analysis (p. 1176). Therefore, as the effect of continuous learning on sustainable Lean implementation shrink upon the addition of continuous improvement as a mediator into the mediation model, it can be implied that continuous improvement has a partial mediating effect on the relationship between continuous learning and sustainable Lean implementation. In terms of explanatory power, the inclusion of continuous improvement in the mediation model explained 74% of the

variance in sustainable Lean implementation. Therefore, we have evidence to accept the following hypothesis:

H_{a8}: Continuous improvement mediates the relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

One of the explanations for the partial mediation could be due to the organizations involved in this study implemented continuous improvement initiatives and encouraged workplace learning without comprehensive integration between both practices. This situation might have similarities to Gleskes and ten Broeke (2000) study which proposed that the “perceived gap between continuous improvement and learning are not translated into action because these organizations are heavily engaged in the day-to-day management of projects, try to increase their capabilities and skills in carrying out the projects, but are not oriented towards improvement” (pp. 193-194). This situation best explained the results obtained through this study which showed that continuous improvement partially mediates the relationship between workplace learning and sustainable Lean implementation.

Since the findings found out that continuous improvement somehow influences the relationship between workplace learning and sustainment of Lean initiative although the situation is not in the form of perfect or full mediation, therefore, this study has the confident to highlight Savolainen and Haikonen (2007) suggestion that investment and resource allocation to support employee’s training is needed to enhance learning and continuous improvement. The manufacturing sector registered the highest number of the job vacancy, 41.9% out of a total of 1,473,376 job opportunities available in Malaysia during the year 2017 as compared to other major sectors that provide job opportunities in Malaysia (MOF, 2018a). One of the factors that could explain the mentioned figure could be due to the high

turnover of labour in the manufacturing sector which explained the result of this study. Minh et al. (2018) also mentioned that employee turnover is one of the major problems in the manufacturing sector in Malaysia. Alstrup (2000) suggested that due to “high turnover of labor and the firm’s policy of constantly adapting the size of the workforce to the order situation, it will be more relevant to aim at the workers’ continuous learning than initiating continuous improvement in the firm” (p. 168).

Besides the issue with the dynamic workforce, Singh and Singh (2015) pointed out that continuous learning is also required to cope with new discoveries which challenge the existing organizational practices in order to continuously improve organizational performance. Continuous learning initiatives are powerful enough to drive employees towards a more intensive understanding of Lean principles and provide employees with sufficient competencies on sustaining Lean gains. Although results showed that continuous learning would somehow affect continuous improvement in a positive way which then leads to the sustainment of Lean implementation, organization should be aware that rigidity in terms of methodological standardization must not mean that the new Standard Operating Procedures (SOPs) based on new methods should become the fixed goal (Imai, 1986). Continuous improvement team should constantly revisit and review the new standardized procedures and make necessary improvement from time to time.

Active implementation of continuous improvement or “Kaizen” activities as a result of the dynamic continuous learning environment at the workplace is one of the unique capabilities that can strengthen an organization from the perspective of Resource Based View (RBV). This is because a productive culture enables an organization to sustain their competitive advantage through efficient utilization of their valuable resources in a more organized manner. A good workplace culture and practice that are oriented towards productivity is a

strength that is hard to imitate by the industry rivals. This situation has been observed in the adoption of Lean practices among the Japanese and Western manufacturer's working culture at which, the Western manufacturers often find it challenging to practice Lean Thinking (Hines et al., 2004; Imai, 1986). From the perspective of adult learning, the perceived benefits or reward for learning that are created to promote a culture for continuous learning at the workplace also motivate employees to repeat the same effort and improve continuously to sustain Lean gains.

Continuous Improvement Mediates the Relationship between Dialogue Inquiry and Sustainable Lean Implementation

Table 4.16: Results of Mediation Test for Continuous Improvement on the Relationship between Dialogue Inquiry and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R2=0.446)		
Dialogue Inquiry → Sustainable Lean Implementation	0.582	0.000
Mediation Model (R2=0.736)		
Dialogue Inquiry → Sustainable Lean Implementation	0.071	0.119
Dialogue Inquiry → Continuous Improvement	0.644	0.000
Continuous Improvement → Sustainable Lean Implementation	0.793	0.000

Referring to Table 4.16, the inclusion of continuous improvement in the mediation model showed that continuous improvement mediates the relationship between dialogue inquiry and sustainable Lean implementation. Before the inclusion of continuous improvement as a mediator variable into the analysis in the direct model, dialogue inquiry is found to be a significant predictor of sustainable Lean implementation ($\beta=0.582$, $p=0.000$). However, after the inclusion of continuous improvement in the mediation model, the previous significant relationship between dialogue inquiry and sustainable Lean implementation

($\beta=0.582$, $p=0.000$) changes to the non-significant relationship in the mediation model ($\beta=0.071$, $p=0.119$).

Baron and Kenny (1986) stated that a variable functions as a mediator when it meets the conditions when the path representing the relationship between dialogue inquiry and continuous improvement and the path representing the relationship between continuous improvement and the sustainable Lean implementation are controlled, a previously significant relation between the predictor (dialogue inquiry) and dependent variable (sustainable Lean implementation) is no longer significant, with the strongest demonstration of mediation occurring when the path representing a direct model of the relationship between dialogue inquiry and sustainable Lean implementation is zero. In short “when the path representing direct model is reduced to zero, we have strong evidence for a single, dominant mediator” (Baron and Kenny, 1986, p. 1176). Therefore, as the previous significant relationship between dialogue inquiry and sustainable Lean implementation ($\beta=0.495$, $p=0.000$) changes to non-significant relationship in the mediation model ($\beta=0.071$, $p=0.119$) and the strength of the relationship decreases, it can be implied that continuous improvement has a full mediating effect on the relationship between dialogue inquiry and sustainable Lean implementation. In terms of explanatory power, the inclusion of continuous improvement in the mediation model explained 73.6% of the variance in the sustainable Lean implementation. Hence, the following hypothesis is accepted:

H_{a9}: Continuous improvement mediates the relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

The results showed logical finding that active dialogue inquiry reinforced sustainment of Lean implementation which is strengthened with the existence of continuous improvement

or “Kaizen” programmes. This finding is consistent with the previous studies and literature support (Gelei, Losonci & Matyusz, 2015; Jadhav et al., 2014b; Comm & Mathaisel, 2005b) which indicated that open communication and dialogue contribute to Leanness. Continuous improvement or “Kaizen” programme is expected to be the medium in which employees actively engage in brainstorming during the Quality Circle activities and discuss solutions to quality problems which is believed to be the gist for effective transfer of knowledge. From the adult learning point of view, employees as adult learners learn best when their learning orientation is more life-centred in which such situation is generated when employees engage themselves in searching for solutions which affect them in their real working environment.

Long-lasting improvement in terms of positive communication practices among employees is predictable as the result of frequent problem-solving sessions within continuous improvement or “Kaizen” programme roll-out (Hirzel et al., 2017; Ali et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005). Therefore, Hirzel et al. (2017) claimed that “open and structured communication is needed to promote continuous improvement in a sustainable way” (p. 1568). Deriving at this point, the findings of this study provide a valid justification that positive interaction at the workplace for successful transfer of information assisted through continuous improvement or “Kaizen” initiatives is a must for sustainable Lean implementation. A high level of respect for employee’s idea within the continuous improvement culture or “Kaizen” mindset provides employees with the chance to deliver and at the same time receive open and honest feedback through a series of constructive problem-solving discussions. This learning environment gives the employee the foundation to think critically and practice their new ideas as a solution to the challenge faced in day-to-day operations without the fear of getting blame which will eventually help the organization to sustain their Lean initiatives.

Continuous Improvement Mediates the Relationship between Team Learning and Sustainable Lean Implementation

Table 4.17: Results of Mediation Test for Continuous Improvement on the Relationship between Team Learning and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R ² =0.434)		
Team Learning → Sustainable Lean Implementation	0.587	0.000
Mediation Model (R ² =0.733)		
Team Learning → Sustainable Lean Implementation	0.031	0.512
Team Learning → Continuous Improvement	0.672	0.000
Continuous Improvement → Sustainable Lean Implementation	0.826	0.000

The inclusion of continuous improvement in the mediation model of the analysis showed that the continuous improvement does act as a mediating variable for the relationship between team learning and sustainable Lean implementation. Prior to the inclusion of continuous improvement into the analysis in the direct model, team learning is found to be a significant predictor of sustainable Lean implementation ($\beta=0.587$, $p=0.000$). However, upon the inclusion of continuous improvement in the mediation model, the previous significant relationship between team learning and sustainable Lean implementation in the direct model ($\beta=0.587$, $p=0.000$) change to insignificant relationship in the mediation model ($\beta=0.031$, $p=0.512$).

Baron and Kenny (1986) stated that the mediating variable can be considered when a previously significant effect of a predictor variable is reduced to insignificant or reduced in terms of effect size after the inclusion of mediator variable into the analysis. Hence, as the previous significant relationship between team learning and sustainable Lean implementation in the direct model ($\beta=0.587$, $p=0.000$) change to the insignificant relationship in the mediation model ($\beta=0.031$, $p=0.512$) and the strength of the relationship

decreased, it can be implied that continuous improvement has a full mediating effect on the relationship between team learning and sustainable Lean implementation. As for the explanatory power, the inclusion of continuous improvement in the mediation model explained 73.3% of the variance in sustainable Lean implementation. Therefore, we have evidence to accept the following hypothesis:

H_{a10}: Continuous improvement mediates the relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

According to Boyer (1996), investment in small groups or teams for problem-solving predicts managerial commitment to Lean production which increases the chance for a successful program roll-out. This study shed light to previous literature (Hirzel et al., 2017; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Kululanga, 2009; Bateman, 2005) which pointed out that team-based work and decision are one of the factors which contributed towards continuous improvement under Lean environment. Under Lean team, all members share their innovative ideas for successful implementation of problem-solving activities. The influence of team learning on the sustainment of Lean implementation are strengthened by the value of respect and mutual trust as the outcome of collaboration exerted through continuous improvement or “Kaizen” effort (Jadhav et al., 2014b).

From the adult learning point of view, adults learn through their experience. Participation in continuous improvement or “Kaizen” team is one of the workplace activities that enrich the learner’s positive experience in the learning process. Positive interaction and sharing of knowledge generated within continuous improvement or “Kaizen” project team latter, establish mutual respect among team members and encouraged long-term commitment towards sustainment of Lean practices.

Continuous Improvement Mediates the Relationship between Embedded Systems and Sustainable Lean Implementation

Table 4.18: Results of Mediation Test for Continuous Improvement on the Relationship between Embedded Systems and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R ² =0.531)		
Embedded Systems → Sustainable Lean Implementation	0.633	0.000
Mediation Model (R ² =0.733)		
Embedded Systems → Sustainable Lean Implementation	0.005	0.936
Embedded Systems → Continuous Improvement	0.741	0.000
Continuous Improvement → Sustainable Lean Implementation	0.848	0.000

The result in Table 4.18 shows that continuous improvement mediates the relationship between embedded systems and sustainable Lean implementation. Initially, embedded systems are found to be a significant predictor of sustainable Lean implementation ($\beta=0.633$, $p=0.000$). However, with the presence of continuous improvement as the mediator variable in the mediation model, the significant relationship between embedded systems and sustainable Lean implementation in the direct model ($\beta=0.633$, $p=0.000$) was reduced to zero, where the relationship between the predictor variable and the dependent variable was no longer significant in the mediation model ($\beta=0.005$, $p=0.936$).

According to Baron and Kenny (1986), a variable may function as a mediator when it accounts for the relationship between the predictor and the dependent variable. Hence, as the significant relationship between embedded systems and sustainable Lean implementation in the direct model ($\beta=0.633$, $p=0.000$) was reduced to zero, where the relationship between the predictor variable and the dependent variable was no longer significant in the mediation model ($\beta=0.005$, $p=0.936$) and the strength of the relationship decreased, it can be implied that continuous improvement has a full mediation effect on the relationship between

embedded systems and sustainable Lean implementation. As for the explanatory power, the inclusion of continuous improvement in the mediation model explained 73.3% of the variance in a sustainable Lean implementation. Since in this case, the total mediation occurs, the hypothesis is therefore accepted indicating that:

H_{a11}: Continuous improvement mediates the relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Savolainen and Haikonen (2007) proposed that the “development of information system is a necessity for supporting continuous improvement structures and for progressive learning” (p. 16). Current findings supported Savolainen and Haikonen (2007) proposition which is very important for Lean companies when making their decisions with regards to investment in technology upgrading and resource allocation for information and knowledge management. According to Comm and Mathaisel (2005b), the convergence of information technology network is one of the predictor variables affecting sustainable Lean implementation. The organizations that are able to maintain up-to-date skill matrix of their employees for skill gaps identification can easily address an area that needs improvement. Hence, this study has the reason to believe that performance appraisal is crucial as a means to measure the gap between the employee’s actual performance and the established standards set by the organization under Lean setting.

In addition, Eaidgah et al. (2016) study which focuses on visual management as a mean in ensuring effective and efficient information flow claimed that “it has to be linked to a performance management program in order to provide inputs into continuous improvement initiatives” (p. 187). The integration of embedded systems with continuous improvement or “Kaizen” initiatives will boost “transparency, discipline, shared ownership, team

involvement and scientific mindset” and then, sustain Lean implementation (Eaidgah et al., 2016, p. 194). Jayaraman et al. (2012) also found out that visual display which provides an update on the progress of continuous improvement or “Kaizen” activities positively affect performance in the Lean organization. Performance management systems which is visually transparent to the employees is expected to enhance their sense of accountability and commitment towards continuous improvement efforts. Embedded systems that connect employee’s learning at the workplace to the external environment enable the employee to monitor and keep track of their own productivity as well as the company’s performance in the industry. A well-maintained information system from the perspective of Resource Based View (RBV) is a source of competitive advantage and in this study, is an important factor that contributes towards sustainment of Lean. The power of quality information that is kept in an up-to-date database enables the organization to detect a problematic area that needs improvement in a timely manner as well as identifying the competencies gap to perform continuous improvement.

Continuous Improvement Mediates the Relationship between Empowerment and Sustainable Lean Implementation

Table 4.19: Results of Mediation Test for Continuous Improvement on the Relationship between Empowerment and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R2=0.473)		
Empowerment → Sustainable Lean Implementation	0.559	0.000
Mediation Model (R2=0.733)		
Empowerment → Sustainable Lean Implementation	0.014	0.761
Empowerment → Continuous Improvement	0.650	0.000
Continuous Improvement → Sustainable Lean Implementation	0.839	0.000

The result in Table 4.19 shows that mediation occurs as continuous improvement intervenes the relationship between empowerment and the sustainable Lean implementation. Empowerment are found to be a significant predictor of sustainable Lean implementation ($\beta=0.559$, $p=0.000$) with the absent of mediator variable. However, with the present of continuous improvement as the mediator variable in the mediation model, the significant relationship between empowerment and sustainable Lean implementation in the direct model ($\beta=0.559$, $p=0.000$) was no longer significant ($\beta=0.014$, $p=0.761$). According to Baron and Kenny (1986), a variable function as a mediator when the relation between predictor and criterion are reduced to zero in the case of a total mediation after controlling the relationship between the mediator and the criterion variable. Hence, as the significant relationship between empowerment and the sustainable Lean implementation in the direct model ($\beta=0.559$, $p=0.000$) which was no longer significant with the presence of continuous improvement in the mediation model ($\beta=0.014$, $p=0.761$) and the strength of the relationship decreased, it can be implied that continuous improvement has a full mediation effect on the relationship between empowerment and sustainable Lean implementation. As for the explanatory power, the inclusion of continuous improvement in the mediation model explained 73.3% of the variance in the sustainable Lean implementation. There is enough statistical evidence to accept the hypothesis which states that:

H_{a12} : Continuous improvement mediates the relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

The result of hypothesis testing is consistent with several prior research findings and literature support (Aij et al. 2015; Dibia et al., 2014; Jadhav et al., 2014b; Boyer, 1996) which found that empowerment is the key to a successful Lean transformation. Empowerment provides employees with a sense of accountability and control over Lean

manufacturing processes besides enhancing employee's job satisfaction as well as increasing their levels of learning to develop the capabilities needed to effectively exercise increased responsibility through continuous improvement or "Kaizen" initiatives (Hirzel et al., 2017; Aij et al. 2015; Gao & Low, 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005; Boyer, 1996). However, this finding showed that the sustainability of Lean implementation in Lean manufacturing firm are different from Lean implemented in healthcare industry as reported in the findings by (Lindskog et al., 2016) which found out that in terms of goal clarity, "the first-line managers did not understand the statement about Lean already being implemented, as the work with Lean had only just begun" (p. 61). Lack of goal clarity and power to allocate resources "inhibited the learning process among the employees and meant late responses to improvement opportunities" causing the implementation of Lean was not sustainable (Lindskog et al., 2016, p. 64). However, the direction of the relationship is similar to the current study at which, both studies derived that continuous improvement resulted from empowerment somehow affect the sustainment of Lean implementation in a positive way.

On the other hand, Fraser (1995) study reported a different understanding which explained in a clearer sense that, in a "longer term, generating a culture focused on continuous improvement will also deliver a culture focused on participation, partnership and empowerment" (p. 10). Therefore, this study has the reason to believe that continuous improvement fosters the relationship between empowerment and sustainment of Lean implementation in a long-term perspective. A high level of standardization in Lean implementation restricts employee autonomy and leads to employee dissatisfaction (Minh et al., 2018). However, Lantz et al. (2015) indicated that a high level of decision-making authority and job autonomy dissolve the paradox between standardized work and promoting

innovative teamwork. With the presence of empowerment, standardization in terms of audit and documentation in continuous improvement or “Kaizen” no longer serves as a barrier to team innovation which increases the chance for sustainment of Lean implementation.

Continuous Improvement Mediates the Relationship between System Connections and Sustainable Lean Implementation

Table 4.20: Results of Mediation Test for Continuous Improvement on the Relationship between System Connections and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R ² =0.457)		
System Connections → Sustainable Lean Implementation	0.587	0.000
Mediation Model (R ² =0.734)		
System Connections → Sustainable Lean Implementation	0.056	0.236
System Connections → Continuous Improvement	0.661	0.000
Continuous Improvement → Sustainable Lean Implementation	0.804	0.000

Table 4.20 shows that continuous improvement functions as a mediator in the relationship between system connections and sustainable Lean implementation. System connections are found to be a significant predictor of sustainable Lean implementation ($\beta=0.587$, $p=0.000$) without the presence of the mediator variable. However, with the existence of continuous improvement as the mediator variable in the mediation model, the significant relationship between system connections and sustainable Lean implementation in the direct model ($\beta=0.587$, $p=0.000$) becomes insignificant ($\beta=0.056$, $p=0.236$).

Baron and Kenny (1986) stated that “from a theoretical perspective, a significant reduction demonstrates that a given mediator is potent, albeit not both a necessary and a sufficient condition for an effect to occur” (p. 1176). Hence, as the significant relationship between

system connections and sustainable Lean implementation in the direct model ($\beta=0.587$, $p=0.000$) which was no longer significant with the presence of continuous improvement in the mediation model ($\beta=0.056$, $p=0.236$) and the strength of the relationship decreased, it can be implied that continuous improvement as a mediator has a full mediation effect on the relationship between system connections and sustainable Lean implementation. As for the explanatory power, the inclusion of continuous improvement in the mediation model explained 73.4% of the variance in sustainable Lean implementation. There is sufficient evidence to accept the following hypothesis:

H_{a13}: Continuous improvement mediates the relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

“Human resources are significantly related to Lean manufacturing” (Zahraee, 2016, p. 144). From the perspective of the workplace learning, the results of this study proved that increasing collaborative effort, information sharing and shared vision of mutual learning among employees created through system connections contributed towards continuous improvement which sustained Lean implementation at the workplace (Sraun & Singh, 2017; Jadhav et al., 2014a; 2014b; Comm & Mathaisel, 2005b; Love & Gunasekaran, 1999). System connections are an important dimension in the workplace learning that encourages learners to think extensively from a different viewpoint for better productivity and for the sustainment of improvement initiatives.

This study confirmed Love and Gunasekaran (1999) study which suggested that the capability of a manufacturing organization in terms of forming learning alliances is one of the important sources to achieve competitive advantage. The authors further explained that forming long-term alliances enables cultivation of mutual learning and trust climate which

“may not only reduce costs but a sustainable competitive advantage in today’s competitive environment” (Love & Gunasekaran, 1999, p. 95). Love and Gunasekaran (1999) also believed that the climate established through cooperative alliances is believed to develop a manufacturing organization’s ability to continuously learn and improve operational productivity.

A continuous improvement programme also develops employee’s resourcefulness to search for answers across the organization for a better way of getting the work done. Papadopoulos (2011) believed that the “Lean-favoring network from association between actors” is needed in order to develop “innovative competencies” and continuous improvement programme which support Lean Thinking implementation (pp. 218-219). Linking the organization to its environment also enables employees to think from a global outlook. Consequently, this study agreed with Psomas et al. (2018) recommendation for Lean organizations to achieve a sustainable Lean journey through encouragement provided to the employees to get answers for problem-solving from “educational seminars, attending international conferences, consulting experts in the field and benchmarking successful Lean organizations” (p. 76). Employees who are exposed to the external environment are expected to be more innovative in their learning, idea generation and their approach towards continuous improvement initiatives.

System connections enable employees including Lean practitioners to think from a wider point of view, be more customer-focused and take into consideration sustainable value creation because they are capable to consider the issues from the customer’s viewpoint as well as predicting the impact of their actions on other stakeholders. The employees are also expected to develop a better problem-solving capability when they are encouraged to becoming more responsive to their environment during their participation in the continuous

improvement programme. The ability of the employees in the Lean organization to focus on the entire value chain when making a decision will eliminate the tendency of treating continuous improvement or “Kaizen” activities merely for temporary cost saving, but more towards a long-term perspective in sustaining Lean gains.

Continuous Improvement Mediates the Relationship between Support Leadership and Sustainable Lean Implementation

Table 4.21: Results of Mediation Test for Continuous Improvement on the Relationship between Support Leadership and Sustainable Lean Implementation

Dimensions	β	p
Direct Model (R2=0.469)		
Support Leadership → Sustainable Lean Implementation	0.568	0.000
Mediation Model (R2=0.733)		
Support Leadership → Sustainable Lean Implementation	0.036	0.446
Support Leadership → Continuous Improvement	0.650	0.000
Continuous Improvement → Sustainable Lean Implementation	0.819	0.000

The result in Table 4.21 shows that mediation occurs with the presence of continuous improvement in the relationship between support leadership and sustainable Lean implementation. Under the direct model as shown in Table 4.21, support leadership significantly affects sustainable Lean implementation in the absence of continuous improvement ($\beta=0.568$, $p=0.000$). However, the effect of support leadership on sustainable Lean implementation shrink upon the addition of continuous improvement to the mediation model ($\beta=0.036$, $p=0.446$). According to Baron and Kenny (1986), a variable may be considered a mediator to the extent that it carries the influence of predictor to the dependent variable. Hence, as the significant relationship between support leadership and sustainable Lean implementation in the direct model ($\beta=0.568$, $p=0.000$) was reduced to zero, which the

relationship between the predictor variable and the dependent variable was no longer significant in the mediation model ($\beta=0.036$, $p=0.446$), it can be implied that continuous improvement has a full mediation effect on the relationship between support leadership and sustainable Lean implementation. As for the explanatory power, the inclusion of continuous improvement in the mediation model explained 73.3% of the variance in sustainable Lean implementation. Since in this case, total mediation occurred, the hypothesis is therefore accepted indicating that:

H_{a14}: Continuous improvement mediates the relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.

Leader's commitment and support for learning are evident in this study as one of the significant enablers which sustain Lean implementation and are found to be consistent with earlier literature (Sraun & Singh, 2017; Jadhav et al., 2014b; Marksberry et al., 2010; Comm & Mathaisel, 2005b; Boyer, 1996). Savolainen and Haikonen (2007) research findings imply that the managerial commitment is the foundation which creates sustained learning as well as continuous improvement. The authors further recommended that the organization may enhance learning and increase support towards continuous improvement by organizing a "forum for knowledge dissemination where successes and failure are shared" (p. 16). In another study by Habtoor (2016), supportive leadership in establishing clear Standard Operating Procedures (SOPs) and inspiring changes in processes for employees are found to be the success factor for Total Quality Management (TQM) implementation and organizational performance. From the employee's point of view, supportive leadership shown through the strong management commitment towards continuous improvement program is a significant indicator which sets the tone for the entire organization to be persistent in ensuring Lean success. It is recommended that superior can show their support

through both extrinsic as well as intrinsic reward system as a motivator for the employees to achieve the final goal of Lean sustainment effort by engaging actively in continuous improvement or “Kaizen” projects. This is due to the facts presented in the findings of this study that leaders who nurture “blame-free” continuous improvement culture is consistent with sustainment of Lean initiatives (Hirzel et al., 2017; Lam et al., 2015; Ali et al., 2013; Gao & Low, 2013; Glover et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Bateman, 2005).

4.5.4 Results of Bootstrapping Analysis using PROCESS

Table 4.22: Results of Sobel Test of Indirect Effects of Workplace Learning, Continuous Improvement and Sustainable Lean Implementation

Dimensions	Indirect Effect	SE	95% CI Bootstrap		Sobel Test p
			LB	UB	
Continuous Learning	0.5426	0.0472	0.4519	0.6359	0.0000
Dialogue Inquiry	0.5111	0.0617	0.3953	0.6363	0.0000
Team Learning	0.5553	0.0564	0.4489	0.6715	0.0000
Embedded Systems	0.6287	0.0689	0.4961	0.7675	0.0000
Empowerment	0.5448	0.0493	0.4548	0.6471	0.0000
System Connections	0.5318	0.0490	0.4396	0.6325	0.0000
Support Leadership	0.5325	0.0520	0.4372	0.6385	0.0000

Table 4.22 shows that zero is outside the 95% confidence bootstrap interval which signified that the mediation was significant for the entire hypothesis tested. The result of the Sobel test also showed that continuous improvement significantly mediates the relationship between all the dimensions of workplace learning and sustainable Lean implementation ($p=0.0000$). Therefore, the findings of this study confirmed the claims reported by previous literature (Habtoor, 2016; Jönsson & Schölin, 2014; Mohd-Zainal et al., 2011) that the probability to achieve successful implementation of Lean intervention is higher with the

existence of continuous improvement or Kaizen culture together with the establishment of a positive learning environment at work which is defended through the support of empirical evidence. The summary of hypothesis testing can be found in Table 4.23.

Table 4.23: Summary of Hypothesis Testing

Hypothesis	Data Analysis Technique	Result Findings
H _{a1} : There is a relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a1} accepted
H _{a2} : There is a relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a2} accepted
H _{a3} : There is a relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a3} accepted
H _{a4} : There is a relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a4} accepted
H _{a5} : There is a relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a5} accepted
H _{a6} : There is a relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a6} accepted
H _{a7} : There is a relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Pearson Product Moment Correlation Coefficient	H _{a7} accepted

Table 4.23 continued

H _{a8} :	Continuous improvement mediates the relationship between continuous learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a8} accepted
H _{a9} :	Continuous improvement mediates the relationship between dialogue inquiry and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a9} accepted
H _{a10} :	Continuous improvement mediates the relationship between team learning and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a10} accepted
H _{a11} :	Continuous improvement mediates the relationship between embedded systems and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a11} accepted
H _{a12} :	Continuous improvement mediates the relationship between empowerment and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a12} accepted
H _{a13} :	Continuous improvement mediates the relationship between system connections and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a13} accepted
H _{a14} :	Continuous improvement mediates the relationship between support leadership and sustainable Lean implementation within Lean manufacturing companies in Malaysia.	Sobel Test	H _{a14} accepted

4.6 Summary

This chapter revealed the findings and results of data analysis as the statistical evidence to confirm with the hypothesis of this study in order to achieve the research objectives. Most of the data collected for the purpose of this study are contributed by young working adults age between 20 to 39 years old, female, holding middle management position, have served for at least two years, Bachelor Degree holders and attended Lean training. Most of the

respondents reported having been either exposed to Lean activities for less than two years or participated in continuous improvement or “Kaizen” activities. Most of the respondents also reported that the implementation level of Lean manufacturing in Malaysia is between moderate to high level of sustainment. Workplace learning is proven to have positive correlations with sustainment of Lean implementation. Results of data analysis also showed that continuous improvement significantly mediates the relationship between all dimensions of workplace learning and sustainable Lean implementation.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the overall idea of this study based on the findings and discussion from previous chapters and its implications in the area covered under the scope of this study. Moreover, this study also proposed some recommendations for future studies based on the significant impact of this study and its potential influence on various stakeholders, specifically, those currently operating or dealing with Lean manufacturing companies in Malaysia. Chapter 5 concludes this study by incorporating the closure for the overall summary of this research report.

5.2 Summary of the Study

The main intention of this study is to clarify the relationship between workplace learning and sustainable Lean implementation with continuous improvement as a mediator within Lean manufacturing companies in Malaysia with evidence from empirical analysis. It is undeniable that the manufacturing sector still plays a significant role as one of the major contributors towards Malaysia economic growth. Malaysia through its Lean initiative encouraged by Malaysia Productivity Corporation (MPC) is constantly promoting innovation and sustaining the effort of talent cultivation in various aspects with the aim to achieve forward-looking competitiveness. The benefits obtained through this study are not limited to the practical consideration in achieving the nation's vision to be recognized as a

developed country alone but as well extending the idea of continuous improvement effort, for other developing countries which shares similar economic conditions.

The empirical findings of this study supported the conceptual framework formulated in the earlier chapter which illustrates the overall idea of this study. The basis underlying the formulation of the tested conceptual framework was based on the review of past research papers related to this field of study. As for the analysis and evaluation to interpret the results of this study, the researcher follows quantitative research approach that uses Dimensions of The Learning Organization Questionnaire (DLOQ) as part of the instrument of this study to gather data from employees across eight manufacturing firms located in East and West Malaysia. All variables exceeded the minimum standards for reliability and validity tests. Overall, the data represents the perception of a total of 219 respondents participated in this study.

As a result of data analysis, this study found out that supervisory and supporting staffs have a better impression of the level of Lean sustainment as compared to management staff. Besides that, inferential statistics findings supported the entire hypothesis in this study. The result of hypothesis testing showed a result worth mentioning, where among all the dimensions of workplace learning, embedded systems are found to be strongly and positively correlated with the sustainment of Lean implementation. The findings of this study extended previous findings (Waterbury, 2015; Habidin & Yusof, 2013; Jayaraman et al., 2012; Roslin et al., 2012) that look into the factors affecting Lean implementation by identifying the dimensions of workplace learning and the impact on sustainable Lean implementation. The findings of the Sobel Test provide an empirical evidence that the mediation effects are significant at $\alpha=0.05$ level. The results are sufficient to verify that continuous improvement mediates the relationship between workplace learning and sustainable Lean implementation

within manufacturing companies in Malaysia. Unlike the other dimensions of workplace learning, it was found that continuous improvement partially mediates the relationship between continuous learning and sustainable Lean implementation. Overall, the objective of this study has been met leading to further understanding of Lean application and contributed to empirical literature from the Malaysia context.

5.3 Implications of the Study

5.3.1 Theoretical Implications

One of the significant implications of the current study is to close the knowledge gap through empirical findings. Theoretically, the empirical findings of this study have scholarly contributed to the existing body of knowledge in the area of human resource development and operations management. Barney and Clark (2007) claimed that empirical tests are the most obvious extensions of Resource Based Theory (RBT). According to Jadhav et al. (2014a) continuous improvement initiatives is the ideal representation of Resource Based View (RBV) application in practice. Continuous improvement or “Kaizen” mindset as an enabler to the sustainment of Lean gains is also a part of the core competencies that leverage productive deployment of important resources which distinguish a Lean organization from their competitors, by creating more values for the customers. Responding to the call by Barney and Clark (2007), the empirical results in this study have strengthened the RBT through the provision of significant evidence that through the presence of continuous improvement as a mediator, the dimensions of workplace learning (i.e. continuous learning, dialogue inquiry, team learning, embedded systems, empowerment, system connections, support leadership) serves as an important source that sustain Lean implementation. The

implication of this study showed that continuous improvement culture that is successfully nurtured from productive workplace learning practices such as continuous learning, embedded systems and support leadership does depicts the perfect representation of RBV application in practice. The mediation effect of continuous improvement in this study is socially complex in nature and serves as a source of competitive advantage for Lean organization. The research framework enlightens the role of human resource development in the sustainment of Lean implementation as the core competencies that are rare and unavailable to the rivals, besides, being difficult to imitate. Therefore, the current study contributed to the theoretical development of RBT by suggesting a socially complex phenomenon which is imperfectly imitable as a source that is capable of sustaining the success of Lean rather than merely identifying the type of resources that the Lean firm must have.

From the adult learning point of view, the process directed towards the sustainment of Lean implementation has enriched the principles of adult learning. A detailed understanding on employee's learning orientation at the workplace as an adult learner and its capabilities to drives continuous improvement in the Lean organization had enriched the theory by recognizing its significant impact and contribution towards a better culture and mindset. The principles of adult learning have proven its effectiveness in developing continuous improvement or "Kaizen" mindset as well as Lean Thinking that are not only beneficial for the organization as a system but also proven to be effective in helping an adult learn and implement change. The general opinion provided by the respondent also supported this view by stating that "Lean implementation should be organization culture, and not a project based work or a small team to do it. It is a mindset for everyday work [sic]". Such culture is cultivated through adult learner's experience in respect and trust during daily communication

at work as well as their involvement in connecting to their strategic learning alliances. This study also challenged the previous belief by Yang et al. (2004) which claimed that system connections are more important than embedded systems. However, the objectivity of the results obtained from this study suggested that the impact of information technology should not be underrated as the findings of data analysis showed that there is a strong relationship between embedded systems and sustainable Lean implementation. As for the implication of the adult learning theory, this study has incorporated various contemporary workplace learning practices that need to be pursued by Lean manufacturing companies besides, taking into account the latest technological development and its integration in embedded systems to explain the impact and practicality of the original “Andragogy” assumptions proposed by Knowles (1984) as an effort to optimize adult learning in today’s real working condition.

The empirical results of this study also updated and verified some proposed ideas published in previous literature on Lean studies. For instance, the empirical findings of this study also add value to past literature (Lindskog et al., 2016; van Dun & Wilderom, 2016; Zahraee, 2016; Jadhav et al., 2014a; 2014b; Ali et al., 2013; Gao & Low, 2013; Glover et al., 2013; Angelis & Fernandes, 2012; Magnier-Watanabe, 2011; Mohd-Zainal et al., 2011; Bateman, 2005; Comm & Mathaisel, 2005b; Hines et al., 2004) by clarifying the linkage between workplace learning and sustainable Lean implementation which is mediated by continuous improvement. More importantly, the statistical findings in this study provided a significant impact on bridging the gap between most research findings on Lean implementation (Manzouri et al., 2013; Jayaraman et al., 2012) which had failed to acknowledge sustainment of Lean initiatives. Failure of true understanding about Lean principles often give rise to confusion (Aminuddin, 2014; Legge, 1998; Sisson, 1994) and problems related to resistance to accept change (Bakar et al., 2017; Zahraee, 2016; Manzouri, Rahman & Saibani, 2013;

Sahwan et al., 2012; Papadopoulos, 2011) among employees. For instance, Lean manufacturing has been perceived as “mean production” in several past literature (Legge, 1998; Sisson, 1994). Therefore, this study has shown that Lean is not just about cost saving or short-term financial gain, but it is about developing a culture of Lean philosophy with high value in terms of trust in teamwork and respect for people in everyday work.

Most importantly, this study provided significant statistical findings which supported the claim by Hines et al. (2004) that “Lean should be regarded as more than a set of mechanistic hard tools and techniques and the human dimensions of motivation, empowerment and respect for people are very important for a long-term sustainability of any Lean program, regardless of the industry sector” (pp. 994-1000). The empirical findings of this study have cleared the misunderstanding of the real Lean theoretical foundation which has long been mistreated as a short-term cost-saving tool without much emphasis being placed on the long-term value creation of Lean Thinking. The current research perceived that it is important to highlight this particular issue as it is happening in the local context as well. The general opinion provided by the respondents supported the claim by commenting on their company’s Lean practices which is “more to cost-saving” instead of embracing the real Lean Thinking. Therefore, this study defended the need to set the idea of Lean Thinking straight to the point based on its original principles which is supported by the empirical findings of this study. It has been proven in this study that “sustainability” from “Lean methodology entails developing organizational discipline and process via training, empowerment, continuous improvement and respect teamwork” rather than just about cost-saving (Averill, 2011, pp. 3-58). The respondents in this study also agreed that improving employee’s skills through training, teamwork and management support and believe are among several important indicators that influence Lean success. For instance, “improved employee skill and

teamwork can achieve learn target [sic]” and “Lean implementation can successful or not very depend on the support and believe from management [sic]”.

Even though Habidin and Yusof (2013) suggested that employee involvement is important for a successful Lean implementation, the researchers never include this important factor in their study. The current study has significantly proven that employee empowerment does have a positive relationship with the sustainability of Lean implementation. The significance of this implication is supported by Lien et al. (2006) study which infers that cultural differences could be one of the factors that influence the way empowerment and systems creation are construed. For instance, some practitioners in Lean that focus on standardization might support in encouraging employees to take calculated risks to challenge their existing work practice, which is perceived as not productive. Employees need empowerment to be motivated to learn, accept changes to their current work practice and search for better ways to accomplish their tasks. The general opinion provided by the employees confirmed with the findings of this study in which one of the respondents commented that it “is not easy to implement ‘lean’ concept to people who already use to the ‘old way’”. The most challenging part of implementing ‘lean’ is people is difficult to change old habits [sic]”. Statistical evidence obtained through this study has closed empirical gaps mentioned above and solve the research problems that arise from review of past literature.

Furthermore, this study combined pieces of ideas from various related Lean literature to be generalized into different settings in order to provide enrichment and tentative support to the existing theories proposed in the past Lean literature. Correspondingly, statistical evidence of this study adds justice to the lack of empirical literature about the Lean concept from the perspective of human resource development in Malaysia. The findings of this study have shown that in order to achieve competitive advantage to strengthen its market positioning

through sustainable Lean implementation, a Lean organization must encourage the development of their human resources especially in the area of workplace learning and continuous improvement. Therefore, this study would re-emphasize that workplace learning is a source of competitive advantage which is sustained with the presence of continuous improvement or “Kaizen” mindset in ensuring long-term success for Lean manufacturing firms. The empirical findings of this study indirectly functioned as an audit which followed up on Lean implementation and its progress in Malaysia.

5.3.2 Practical Implications

Lean implementation has proven its importance in promoting operational effectiveness and efficiency. In the fast-growing business environment, businesses including those in the manufacturing sector have to adapt to the dynamic changes in the industry. Upon channelling most of the resources in meeting the needs for rapid business growth and expansion in order to capture more market opportunities, many companies nowadays face numerous problems related to resource constraint. As mentioned in previous studies (Manzouri et al., 2013; Jayaraman et al., 2012), not all industries benefited from Lean implementation due to limiting factors like cost and time. One of the dangers in this situation is when the organization responded with a mere cost reduction in every aspect of production without sufficient budget allocation for research and development purposes. As a result, lack of researching skills among human resources is common especially among companies operating in developing countries. Based on the findings of this study that continuous improvement partially mediates the relationship between continuous learning and sustainment of Lean implementation, employees need to be given sufficient time to learn the

root cause of a problem when searching for solutions. Support in terms of time to perform detailed analysis prior to decision making and time in building positive culture such as trust as well as respect within continuous improvement team for open and honest feedback are acknowledged as important source for achieving positive Lean results which is sustainable. Furthermore, the results of the time spent to build these learning culture at the workplace need to be objectively measured with consistency to ensure long-term sustainment of Lean initiatives. Acknowledging this area of concern, this study contributed validated empirical evidence that organization could take into consideration as a guideline to help improve employee's learning capacity. Employee's learning which is mediated through continuous improvement is socially complex in nature, and therefore, is a source of competitive advantage for business growth ideal for Lean intervention.

The findings of this study put together important factors for consideration among practitioners to design and develop a more solid roadmap suitable according to their business needs before launching their Lean implementation. According to the general opinion provided by one of the respondents on Lean sustainment, the employee commented that "first is good, second is great, but now is less [sic]". In another response, the respondent reported that "we used to have strong Lean concept but now this seems not important in current company culture. However, some of the Lean concept is practiced without everyone knowing it as we do not called it Lean although it is very much of the same concept [sic]". From the general opinion provided by the respondents, it is observable that the management in Lean organization need to be more aware that communication barriers exist and there is a high potential to unsustainable Lean. Under such situation as mentioned, previous resources which is invested in Lean effort might be wasted. Therefore, since the findings of this study have proven that dialogue inquiry, empowerment and support leadership is important for the

sustainment of Lean effort, leaders should provide clear sense of direction and shared vision to ensure successful Lean initiatives.

A more insightful general opinion is provided by an employee which responded that “Lean implementation in my organization start out as a great activities but as time go, sustainability drop and continuous improvement activities reduced. Lean is great but the biggest bottleneck will be sustainability to Lean [sic]”. Therefore, the result of this study highlighted areas that practitioners should focus on when encountering problems related to sustaining their Lean efforts because there is a high potential that the barriers are coming from human factors. For instance, the insufficient time provided to the employees in their learning, unavailability of a proper system to keep track and monitor the gap between current and expected performance will lead to untracked changes, and thus lack of quality information to be communicated. Consequently, employees perceived that the leaders did not provide them with a clear sense of direction to achieve continuous improvement. This situation will lead to unsustainable Lean. The findings of this study revealed that continuous improvement significantly mediates the relationship between all the dimensions of workplace learning and sustainable Lean implementation among Lean manufacturing companies in Malaysia. This study provides evidence to the management and corporate leaders about the importance of human development in the area of continuous improvement and sustainment of Lean initiatives which is too costly to be ignored.

Another important practical implication of this study is that the results obtained through hypothesis testing have shown a significant finding which clears the misinterpretation of the original Lean Thinking and continuous improvement or “Kaizen” mindset due to some practices in Lean organization which treat short-term cost saving as their top priority in their Lean initiatives that resulting in unsustainable Lean practices. The real Lean practices have

been proven from the results obtained from this study, derived from the principle of trust and respect among employees to help each other in their learning process and focus on teamwork. The findings of this study also proved that an effective two-way communication among employees and the management in the form of group discussions is vital for sustainment of Lean initiatives. The informational role of top management in aligning employees to the organizational direction is crucial from the employee's perspective to have a better understanding of Lean practices at their workplace. As an example, the employees might perceive lack of support, insufficient knowledge and information as well as empowerment are not provided to encourage their contribution to the organization's vision in which the employee commented that "the implementation of lean training is not much practicing at my workplace. Instruction and decision come from top management [sic]". As a result, employees might think that the success of Lean implementation is none of their concern because they are not aware of their role and did not receive any encouragement to implement change or participate in any continuous improvement program. Consequently, the investment in Lean training might go to waste as employees do not apply the principles in their everyday work. This study has also emphasized to Lean practitioners that they should be aware not to be too rigid in terms of treating the outcome of continuous improvement as a fixed goal upon standardization, but rather, continue to revisit and review the new Standard Operating Procedures (SOPs) besides making essential improvement occasionally. Therefore, Lean practitioners must not take Lean implementation for granted and treating it as a tool for a quick fix but rather consider Lean as a way of thinking to eliminate waste and create value for the customers to strengthen their market positioning.

Leaders and management staff in the corporate office operating under Lean manufacturing are encouraged to use the findings of this study as a guideline to plan for their own employee

developments initiatives. It is believed that the findings of this study are useful to strategic leaders and senior managers who are evaluating their strategy to sustain their Lean implementation because the findings provide significant empirical evidence which links the dimensions of workplace learning and sustainable Lean implementation through continuous improvement as a mediator. The findings of this study are also important to be used as a reference for the development of a learning culture when implementing Lean manufacturing. This study also provides up-to-date input for human resource practitioners to develop their research framework when reassessing their audit criteria or establishing standards to enhance employee's learning capabilities in the context of Lean manufacturing. In addition, the findings of this study might be useful to the Malaysian government in reviewing the industrial policies to enhance the competitiveness of Malaysia manufacturing players in the world economy.

5.3.3 Methodological Implications

The Dimensions of Learning Organization Questionnaire (DLOQ) developed by Marsick and Watkins (2003) is the instrument used in this study for data collection purposes. The items selected for continuous improvement as the mediator variable and the choice of items that represent sustainable Lean implementation as the dependent variable in this study are chosen from a range of publicized materials with careful consideration based on the original concept as proposed by Imai (1986). Apart from the results of reliability analysis which has proven that the credibility of the instrument in this study, the source of reference for the adoption of items used in the instrument justified its trustworthiness as it has been replicated in multiple studies across various context beforehand. Furthermore, factor analysis has been

performed to examine the validity of the instrument in this study that is tested under the context of Lean manufacturing companies in Malaysia and is proven positive.

Therefore, future researchers who are concerned with the similar area of study may replicate the current research instrument adoption process, especially, the use of DLOQ as a reference when developing their own research instrument for data collection purposes. Besides that, this study also generalized the findings to cover a wider range of possibilities about the effect of continuous improvement as a mediator on the relationship between workplace learning and the sustainability of Lean implementation within Lean manufacturing companies in Malaysia. This study conducted a sample survey to provide quantitative evidence which robustly takes into account the perception of Lean practitioners among Lean manufacturing companies in Malaysia in order to understand the issues which this study seeks to answer. Therefore, future researchers may refer to the methods used under this study for adaptation when conducting research similar to this area of study.

5.4 Recommendations

5.4.1 Recommendations for Future Researchers

There were few recommendations to be dedicated for future researchers who are interested in this area of study to further enhance human resource development literature. Lean is described as “something which has already been practiced in many large-scale organizations, but still lacking in implementation within both the private and public sector” (MPC, 2016b). Therefore, the current study strongly recommend that future researchers should extend similar study to understand the progress of Lean implementation in other sectors such as education (Isaksson et al., 2015), healthcare (Lindskog et al., 2016), financial (Hirzel et al.,

2017) and public sector (MPC, 2018). MPC (2018) reported several successful Lean projects has been implemented by public service organizations in Malaysia such as “Dewan Bandaraya Kuching Utara (DBKU), Pejabat Kesihatan Wilayah Persekutuan Putrajaya (PKPj), Hospital Sultanah Nur Zaharah (HSNZ), Hospital Universiti Sains Malaysia (HUSM), Tabung Haji Johor, Majlis Perbandaran Kuantan (MPK), Kolej Kemahiran Tinggi Mara Petaling Jaya (KKTMPJ) and Universiti Putra Malaysia (UPM)” which is worth the research attention and is highly recommended for further studies (p. 61). Studying Lean in other sector is also a critical suggestion for researchers who are interested to study the most recent progress of Lean implementation in the Malaysian food industry in order to verify the claim by Psomas et al. (2018)’s findings which found that “the Greek food companies outperformed the Malaysian food industrial small companies” when comparing their results with Manzouri et al. (2013) study (p. 75).

Besides, future researchers who are interested to partake in the development studies related to the sustainment of Lean are reminded to understand the real Lean Thinking as this study has proven that Lean does not constitute only the aspect of mechanistic tools nor be applicable only for short-term financial gain to avoid further misinterpretation and misrepresentation of real Lean principles. Nevertheless, Lean is more than just a technique, method or some success stories exaggeration, but Lean Thinking needs to be embraced as a way of life that respects humanity. The Lean journey has proven to be changing the way practitioners from diverse field perceive the evolution of industrialization. For instance, Lean implementation has improved the working conditions of factory workers by “incorporating worker-compatible machines, work strain avoidance as well as numerous investments in ergonomics” (Monden, 2012, pp. 436-437). Future research is recommended to continuously

understand the evolution of Lean through longitudinal survey and produce more discoveries on successful Lean gains in the manufacturing sector.

The instrument used in this study is proven to be reliable and is suitable to be recommended to future researchers for data collection purposes. Although results showed that the instrument of this study is valid to measure the variables involved in this study, there might be limitations when applied to another context which future researchers will need to be aware of, when adapting the instrument from this study. Future researchers may also consider incorporating other factors that might affect the sustainability of Lean implementation such as socio-technical principles (Birkie et al., 2017; Lindskog et al., 2016) or Lean-leadership competencies (Seidel, Saurin, Marodin & Ribeiro, 2017) when conducting studies in similar context.

Besides, future researchers may replicate this study by extending the use of qualitative measures to reveal more in-depth information from the individual employee (Habtoor et al., 2016). Future researchers may also consider using the findings from the current study as a reference to get a clearer understanding on the real concept underlying Lean implementation, especially through the means of cultural comparison would be strongly recommended. As an example, the comparison between Lean companies that are operating under culture with short-term orientation and those focusing on long-term orientation in terms of the end goals of continuous improvement or “Kaizen” initiatives and its impact on sustaining the Lean effort. It is believed that the findings of this study will be useful as a secondary data which assist future researchers when planning to conduct their subsequent study under these areas of concern as mentioned in the above statements.

5.4.2 Recommendations for Human Resource Practitioners

Lean is closely linked to the alignment of vision across the organization and creates an integrated system to achieve these goals. One of the respondents provided some additional comments about Lean in their organization that the implementation “allows the organization to standardize in terms of working goal and how to reach that goal. Clear measurement technique is tool [sic]”. In a simpler term, Lean emphasizes close monitoring on the achievement of organizational goal through objective measures. These processes require a high level of support from human resource practitioners.

This study seeks to assist in uplifting the sensitivity of human resource practitioners in terms of resource planning when developing any initiatives related to enhancing the human resource capabilities and productivity under Lean manufacturing workplace setting. Findings in the area of this study “assist human resource practitioners and training professionals establish the role that the tacit character of knowledge plays in the creation, integration, transfer, use and protection of knowledge to address the issue of prime concern given the importance of developing a skilled workforce and the enormous costs of designing and implementing training programs” (Hernandez, 2003, p.220). The findings highlighted important human factors which predict sustainability for Lean initiatives. It is thus recommended that human resource practitioners in Lean manufacturing companies should focus on continuous improvement initiatives alongside the dimensions of workplace learning (i.e. continuous learning, dialogue inquiry, team learning, embedded systems, empowerment, system connections and support leadership) to establish a condition for the higher success of Lean initiatives. The result of data analysis also found out that 23.3% of the total respondents reported that they never attended any formal Lean training. In order to

enhance employee's involvement, human resource practitioners need to increase training effort to make sure all employees are able to understand the real Lean concept.

Embedded systems are proven to have a strong positive relationship with sustainment in Lean implementation. Therefore, it is recommended that Human Resource Development (HRD) practitioners in the Lean organization must focus on the development of information technology to maintain an up-to-date information system which is accessible by employees for their learning purposes. Besides, HR practitioners are encouraged to keep an updated skill matrix of their employees for easy identification of competencies gap that needs improvement. In addition, this study also seeks to facilitate a more strategic role among HRD practitioners, especially when communicating or presenting a relevant business case to senior operation managers and line leaders during planning as well as decision-making process (Ellinger et al., 2003). During continuous improvement or "Kaizen" implementation, constructive interaction through dialogue inquiry among employees such as active collaboration and effective communication also need to be prioritized to create a desirable learning environment in order to allow effective exchange of information.

5.4.3 Recommendations for Strategic Decision Makers in Lean Manufacturing Companies

Referring to the result of hypothesis testing, continuous improvement significantly mediates the relationship between workplace learning and sustainable Lean implementation. Therefore, all the predictors are proven to be the important factors, worthwhile to be considered not only for Lean manufacturing companies in Malaysia but for other relevant businesses operating under similar business environment as well when formulating

corporate, business and functional-level strategies. The findings of this study suggested that the intellectual aspect of human capital should not be ignored by policymakers when deciding on alternatives in the course towards operational excellence. Priorities should be given to the development of embedded systems. The result of data analysis proved that embedded systems are strongly correlated with the sustainability of Lean implementation. These findings have highlighted the importance of being responsive to technological advancement and the growing impact of information technology in today's workplace. Organizations need to deploy information technology with the higher capacity to store, update, analyze and communicate quality information which is needed to achieve sustainment of superior competitive positioning in the market. For instance, Lean organizations that ease their employee's accessibility to well-maintained quality information will provide the employees with quality inputs to make a detailed analysis which will result in higher accuracy on impact studies that would secure a better chance of Lean sustainment. Incorporation of visual management into the embedded systems are highly recommended to the management in a Lean organization to establish a standardized measure for performance gaps, ensure that the result of continuous improvement is tracked and make sure that follow-up to ensure consistency of results is achieved to sustain Lean.

According to Ellinger et al. (2003), "scholars have articulated the need to more firmly establish the linkage between learning organization practices and firm performance because the relative absence of such research does little to encourage leaders, managers and employees to adopt learning organization practices" (p. 170). It is recommended that decision makers utilize the findings of this study as the foundation in their strategy formulation to continuously innovate and develop their employees accordingly. Strategic leaders should focus on the effort to develop various dimensions of workplace learning as

well as emphasizing more on collaborative learning when establishing continuous improvement or “Kaizen” projects to achieve sustainable Lean results. Leaders should set the appropriate tone “to make team confidence grow, to create an atmosphere of frank and open dialogue and to encourage the employees to contribute to the organizational vision” (Michna, 2009, p. 366). Lean principles place high importance on problem-solving. Therefore, leaders should make themselves available for open discussion, provide guidance and support by creating a blame-free environment which encourages employees who are committed to involve in problem-solving initiatives to take the calculated risk. Lack of support from management in encouraging employee’s participation will affect employee’s perception negatively when employees are not aware of the significance of their task and work role in the Lean roll-out. Moreover, Lean practitioners are also recommended to use the instrument in this study to audit the progress of their Lean maturity and benchmark the result with other industry players in order to better understand their strategic positioning.

The result of this study also revealed that employees from different hierarchical level perceived the achievement of Lean progress differently. The lower level employees perceived the level of Lean sustainment more favourably if compared to the management level employees. Lean manufacturing companies need to consider “introducing appropriate Lean education, training and professional development for staff” (Zahraee, 2016, p. 145) in order to promote “non-resistant behavior” among staff which is crucial in order to “create innovative competencies and continuous roll-outs of changes” (Papadopoulos, 2011, p. 219). These efforts in promoting the Lean Thinking is not only important to avoid misunderstanding of the real Lean principles but to reduce the differences between employees from the various hierarchical level in terms of their perception towards Lean

progress so that all employees will be able to contribute towards Lean sustainment with a consistent pace.

5.5 Conclusion

As a conclusion, continuous improvement is proven to mediate the relationships between all dimensions as proposed in the Dimensions of The Learning Organization Questionnaire (DLOQ) developed by Marsick and Watkins (2003) and sustainable Lean implementation. In order for manufacturing organizations in Malaysia to ensure that Lean implementation could be sustained, the implication of this study suggested that management should emphasize on cultivating a continuous improvement mindset along with the development of positive learning culture at the workplace. Besides, the current empirical evidence also shows that among all the independent variables, embedded systems is strongly correlated with the sustainment of Lean implementation. Therefore, this study suggested that provision of capital-intensive learning infrastructure is a vital element for today's business operations and should be prioritized to ensure success in Lean. Management can use technological system to monitor and track Lean progress to identify area that need further actions or improvement.

Besides that, another important finding worth highlighting in this study is the mediating effect of continuous improvement on the relationship between team learning and the sustainment of Lean implementation. The implication of this finding has cleared the long-existed paradox between work standardization and providing autonomy for innovative teamwork which is crucial to drive continuous improvement in Lean organization. The result of hypothesis testing supported with sufficient empirical evidence that team learning

resolved the contradiction by promoting participative decision-making which encourage continuous improvement and result in sustainment of Lean implementation. Moreover, top management must understand the concept of empowerment as a trigger for employee's motivation to learn and the willingness to take the initiatives for continuous improvement or "Kaizen" projects based on calculated risks. Leader's relentless support is also important to establish an active learning environment through the encouragement of active dialogue inquiry to ensure effectiveness in employee's communication. Leaders play an important part in clarifying to the employees of the role that they are playing as part of the continuous improvement team so that they have a clear sense of direction throughout the entire Lean journey. Besides, communication of Lean success stories is very important to obtain employee support from all level. Lastly, in order to sustain Lean, it is important to promote the establishment of collaborative learning across the supply chain to embrace the philosophy of lifelong learning.

REFERENCES

- Abdullah, H., Rose, R. C., & Kumar, N. (2007). Human resource development strategies: The Malaysian scenario. *Journal of Social Science*, 3(4), 213-222. Retrieved from <http://thescipub.com/PDF/jssp.2007.213.222.pdf>
- Agus, A., & Hajinoor, M. S. (2012). Lean production supply chain management as driver towards enhancing product quality and business performance: Case study of manufacturing companies in Malaysia. *International Journal of Quality & Reliability Management*, 29(1), 92-121. doi: 10.1108/02656711211190891
- Ahmad, R., Usop, H., Ismail, A., Bujang, S., & Mansor, N. N. A. (2014). *Conducting Research in Social Sciences and Management Studies: Practical and A Step-by-Step Guide* (2nd ed.). Malaysia: RS Publishing House.
- Aij, K. H., & Teunissen, M. (2017). Lean leadership attributes: a systematic review of literature. *Journal of Health Organization and Management*, 31(7/8), 713-729. doi: 10.1108/JHOM-12-2016-0245
- Aij, K. H., Visse, M., & Widdershoven, G. A. M. (2015). Lean leadership: an ethnographic study. *Leadership in Health Services*, 28(2), 119-134. doi: 10.1108/LHS-03-2014-0015
- Alefari, M., Salonitis, K. & Xu, Y. (2017). *The role of leadership in implementing lean manufacturing*. Paper presented at The 50th CIRP Conference on Manufacturing Systems, Taiwan. doi: 10.1016/j.procir.2017.03.169
- Ali, A. J., Islam, M. A., & Lim, P. H. (2013). A study of sustainability of continuous improvement in the manufacturing industries in Malaysia: Organizational self-assessment as a mediator. *Management of Environmental Quality: An International Journal*, 24(3), 408-426. doi: 10.1108/14777831311322695

- Alstrup, L. (2000). Coaching continuous improvement in small enterprises. *Integrated Manufacturing Systems*, 11(3), 165-170. doi:10.1108/09576060010320371
- Aminuddin, M. (2014). *Human Resource Management: Principles and Practices* (3rd ed.). Malaysia: Oxford Fajar Sdn. Bhd.
- Angelis, J., & Fernandes, B. (2012). Innovative Lean: Work practices and product and process improvements. *International Journal of Lean Six Sigma*, 3(1), 74-84. doi: 10.1108/20401461211223740
- Antony, J., Gupta, S., Sunder, V. M., & Gijo, E. V. (2018). Ten commandments of Lean Six Sigma: A practitioners' perspective. *International Journal of Productivity and Performance Management*, 67(6), 1033-1044. doi: 10.1108/IJPPM-07-2017-0170
- Arya, A. K., & Jain, S. K. (2013). Impacts of Kaizen in a small-scale industry in India: a case study. *International Journal of Lean Six Sigma*, 5(1), 22-44. doi: 10.1108/IJLSS-03-2013-0019
- Asthana, H. S., & Bhushan, B. (2007). *Statistics for Social Sciences: With SPSS Applications*. New Delhi: Prentice-Hall of India.
- Audi, R. (1998). *Epistemology: A Contemporary Introduction to The Theory of Knowledge*. NY10001: Routledge.
- Averill, D. (2011). *Lean Sustainability: Creating Safe, Enduring, and Profitable Operations*. Boca Raton, FL 33487-2742: Taylor & Francis Group.
- Awasthy, R., & Gupta, R. K. (2012). Dimensions of the learning organization in an Indian context. *International Journal of Emerging Markets*, 7(3), 222-244. doi: 10.1108/17468801211236956
- Babbie, E. (2017). *The Basics of Social Research* (7th ed.). MA 02210: Cengage Learning.

- Bakar, N. A. A., Mat, T. Z. T., Fahmi, F. M., & Urus, S. T. (2017). Lean management practices and its effect in Malaysian local government performance. *Asia-Pacific Management Accounting Journal*, 12(2), 79-104. Retrieved from arionline.uitm.edu.my/ojs/index.php/APMAJ/article/view/717/402
- Ballé, M., Chaize, J., & Jones, D. (2015) Inclusive versus exclusive learning: the secret ingredient to creating a truly “Lean” and “learning” culture. *Development and learning in Organizations: An International Journal*, 29(1), 20-23. doi: 10.1108/DLO-10-2014-0080
- Balzer, W. K., Brodke, M. H., & Kizhakethalackal, E. T. (2015). Lean higher education: successes, challenges, and realizing potential. *International Journal of Quality & Reliability Management*, 32(9), 924-933. doi: 10.1108/IJQRM-08-2014-0119
- Barney, J. (1991). Firm resources and sustained competitive advantage: *Journal of Management*, 17(1), 99-120. Retrieved from http://business.illinois.edu/josephm/BA545_Fall%202011/S10/Barney%20%281991%29.pdf
- Barney, J. B., & Clark, D. N. (2007). *Resource-Based Theory: Creating and Sustaining Competitive Advantage*. New York: Oxford University Press.
- Barney, J. B., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management*, 27(6), 625-641. doi: 10.1177/014920630102700601
- Barney, J. B., & Hesterly, W. S. (2010). *Strategic Management and Competitive Advantage: Concepts and Cases* (3rd ed.). New Jersey: Pearson Education, Inc.
- Baron, R. M., & Kenny, D. A. (1986). The Moderator Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.

- Basim, H. N., Sesen, H., & Korkmazurek, H. (2007). A Turkish translation, validity and reliability study of the dimensions of the learning organization questionnaire. *World Applied Sciences Journal*, 2(4), 368-347. Retrieved from <http://www.hrd.nida.ac.th/fileupload/paper/teacher/7.1.%20Basim%20et%20al.%202007%20A%20Turkish%20LO%20Dimensions%20Questionnaire.pdf>
- Bateman, N. (2005). Sustainability: The elusive element of process improvement. *International Journal of Operations & Production Management*, 25(3), 261-276. doi: 10.1108/01443570510581862
- Bauer, J., Festner, D., Gruber, H., Harteis, C., & Heid, H. (2004). The effects of epistemological beliefs on workplace learning. *Journal of Workplace Learning*, 16(5), 284-292. doi: 10.1108/13665620410545561
- Berg, S. A., & Chyung, S. Y. Y. (2008). Factors that influence informal learning in the workplace. *Journal of Workplace Learning*, 20(4), 229-244. doi: 10.1108/13665620810871097
- Bhasin, S. (2011). Measuring the Leanness of an organization. *International Journal of Lean Six Sigma*, 2(1), 55-74. doi: 10.1108/20401461111119459
- Bhasin, S. (2012). An appropriate change strategy for Lean success. *Management Decision*, 50(3), 439-458. doi: 10.1108/00251741211216223
- Bhasin, S. (2013). Impact of corporate culture on the adoption of the Lean principles. *International Journal of Lean Six Sigma*, 4(2), 118-140. doi: 10.1108/20401461311319329
- Bhasin, S. (2015). Lean Sustainability Audit. *Lean Management Beyond Manufacturing*, 199-227. doi: 10.1007/978-3-319-17410-5_12
- Billet, S. (2002). Toward a workplace pedagogy: Guidance, participation, and engagement. *Adult Education Quarterly*, 53(1), 27-43. doi: 10.1177/074171302237202

- Birkie, S. E., Trucco, P., & Kaulio, M. (2017). Sustaining performance under operational turbulence: The role of Lean in engineer-to-order operations. *International Journal of Lean Six Sigma*, 8(4), 457-481. doi: 10.1108/IJLSS-12-2016-0077
- Boud, D., & Griffin, V. (1987). *Appreciating Adults Learning: From the Learners' Perspective*. London N19JN: Kogan Page Ltd.
- Boyer, K. K. (1996). An assessment of managerial commitment to Lean production. *International Journal of Operations and Production Management*, 16(9), 48-59. doi: 10.1108/01143579610125589
- Buckler, B. (1996). A learning process model to achieve continuous improvement and innovation. *The Learning Organization*, 3(3), 31-39. doi: 10.1108/09696479610119660
- Burrell, G., & Morgan, G. (1979). *Sociological Paradigms and Organizational Analysis*. London: Heinemann Educational Books.
- Burgess, N., & Radnor, Z. (2013). Evaluating Lean in healthcare. *International Journal of Health Care Quality Assurance*, 26(3), 220-235. doi: 10.1108/09526861311311418
- Cavusgil, S. T., Knight, G., & Riesenberger, J. (2017). *International Business: The New Realities* (4th ed.). England: Pearson Education Limited.
- Chauhan, G., & Singh, T. P. (2012). Measuring parameters of Lean manufacturing realization. *Measuring Business Excellence*, 16(3), 57-71. doi: 10.1108/13683041211257411
- Chay, T. F., Xu, T. C., Tiwari, A. & Chay, F. S. (2015). Towards Lean transformation: The analysis of Lean implementation frameworks. *Journal of Manufacturing Technology Management*, 26(7), 1031-1052. doi: 10.1108/JMTM-10-2013-0143

- Coakes, S. J., Steed, L., & Ong, C. (2010). *SPSS Version 17.0 for Windows: Analysis without Anguish*. Milton Qld 4064, John Wiley & Sons Australia, Ltd.
- Comm, C. L., & Mathaisel, D. F. X. (2005a). A case study in applying Lean sustainability concepts to universities. *International Journal of Sustainability in Higher Education*, 6(2), 134-146. doi: 10.1108/14676370510589855
- Comm, C. L., & Mathaisel, D. F. X. (2005b). An exploration study of best Lean sustainability practices in higher education. *Quality Assurance in Education*, 13(3), 227-240. doi: 10.1108/09684880510607963
- Cornell University, INSEAD & the World Intellectual Property Organization. (2017). The Global Innovation Index 2017: Innovation Feeding the World (10th ed.). In S. Dutta, B. Lanvin & S. Wunsch-Vincent (Eds.). Retrieved from http://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf
- Crane, A., & Matten, D. (2010). *Business Ethics*. New York: Oxford University Press.
- Crane, A., & Matten, D. (2016). *Business Ethics: Managing Corporate Citizenship and Sustainability in the Age of Globalization*. United Kingdom: Oxford University Press.
- Curatolo, N., Lamouri, S., Huet, J., & Rieutord, A. (2014). A critical analysis of Lean approach structuring in hospitals. *Business Process Management Journal*, 20(3), 433-454. doi: 10.1108/BPMJ-04-2013-0051
- De Zan, G., De Toni, A. F., Fornasier, A., & Battistella, C. (2015). A methodology for the assessment of experiential learning Lean: The Lean Experience Factory case study. *European Journal of Training and Development*, 39(4), 332-354. doi: 10.1108/EJTD-05-2014-0040
- Deming, W. E. (1982, 1986). *Out of the Crisis: Quality, Productivity and Competitive Position*. US, Cambridge, Massachusetts 02139: Cambridge University Press.

Department of Statistics Malaysia (DOSM). (2016). Compendium of Environment Statistics 2016.

Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=162&bul_id=MTZVTGQycmc4azNuaDI6NGdhUjZoZz09&menu_id=NWVEZGhEVlNMMeitaMHNzK2htRU05dz09

Department of Statistics Malaysia (DOSM). (2017a). Economic Census 2016 – Economic

Compliance. Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=407&bul_id=eFI1NIJXQjQ3cTNRVXVNSWZ0cTQ0UT09&menu_id=NWVEZGhEVlNMMeitaMHNzK2htRU05dz09

Department of Statistics Malaysia (DOSM). (2017b). Employment. Malaysia Economic Statistics

Time Series 2016. Retrieved from https://www.dosm.gov.my/v1/uploads/files/3_Time%20Series/Malaysia_Time_Series_2016/21_Guna_Tenaga.pdf

Department of Statistics Malaysia (DOSM). (2018). Malaysia Economic Performance First Quarter

2018. Retrieved from https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=100&bul_id=SU85RzF6TjNQdWJqUTd1RG9XeGF5dz09&menu_id=TE5CRUZCblh4ZTZMODZlbnk2aWRRQT09

Dibia, I. K., Dhakal, H. N., & Onuh, S. (2014). Lean “leadership people process outcome” (LPPO)

implementation model. *Journal of Manufacturing Technology Management* 25(5), 694-711. doi: 10.1108/JMTM-08-2011-0076

Eaidgah, Y., Maki, A. A., Kurczewski, K., & Abdekhodae, A. (2016). Visual management,

performance management and continuous improvement: A Lean manufacturing approach. *International Journal of Lean Six Sigma*, 7(2), 187-210. doi: 10.1108/IJLSS-09-2014-0028

Ellinger, A. D., Ellinger, A. E., Yang, B., & Howton, A. W. (2003). Making the business case for

the learning organization concept. *Advances in Developing Human Resources*, 5(2), 163-172. doi: 10.1177/1523422303005002004

- Federation of Malaysian Manufacturer (FMM). (2017). FMM-MPC Lean System Development Programme. Retrieved from http://www.fmm.org.my/events_details.aspx?eventID=e2bc0d0e-67f5-442c-a316-d6450f613f15
- Farquharson, A. (1995). *Teaching in Practice: How Professionals Can Work Effectively with Clients, Patients, and Colleagues*. California 94104: Jossey-Bass Inc.
- Fiol, C. M., & Lyles, M. A. (1985). Organizational learning. *The Academy of Management Review*, 10(4), 803-813. Retrieved from <http://www.jstor.org/stable/258048>
- Foo, W. S., Ang, E. L., Rajamony, B., & Lee, C. C. (2015). Lean manufacturing implementation and sustenance in Malaysian manufacturing industry: Challenges and issues. *Australian Journal of Basic and Applied Sciences*, 9(12), 1-6. Retrieved from <https://www.researchgate.net/publication/277015383/download>
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to Design and Evaluate Research in Education* (8th ed.). NY10020: McGraw-Hill Companies, Inc.
- Fraser, D. (1995). Generating a culture focused on continuous improvement. *Health Manpower Management*, 21(4), 5-10. doi: 10.1108/09552069510092700
- Freire, P. (1972). *Pedagogy of the Oppressed* (M. B. Ramos, Trans). England: Penguin Group.
- Fujimoto, T. (2007). *Competing to Be Really, Really Good: The Behind-the-Scene Drama of Capability-Building Competition in the Automobile Industry*. Japan: International House of Japan.
- Fuller, A., & Unwin, L. (2005). Older and wiser?: workplace learning from the perspective of experienced employees. *International Journal of Lifelong Education*, 24(1), 21-39. doi: 10.1080/026037042000317329

- Gao, S., & Low, S. P. (2013). Understanding the application of Kaizen methods in construction firms in China. *Journal of Technology Management in China*, 8(1), 18-33. doi: 10.1108/JTMC-03-2013-0018
- Garavan, T. N. (1997). Training, development, education and learning: different or the same? *Journal of European Industrial Training*, 21(2), 39-50. doi: 10.1108/03090599710161711
- Garza-Reyes, J. A., Betsis, I. E., Kumar, V., & Al-Shboul, M. A. R. (2018). Lean readiness – the case of the European pharmaceutical manufacturing industry. *International Journal of Productivity and Performance Management*, 67(1), 20-44. doi: 10.1108/IJPPM-04-2016-0083
- Gelei, A., Losonci, D., & Matyusz, Z. (2015). Lean production and leadership attributes – the case of Hungarian production managers. *Journal of Manufacturing Technology Management*, 26(4), 477-500. doi: 10.1108/JMTM-05-2013-0059
- Gleskes, J. F. B., & ten Broeke, A. M. (2000). Infrastructure under construction: continuous improvement and learning in projects. *Integrated Manufacturing Systems*, 11(3), 188-198. doi: 10.1108/09576060010320425
- Glover, W. J., Liu, W., Farris, J. A., & Aken, E. M. V. (2013). Characteristics of established Kaizen event programs: an empirical study. *International Journal of Operations & Production Management*, 33(9), 1166-1201. doi: 10.1108/IJOPM-03-2011-0119
- Habidin, N. F., & Yusof, S. M. (2013). Critical success factors of Lean Six Sigma for the Malaysian automotive industry. *International Journal of Lean Six Sigma*, 4(1), 60-82. doi: 10.1108/20401461311310526

- Habidin, N. F., Zubir, A. F. M., Conding, J., Jaya, N. A. S. L., & Hashim, S. (2013). Sustainable manufacturing practices, sustaining Lean improvements and sustainable performance in Malaysian automotive industry. *World Review of Entrepreneurship, Management and Sustainable Development*, 9(4), 444-459. doi: 10.1504/WREMSD.2013.056755
- Habtoor, N. (2016). Influence of human factors on organizational performance: Quality improvement practices as mediator variable. *International Journal of Productivity and Performance Management*, 65(4), 460-484. doi: 10.1108/IJPPM-02-2014-0016
- Hair, J. F. Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate Data Analysis with Readings* (4th ed.). New Jersey 07632: Prentice-Hall, Inc.
- Hair, J. F. Jr., Celsi, M. W., Money, A. H., Samouel, P., & Page, M. (2011). *Essentials of Business Research Methods* (2nd ed). NY10017: Taylor & Francis.
- Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. NY 10012: The Guilford Press.
- Hernandez, M. (2003). Assessing tacit knowledge transfer and dimensions of a learning environment in Colombian businesses. *Advances in Developing Human Resources*, 5(2), 215-221. doi: 10.1177/1523422303005002009
- Hines, P., Holweg, M., & Rich, N. (2004). Learning to evolve: A review of contemporary Lean Thinking. *International Journal of Operations & Production Management*, 24(10), 994-1011. doi: 10.1108/01443570410558049
- Hirzel, A., Leyer, M., & Moormann, J. (2017). The role of employee empowerment in the implementation of continuous improvement: Evidence from a case study of a financial service provider. *International Journal of Operations & Production Management*, 37(10), 1563-1579. doi: 10.1108/IJOPM-12-2015-0780

- Holder, S.K. (2016). *Sociology: Theories and Research Methods*. Retrieved from https://books.google.com.my/books?id=svsgDgAAQBAJ&printsec=frontcover&dq=Sociology:+Theories+and+Research+Methods&hl=en&sa=X&ved=0ahUKEwi_uOPa-OPcAhXTFIgKHUIlNBPwQ6AEILDAB#v=onepage&q=Sociology%3A%20Theories%20and%20Research%20Methods&f=false
- Hu, Q., Found, P., Williams, S., & Mason, R. (2016). Lean Thinking and organizational learning: How can they facilitate each other? In A. Chiarini, A. Found, & N. Rich (Eds.), *Understanding the Lean Enterprise: Strategies, Methodologies, and Principles for a More Responsive Organization* (pp. 61-77). Cham: Springer. doi: 10.1007/978-3-319-19995-5
- Imai, M. (1986). *Kaizen: (Ky'zen), The Key to Japan's Competitive Success*. US: McGraw-Hill Publishing Company.
- Ingelsson, P., & Mårtensson, A. (2014). Measuring the importance and practices of Lean values. *The TQM Journal*, 26(5), 463-474. doi: 10.1108/TQM-07-2012-0047
- Isack, H. D., Mutingi, M., Kandjeke, H. Vashishth, A., & Chakraborty, A. (2018). Exploring the adoption of Lean Principles in medical laboratory industry: Empirical evidences from Namibia. *International Journal of Lean Six Sigma*, 9(1), 133-155. doi: 10.1108/IJLSS-02-2017-0017
- Isaksson, R., Garvare, R., Johnson, M., Kuttainen, C., & Pareigis, J. (2015). Sustaining Sweden's competitive position: Lean lifelong learning. *Measuring Business Excellence*, 19(1), 92-102. doi: 10.1108/MBE-11-2014-0045
- Jadhav, J. R., Mantha, S. S., & Rane, S. B. (2014a). Development of framework for sustainable Lean implementation: an ISM approach. *Journal of Industrial Engineering International*, 10(3), 1-27. doi: 10.1007/s40092-014-0072-8

- Jadhav, J. R., Mantha, S. S., & Rane, S. B. (2014b). Exploring barriers in Lean implementation. *International Journal of Lean Six Sigma*, 5(2), 122-148. doi: 10.1108/IJLSS-12-2012-0014
- Jau, H. (2014, Mar 14). MPC doubles effort on LEAN activities. *New Sarawak Tribune*. Retrieved from <http://www.newsarawaktribune.com/news/22491/MPC-doubles-effort-on-LEAN-activities/>
- Jayaraman, K., Teo, L. K., & Keng, L. S. (2012). The perceptions and perspectives of Lean Six Sigma (LSS) practitioners: An empirical study in Malaysia. *The TQM Journal*, 24(5), 433-446. doi: 10.1108/17542731211261584
- Jekiel, C. M. (2011). *Lean Human Resources: Redesigning HR Processes for a Culture of Continuous Improvement*. New York, NY 10016: Productivity Press Taylor and Francis Group.
- Jönsson, S., & Schölin, T. (2014). Potentials facilitators of workplace learning in a TPS based company. *Journal of Management Development*, 33(10), 1004-1018. doi: 10.1108/JMD-10-2012-0130
- Jørgensen, F., Mathiessen, R., Nielson, J., & Johansen, J. (2007). Lean Maturity, Lean Sustainability. In J. Olhager & F. Persson (Eds.), *IFIP International Federation for Information Processing: Vol. 246. Advances in Production Management Systems* (pp. 371-378). doi: 10.1007/978-0-387-74157-4_44
- Kamal, S. K., & Habidin, N. F. (2017). Junshi: A daily Kaizen activity of Lean production management. *International Journal of Academic Research in Business and Social Sciences*, 7(3), 831-836. doi: 10.6007/IJARBSS/v7-i3/2851
- Kant, I. (1949). *Fundamental Principles of The Metaphysics of Morals* (T. K. Abbott, Trans). New York: Macmillan Publishing Company. (Original work published 1785)

- Khaba, S., & Bhar, C. (2018). Lean awareness and potential for Lean implementation in the Indian coal mining industry: An empirical study. *International Journal of Quality & Reliability Management*, 35(6), 1215-1231. doi: 10.1108/IJQRM-02-2017-0024
- Knowles, M. S. (1989). *The Making of an Adult Educator*. California 04104: Jossey-Bass Inc.
- Knowles, M. S., & Associates. (1984). *Andragogy in Action: Applying Modern Principles of Adult Learning*. London EC1Y8QE: Jossey-Bass Publishers.
- Kregel, I., & Coners, A. (2018). Introducing Lean six Sigma to a German municipality: an action research report. *International Journal of Lean Six Sigma*, 9(2), 221-237. doi: 10.1108/IJLSS-02-2017-0019
- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Education and Psychological Measurement*, 30, 607-610. Retrieved from https://home.kku.ac.th/sompong/guest_speaker/KrejcieandMorgan_article.pdf
- Kululanga, G. K. (2009). Construction process improvement through cognitive power under team generative learning. *Engineering, construction and Architectural Management*, 16(4), 307-324. doi: 10.1108/09699980910970815
- Kumar, R. (2005). *Research Methodology: A Step-by-step Guide for Beginners* (2nd ed.). London EC1Y1SP: SAGE Publications Ltd.
- Kumar, S., Dhingra, A., & Singh, B. (2018). Lean-Kaizen implementation: A roadmap for identifying continuous improvement opportunities in Indian small and medium sized enterprise. *Journal of Engineering, Design and Technology*, 16(1), 143-160. doi: 10.1108/JEDT-08-2017-0083
- Kumar, M., Talib, S. A., & Ramayah, T. (2013). *Business Research Methods*. Malaysia: Oxford Fajar Sdn. Bhd.

- Lam, M., O'Donnell, M., & Obertson, D. (2015). Achieving employee commitment for continuous improvement initiatives. *International Journal of Operations & Production Management*, 35(2), 201-215. doi: 10.1108/IJOPM-03-2013-0134
- Lantz, A., Hansen, N., & Antoni, C. (2015). Participative work design in Lean production: A strategy for dissolving the paradox between standardized work and team proactivity by stimulating team learning? *Journal of Workplace Learning*, 27(1), 19-33. doi: 10.1108/JWL-03-2014-0026
- Legge, K. (1995). *Human Resource Management: Rhetorics and Realities*. N.Y. 10010: Palgrave.
- Legge, K. (1998). Is HRM ethical? Can HRM be ethical? In M. Parker (Ed.), *Ethics and Organizations* (pp. 150-172). London: Sage.
- Lewis, M. A. (2000). Lean production and sustainable competitive advantage. *International Journal of Operations & Production Management*, 20(8), 959-976. doi: 10.1108/01443570010332971
- Lien, B. Y. H., Hung, R. Y. Y., Yang, B., & Li, M. (2006). Is the learning organization a valid concept in the Taiwanese context? *International Journal of Manpower*, 27(2), 189-203. doi: 10.1108/01437720610666209
- Liker, J. K. (2004). *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*. New York: McGraw-Hill. Retrieved from <http://library.books24x7.com.remotexts.unimas.my/assetviewer.aspx?bookid=7105&chunkid=203887485¬eMenuToggle=0&hitSectionMenuToggle=0&leftMenuState=1>
- Lindskog, P., Vänje, Å., Törnkvist, Å., & Eklund, J. (2016). Sustainable Lean in psychiatry? Assessment through socio-technical principles. *International Journal of Quality and Service Sciences*, 8(1), 53-71. doi:10.1108/IJQSS-07-2015-0056

- Lohman, M. C. (2006). Factors influencing teachers' engagement in informal learning activities. *Journal of Workplace Learning*, 18(3), 141-156. doi: 10.1108/13665620610654577
- Longoni, A., & Cagliano, R. (2015). Cross-functional executive involvement in Lean manufacturing and sustainability alignment. *Journal of Operations and Production Management*, 35(9), 1332-1358. doi:10.1108/IJOPM-02-2015-0113
- Loseke, D. R. (2003). *Thinking about Social Problems: An Introduction to Constructionist Perspectives* (2nd ed.). NY10017: Routledge.
- Love, P. E. D., & Gunasekaran, A. (1999). Learning alliances: a customer-supplier focus for continuous improvement in manufacturing. *Industrial and Commercial Training*, 31(3), 88-96. doi: 10.1108/00197859910269167
- Magnier-Watanabe, R. (2011). Getting ready for Kaizen: Organizational and knowledge management enablers. *The Journal of Information and Knowledge Management Systems*, 41(4), 428-448. doi: 10.1108/03055721111188520
- Malaysia Productivity Corporation (MPC). (2016a). Background. Retrieved from <http://www.mpc.gov.my/background/>
- Malaysia Productivity Corporation (MPC). (2016b). Lean Management Approach. Retrieved from <http://www.mpc.gov.my/Leanmanagement/>
- Malaysia Productivity Corporation (MPC). (2018). Productivity Report 2017/2018. Retrieved from <https://drive.google.com/file/d/1k-UuTX4GJISLRo9vhoE7RX-t7FpC0eBK/view>
- Malmbrandt, M., & Åhlström, P. (2013). An instrument for assessing Lean service adoption. *International Journal of Operations & Production Management*, 33(9), 1131-1165. doi: 10.1108/IJOPM-05-2011-0175

- Mamat, R. C., Deros, B. M., Rahman, M. N. A., Omar, M. K., & Abdullah, S. (2015). Soft Lean practices for successful Lean production system implementation in Malaysia automotive SMEs: A proposed framework. *Jurnal Teknologi*, 77(27), 141-150. doi: 10.11113/jt.v77.6910
- Manzouri, M., Rahman, M. N. A., & Saibani, N. (2013). Lean supply chain practices in the Halal food. *International Journal of Lean Six Sigma*, 4(4), 389-408. doi: 10.1108/IJLSS-10-2012-0011
- Marksberry, P., Badurdeen, F., Gregory, B., & Kreaflle, K. (2010). Management directed Kaizen: Toyota's Jishuken process for management development. *Journal of Manufacturing Technology Management*, 21(6), 670-686. doi: 10.1108/17410381011063987
- Marsick, V. J., & Watkins, K. E. (2001). Informal and incidental learning. *New Directions for Adult and Continuing Education*, (89). Jossey-Bass, A Publishing Unit of John Wiley & Sons, Inc. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1010.8270&rep=rep1&type=pdf>
- Marsick, V. J., & Watkins, K. E. (2003). Demonstrating the value of an organization's learning culture: The dimensions of the learning organization questionnaire. *Advances in Developing Human Resources*, 5(2), 132-151. doi: 10.1177/1523422303005002002
- Martin, D. (1993). Towards Kaizen: The quest for quality improvement. *Library Management*, 14(4), 4-12. doi: 10.1108/01435129310038712
- McHargue, S. K. (2003). Learning for performance in nonprofit organizations. *Advances in Developing Human Resources*, 5(2), 196-204. doi: 10.1177/1523422303005002007
- McLagan, P. A. (1989a). Models for HRD Practice. *Training and Development Journal*, 43(9), 49-59.

- McLagan, P. A. (1989b). *Models for HRD Practice: The Models*. US: American Society for Training and Development.
- McLagan, P. A., & Suhadolnik, D. (1989). *Models for HRD Practice: The Research Report*. US: American Society for Training and Development.
- Meiling, J., Backlund, F., & Johnsson, H. (2012). Managing for continuous improvement in off-site construction: Evaluation of Lean management principles. *Engineering, Construction and Architectural Management*, 19(2), 141-158. doi: 10.1108/09699981211206089
- Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. *New Direction for Adult and Continuing Education*, (89), 3-13. Retrieved from http://umsl.edu/~wilmarthp/modla-links-2011/Merriam_pillars%20of%20anrdagogy.pdf
- Michna, A. (2009). The relationship between organizational learning and SME performance in Poland. *Journal of European Industrial Training*, 33(4), 356-370. doi: 10.1108/03090590910959308
- Minh, K. S., Zailani, S., Iranmanesh, M., & Heidari, S. (2018). Do Lean manufacturing practices have negative impact on job satisfaction? *International Journal of Lean Six Sigma*. doi: 10.1108/IJLSS-11-2016-0072
- Ministry of Finance Malaysia (MOF). (2018a). Economic Outlook 2019. Retrieved from <http://www.treasury.gov.my/index.php/en/economy/item/3154-economic-outlook-2019.html>
- Ministry of Finance Malaysia (MOF). (2018b). Laporan Ekonomi 2018. Retrieved from <http://www.treasury.gov.my/index.php/ekonomi/laporan-ekonomi.html>

- Mitki, Y., Shani, A.B. R., & Meiri, Z. (1997). Organizational learning mechanisms and continuous improvement: A longitudinal study. *Journal of Organizational Change Management*, 10(5), 426-446. doi: 10.1108/09534819710177530
- Mohd-Zainal, A., Goodyer, J., & Grigg, N. (2011). *Organizational Learning to Sustain Lean Implementation in New Zealand Manufacturing Companies*. Paper presented at the 3rd International Conference on Information and Financial Engineering, Singapore. Retrieved from <http://www.ipedr.com/vol12/27-C029.pdf>
- Monden, Y. (2012). *Toyota Production System: An Integrated Approach to Just-In-Time* (4th ed.). Boca Raton, FL 33487-2742: CRC Press Taylor & Francis Group.
- Muijs, D. (2004). *Doing quantitative research in education with SPSS*. London EC1Y 1SP: SAGE Publications Ltd.
- Muraliraj, J., Zailani, S. Kuppusamy, S., & Santha, C. (2018). Annotated methodological review of Lean Six Sigma. *International Journal of Lean Six Sigma*, 9(1), 2-49. doi: 10.1108/IJLSS-04-2017-0028
- Murray, P., & Chapman, R. (2003). From continuous improvement to organizational learning: developmental theory. *The Learning Organization*, 10(5), 272-282. doi: 10.1108/09696470310486629
- Nafukho, F. M., Graham, C. M., & Muyia, M. H. (2009). Determining the relationship among organizational learning dimensions of a small-size business enterprise. *Journal of European Industrial Training*, 33(4), 32-51. doi: 10.1108/03090590910924360
- Nawanir, G., Lim, K. T., & Othman, S. N. (2016). Lean manufacturing practices in Indonesian manufacturing firms: Are these business performance effects? *International Journal of Lean Six Sigma*, 7(2), 149-170. doi: 10.1108/IJLSS-06-2014-0013

- Netland, T. H., & Aspelund, A. (2013). Company-specific production systems and competitive advantage: A resource-based view on the Volvo production system. *International Journal of Operations & Production Management*, 33(11/12), 1511-1531. doi: 10.1108/IJOPM-07-2010-0171
- Ng, T. C., & Ghobakhloo, M. (2018). What determines Lean manufacturing implementation? A CB-SEM Model. *Economies*, 6(9), 1-11. doi: 10.3390/economies6010009
- Noe, R. A. (2017). *Employee Training and Development* (7th ed.). New York, NY, 10121: McGraw-Hill Education.
- Nordin, N., Deros, B. M., & Wahab, D. A. (2010). A survey on Lean manufacturing implementation in Malaysian automotive industry. *International Journal of Innovation*, 1(4), 374-380. Retrieved from <http://www.ijimt.org/papers/68-M457.pdf>
- Nordin, N., Deros, B. M., Wahab, D. A. & Rahman, M. N. A. R. (2011). Managing change in lean manufacturing implementation. *Advanced Materials Research*, 314-316 (2011), 2105-2111. doi: 10.1002/1522-2875(201108)314:2<2105::AID-AMR2105>3.0.CO;2-1
- Pakdil, F., & Leonard, K. M. (2015). The effect of organizational culture on implementing and sustaining Lean processes. *Journal of Manufacturing Technology Management*, 26(5), 725-743. doi: 10.1108/JMTM-08-2013-0112
- Papadopoulos, T. (2011). Continuous improvement and dynamic actor associations: A study on Lean Thinking implementation in the UK National Health Service. *Leadership in Health Services* 24(3), 207-227. doi: 10.1108/17511871111151117
- Pembangunan Sumber Manusia Berhad (PSMB). (2018a). Pembangunan Sumber Manusia Berhad Act, 2001 (PSMB Act, 2001). Retrieved from <http://www.hrdf.com.my/wps/portal/PSMB/MainEN/Corporate-Profile/PSMB-Act/>

- Pembangunan Sumber Manusia Berhad (PSMB). (2018b). Vision and Mission. Retrieved from <http://www.hrdf.com.my/wps/portal/PSMB/MainEN/Corporate-Profile/Vision-and-Mission/>
- Penrose, E. (2009). *The Theory of The Growth of The Firm*. In C. Pitelis (Ed.). New York: Oxford University Press Inc. (Original work published 1959)
- Piercy, N., & Rich, N. (2015). The relationship between Lean operations and sustainable operations. *Journal of Operations and Production Management*, 35(2), 282-315. doi: 10.1108/IJOPM-03-2014-0143
- Prajogo, D., Oke, A., & Olhager, J.. (2016). Supply chain processes: Linking supply chain logistics integration, supply performance, Lean processes and competitive performance. *International Journal of Operations & Production Management*, 36(2), 220-238. doi: 10.1108/IJOPM-03-2014-0129
- Prashar, A. (2014). Redesigning an assembly line through Lean-Kaizen: an Indian case. *The TQM Journal*, 26(5), 475-498. doi: 10.1108/TQM-04-2013-0054
- Psomas, E., Antony, J., & Bouranta, N. (2018). Assessing Lean adoption in food SMEs: Evidence from Greece. *International Journal of Quality & Reliability Management*, 35(1), 64-81. doi: 10.1108/IJQRM-05-2016-0061
- Puvanasvaran, A. P., HuiHui, Y., & Norazlin, N. (2014). Managing waste elimination database in Lean manufacturing: Improve problem solving capability. *American Journal of Engineering and Applied Sciences*, 7(2), 271-281. doi: 10.3844/ajeassp.2014.271.281
- Raghavan, V. A., Yoon, S., & Srihari, K. (2014). Lean transformation in a high mix low volume electronics assembly environment. *International Journal of Lean Six Sigma*, 5(4), 342-360. doi: 10.1108/IJLSS-07-2013-0042

- Raghu Kumar, B. R., Sharma, M. K., & Agarwal, A. (2015). An experimental investigation of Lean management in aviation: Avoiding unforced errors for better supply chain. *Journal of Manufacturing Technology Management*, 26(2), 231-260. doi: 10.1108/ JMTM-12-2013-0174
- Ramsay, G. (1870). *Ontology or Things Existing*. London: Walton.
- Raval, S. J., & Kant, R. (2017). Study on Lean Six Sigma frameworks: A critical literature review. *International Journal of Lean Six Sigma*, 8(3), 275-334. doi: 10.1108/ IJLSS-02-2016-0003
- Roslin, E. N., Ahmed, S., Dawal, S. Z. M., & Tamri, N. (2012). Strategies for the successful Lean manufacturing implementation: A case study in a Malaysian automotive parts manufacturing. *International Journal of Engineering Research & Technology*, 1(9), 1-6. Retrieved from <https://www.ijert.org/phocadownload/V1I9/IJERTV1IS9015.pdf>
- Rowden, R. W., & Ahmad, S. (2001). The relationship between workplace learning and job satisfaction in small to mid-sized businesses in Malaysia. *Human Resource Development International*, 3(3), 307-322. doi:10.1080/13678860050128492
- Runyon, R. P., Haber, A., Pittenger, D. J., & Coleman, K. A. (1996). *Fundamentals of Behavioral Statistics* (8th ed.). New York: The McGraw-Hill Companies, Inc.
- Sahwan, M. A., Rahman, M. N. A., & Deros, B. M. (2012). Barriers to implement Lean manufacturing in Malaysian automotive industry. *Jurnal Teknologi*, 59(2), 107-110. doi: 10.11113/jt.v59.2571
- Salleh, N. A. M., Kasolang, S., Jaffar, A., & Halim, N. H. A. (2015). Lean TQM leadership management practices in Malaysian automotive companies. *Jurnal Teknologi*, 76(6), 1-6. doi: 10.11113/jt.v76.5663

- Sangwa, N. R., & Sangwan, K. S. (2018). Development of an integrated performance measurement framework for Lean organization. *Journal of Manufacturing Technology Management*, 29(1), 41-84. doi: 10.1108/JMTM-06-2017-0098
- Sarhan, J., Xia, B., Fawzia, S., Karim, A., & Olanipekun, A. (2018). Barriers to implementing Lean construction practices in the Kingdom of Saudi Arabia (KSA) construction industry. *Construction Innovation*, 18(2), 246-272. doi: 10.1108/CI-04-2017-0033
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed.). CM202JE England: Pearson Education Limited.
- Savolainen, T., & Haikonen, A. (2007). Dynamics of organizational learning and continuous improvement in six sigma implementation. *The TQM Magazine*, 19(1), 6-17. doi: 10.1108/09544780710720808
- Scheller, A. C., Sousa-Zomer, T. T., & Cauchick-Miguel, P. A. (2018). Lean Six Sigma in developing countries: evidence from a large Brazillian manufacturing firm. *International Journal of Lean Six Sigma*. doi: 10.1108/IJLSS-09-2016-0047
- Seaker, R., & Waller, M. A. (1996). Brainstorming: The common thread in TTQM, empowerment, re-engineering and continuous improvement. *International Journal of Quality and Reliability Management*, 13(1), 24-31. doi: 10.1108/02656719610108305
- Secchi, R., & Camuffo, A. (2016). Rolling out Lean production systems: A knowledge-based perspective. *International Journal of Operations & Production Management*, 36(1), 61-85. doi: 10.1108/IJOPM-04-2014-0194
- Seidel, A., Saurin, T. A., Marodin, G. A., & Ribeiro, J. L. D. (2017). Lean leadership competencies: a multi method study. *Management Decision*, 55(10), 2163-2180. doi: 10.1108/MD-01-2017-0045

- Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York 10036: Doubleday.
- Senge, P. M., Roberts, C., Ross, R. B., Smith, B. J., & Kleiner, A. (1994). *The Fifth Discipline Fieldbook: Strategies and Tools for Building a Learning Organization*. London WC1N2AT: Nicholas Brealey Publishing.
- Shewhart, W. A. (1986). *Statistical Method From The Viewpoint Of Quality Control*. In W. E. Deming (Ed.). New York: Dover Publications, Inc.
- Singh, J., & Singh, H. (2015). Continuous improvement philosophy – literature review and directions. *Benchmarking: An International Journal*, 22(1), 75-119. doi: 10.1108/BIJ-06-2012-0038
- Sisson, K. (1994). Personnel Management: Paradigms, Practice and Prospects. In K. Sisson (Ed.), *Personnel Management: A Comprehensive Guide to Theory and Practice in Britain* (pp. 3-50). Oxford OX4 1JF, UK: Blackwell Publishers.
- Song, J. H., Joo, B. B. K., & Chermack, T. J. (2009). Dimensions of learning organization questionnaire (DLOQ): A validation study in a Korean context. *Human Resource Development Quarterly*, 20(1), 43-64. Retrieved from <https://pdfs.semanticscholar.org/cabf/0a6ad5c119c9f3708ff2e54af64089214df5.pdf>
- Sraun, J. S., & Singh, H. (2017). Continuous improvement strategies across manufacturing SMEs of Northern India: An empirical investigation. *International Journal of Lean Six Sigma*, 8(2), 225-243. doi: 10.1108/IJLSS-05-2016-0019
- Stelson, P., Hille, J., Eseonu, C., & Doleen, T. (2017). What drives continuous improvement project success in healthcare? *International Journal of Health Care Quality Assurance*, 30(1), 43-57, doi: 10.1108/IJHCQA-03-2016-0035

- Suárez-Barraza, M. F., Ramis-Pujol, J., & Sandoval-Arzaga, F. (2011). Finding Kaizen approach in small Mexican family businesses: An exploratory study. *Journal of Family Business Management*, 1(2), 107-129. doi: 10.1108/20436231111167200
- Suárez-Barraza, M. F., & Miguel-Dávila, J., Á. (2014). Assessing the design, management and improvement of Kaizen projects in local governments. *Business Process Management Journal*, 20(3), 392-411. doi: 10.1108/BPMJ-03-2013-0040
- Sun, H., Ho, K., & Ni, W. (2008). The empirical relationship among organizational learning, continuous improvement and performance improvement. *International Journal of Learning and Change*, 3(1), 110-124. doi: 10.1504/IJLC.2008.018871
- Tabatabaee, S., Mahdiyar, A., Yahya, K., Marsono, A. K., & Sadeghifam, A. N. (2017). Level of awareness of Lean Thinking concept in construction among higher learning students in Malaysia. *Malaysian Journal of Civil Engineering*, 29(1), 94-107. doi: 10.11113/mjce.v29.41
- The Edge Communications Sdn. Bhd. (2018, November 15). Budget 2019: Budget 2019 highlights. *The Edge Malaysia*. Retrieved from <http://www.theedgemarkets.com/article/budget-2019-budget-2019-highlights>
- van Dun, D. H., & Wilderom, C. P. M. (2016). Lean-team effectiveness through leader values and members' informing. *International Journal of Operations & Production Management*, 36(11), 1530-1550. doi: 10.1108/IJOPM-06-2015-0338
- Wahab, A. N. A., Mukhtar, M., Sulaiman, R., Shafinah, K., Ang, M. C., & Jenal, R. (2017). Validating the relationship between Lean dimensions and wastes: A pilot study of Malaysian industries. *International Journal of Engineering Sciences & Research Technology*, 6(7), 366-375. doi: 10.5281/zenodo.827610

- Waterbury, T. (2015). Learning from the pioneers: A multiple-case analysis of implementing Lean in higher education. *International Journal of Quality & Reliability Management*, 32(9), 934-950. doi: 10.1108/IJQRM-08-2014-0125
- Watkins, K. E., & Marsick, V. J. (2013). Adult education & human resource development: Overlapping and disparate fields. *New Horizons in Adult Education & Human Resource Development*, 26(1), 42-54.
- Wickramasinghe, G. L. D., & Wickramasinghe, V. (2016). Effects of continuous improvement on shop-floor employees' job performance in Lean production: The role of Lean duration. *Research Journal of Textile and Apparel*, 20(4), 182-194. doi: 10.1108/RJTA-07-2016-0014
- Willard, B. (2012). *The New Sustainability Advantage: Seven Business Case Benefits of a Triple Bottom Line*. Canada: New Society Publishers.
- Wilson, W. J., Jayamaha, N., & Frater, G. (2018). The effect of contextual factors on quality improvement success in a lean-driven New Zealand healthcare environment. *International Journal of Lean Six Sigma*, 9(2), 199-220. doi: 10.1108/IJLSS-03-2017-0022
- Wittenberg, G. (1994). Kaizen – the many ways of getting better. *Assembly Automation*, 14(4), 12-17. doi: 10.1108/EUM00000000004213
- Womack, J. P., Jones, D. T., & Roos, D. (1990). *The Machine That Changed The World*. New York, N. Y. 10022: Macmillan Publishing Company.
- Wong, Y. C., & Wong, K. Y. (2011). Approaches and practices of Lean manufacturing: The case of electrical and electronics companies. *African Journal of Business Management*, 5(6), 2164-2174. doi: 10.5897/AJBM10.404

- WWF. (2015, January 20). Workshop to Identify Areas for Conservation. Retrieved from http://www.wwf.org.my/media_and_information/updates__former_newsroom_main_/?18745/Workshop-to-Identify-Areas-For-Conservation
- WWF. (n.d.). Threats to rivers. Retrieved from http://www.wwf.org.my/about_wwf/what_we_do/freshwater_main/freshwater_conserving_river_basins/threats_to_rivers/index.cfm
- Yang, B., Watkins, K. E., & Marsick, V. J. (2004). The construct of the learning organization; Dimensions, Measurement, and Validation. *Human Resource Development Quarterly*, 15(1), 31-55. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=BE8CE5DB46A9E9C96F5C77699689594C?doi=10.1.1.589.2724&rep=rep1&type=pdf>
- Yokozawa, K., & Steenhuis, H. (2013). The influence of national level factors on international Kaizen transfer: An exploratory study in The Netherlands. *Journal of Manufacturing Technology Management*, 24(7), 1051-1075. doi: 10.1108/JMTM-05-2011-0046
- Yusof, S. M., & Aoki, K. (2016). *Proposed Lean Sustained Factors*. Paper presented at International Conference on Industrial Engineering and Operations Management, Kuala Lumpur. Retrieved from https://businessdocbox.com/Human_Resources/74624129-Proposed-Lean-sustained-factors.html
- Zahraee, S. M., (2016). A survey on Lean manufacturing implementation in a selected manufacturing industry in Iran. *International Journal of Lean Six Sigma*, 7(2), 136-148. doi: 10.1108/IJLSS-03-2015-0010
- Zan, G. D., Toni, A. F. D., Fornasier, A., & Battistella, C. (2015), A methodology for the assessment of experiential learning Lean: The Lean experience factory case study. *European Journal of Training and Development*, 39(4), 332-254. doi: 10.1108/EJTD-05-2014-0040

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business Research Methods* (9th ed.). South-Western, Cengage Learning.

Zubir, A. F. M., Habidin, N. F., Conding, J., Jaya, N. A. S. L., & Hashim, S. (2012). The development of sustainable manufacturing practices and sustainable performance in Malaysian automotive industry. *Journal of Economics and Sustainable Development*, 3(7), 130-138.
Retrieved from iiste.org/Journals/index.php/JEDS/article/download/2054/2033References