



UNIVERSITI PUTRA MALAYSIA

**IMPLEMENTATION OF LEAN PROCESS MANAGEMENT THROUGH
ENHANCED PROBLEM SOLVING CAPABILITIES**

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ENHANCED PROBLEM SOLVING CAPABILITIES**

By

PUVANASVARAN A/L A.PERUMAL

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

May 2009



DEDICATION

To my dear wife for her support and encouragement

To my children, Hari and Kishor for their love and support



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

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Chairman : Megat Mohamad Hamdan, PhD

Faculty : Engineering

All Original Equipment Manufacturers (OEM) organizations in Aerospace, Automotive and Electronics industries had to upgrade their functions. These organizations including suppliers and solutions providers are duty bound to improve their functions through strategic initiatives. One such initiative is Lean Process Management. Lean Process Management has proven to aid organizations in developing manufacturing and administrative management solutions and make the organization a leaner at the same time a 'fitter' one, achieving World Class standards in terms of production, quality, marketing, etc, etc.

The issue or problem is, although a number of authors, experts, researchers have discussed the lean process management as part organization centric issues, they failed to provide an effective lean process management system. Besides the need to formulate an effective lean process as suggested by some authors, another important



reason suggested is the employee's development aspect regarding how to unlock the infinite potential of their workforce. This employee's development is basically the problem solving capabilities of the employees while implementing the Lean through clear cutting protocols or processes of Lean Process Management. The employees need to be developed and equipped to contribute optimally to the process. Because of this scenario, the main objective of this study is to develop an employees development system which the author has acronym or trademark it as People Development System (PDS) to enhance problem solving capability among its employees while implementing the lean process management there. Although, the PDS can be implemented throughout the organization, if it is implemented in a particular department in an organization, it will be feasible to study and analyze its effectiveness in-depth. So, this study documents and analyzes the implementation of Lean process in the Kitting Department of the aerospace company, CTRM AC.

Qualitative and quantitative measures were also used to document the case study. The outcome of the people development system needs to be measured to understand its value in developing the problem solving capabilities among the employees. Only with developed and equipped employees, the Kitting Department can reduce its wastages, optimize its performance and thereby play a crucial role in making CTRM AC a world class organization. As pertinent results of the PDS implementation, in general Kitting Department successfully achieved to meet their Department Key Performance Indicator and particularly the employees' are also improve by practicing good lean behaviors and skill and knowledge in using lean tools which lead to better leanness level by improving employees' problem solving capabilities in eliminating waste. The study proposed a PDS framework and performance



measurement model for CTRM AC. This model could be replicated in any organization and also in various sectors. Also, it can be modified according to the industries in which it can be implemented. The study also has produced two PDS Manuals as a guide for the Management as well as the shop floor people to practice PDS concept optimally. This study provided a practical as well as theoretical knowledge about the successful PDS practices, which can be implemented in any industry. On the whole, the lean process management and the resultant PDS is having positive applications, and importantly could also have positive applications in the future as well.



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

**PELAKSANAAN SISTEM PROSES PENGURUSAN LANGSING MELALUI
KEBOLEHAN PENYELESAIAN MASALAH**

Oleh

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Semua organisasi perusahaan OEM di dalam industri Aeroangkasa, Otomotif, dan Elektronik harus meningkatkan fungsi kegiatan mereka. Organisasi- organisasi ini adalah juga termasuk para pembekal dan penyelesaian masalah yang bertanggungjawab untuk meningkatkan fungsi kegiatan mereka melalui inisiatif terhadap strategi perusahaan. Salah satu inisiatif tersebut adalah pengurusan proses langsing. Ini kerana pengurusan proses langsing telah terbukti membantu organisasi- organisasi di dalam membangunkan pemecahan masalah terhadap pengurusan pembuatan dan pentadbiran, serta pada masa yang sama ia juga membuatkan organisasi tersebut sebagai satu sistem pembelajar yang sesuai di dalam mencapai standard kelas dunia di dalam bidang pengeluaran, mutu, pemasaran, dan sebagainya.

Di sini , isu atau masalahnya adalah, bahawa meskipun beberapa penulis, pakar, peneliti telah membincangkan pengurusan proses langsing sebagai suatu bahagian dari sudut isu- isu yang berpusat pada organisasi, ternyata mereka gagal



menyediakan satu sistem pengurusan proses langsing yang berkesan. Seperti mana yang disarankan oleh beberapa penulis, selain keperluan terhadap formulasi dari satu proses langsing yang berkesan, juga adalah pentingnya aspek pembangunan pekerja. Ini adalah kerana pembangunan pekerja tersebut pada dasarnya tertakluk kepada kemampuan pemecahan masalah oleh para pekerja di dalam menerapkan proses langsing. Disebabkan perkara tersebut, maka para pekerja perlu dibangunkan dan dipersiapkan untuk menyumbang secara optimum terhadap pembangunan sesuatu proses. Terhadap usaha ini, maka kajian yang dilakukan adalah untuk membangunkan satu sistem pembangunan pekerja yang penulis dalam hal ini menyatakannya sebagai Sistem Pembangunan Manusia (PDS) untuk meningkatkan kemampuan pemecahan masalah di antara pekerja ketika menerapkan pengurusan proses langsing. Walaupun PDS dapat digunakan pada keseluruhan organisasi, apabila ia dapat dipraktikan pada suatu jabatan tertentu di organisasi, maka ia mudah dipelajari dan dianalisa secara berkesan dan mendalam. Oleh itu, apa yang terkandung di dalam kajian dan analisa ini adalah dari proses langsing yang dipraktikan di jabatan '*kitting*' dari perusahaan aeorangkasa CTRM.

Kajian atau thesis ini dibuat secara sistematik ke dalam tujuh Bab dan diuraikan bahagian demi bahagian, di mana pengukuran kuantitaif dan kualitatif telah digunakan terhadap kajian masalah. Di dalam kajian ini, hasil dari sistem pembangunan manusia perlu diukur untuk memahami nilai dari pembangunan kemampuan pemecahan masalah di antara pekerja. Maka, hanya dengan pembangunan dan penyediaan keupayaan para pekerja di jabatan '*kitting*', ia dapat mengurangkan pembaziran dengan mengoptimumkan keupayaannya. Oleh kerana itu, ia memainkan peranan penting di dalam menjadikan CTRM AC sebagai



organisasi kelas dunia. Hasil dari penerapan PDS, secara umumnya jabatan '*kitting*' telah berjaya mencapai KPI jabatannya dan meningkatkan pekerjaannya terhadap penerapan perilaku dan kemampuan langsing yang baik, serta pengetahuan di dalam menggunakan pengetahuan langsing untuk mencapai satu tahap kelangsingan yang lebih baik. Kajian ini juga telah menghasilkan satu kerangka kerja PDS dan model pengukuran keupayaan untuk CTRM AC. Model ini juga dapat digunakan di jabatan lain serta berbagai organisasi di sektor lainnya dengan syarat ia dapat diubahsuai menurut jenis industrinya. Di dalam kajian ini juga penulis telah menghasilkan dua manual PDS sebagai alat petunjuk untuk pengurusan mahupun penerapan daripada para pekerja di bahagian '*shop-floor*' agar dapat mencapai penggunaan optimum. Kajian ini telah memberikan penambahan suatu pengetahuan praktikal dan juga teoritikal mengenai penerapan PDS yang baik supaya dapat digunakan di semua industri. Secara umum, dengan pengurusan proses langsing dan apa yang dihasilkan dari PDS dalam kajian ini telah memberikan sesuatu yang positif terhadap penggunaannya di masa depan.



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TABLE OF CONTENTS

	Page
DEDICATION	ii
ABSTRACT	iii
ABSTRAK	vi
ACKNOWLEDGEMENTS	ix
APPROVAL	xi
DECLARATION	xiii
LIST OF TABLES	xvii
LIST OF FIGURES	xix
LIST OF ABBREVIATIONS	xxiii
	xxv
CHAPTER	
1 INTRODUCTION	1
1.1 Background of the Study	1
1.1.1 Origins of the process	3
1.1.2 Lean process management – a characterization	6
1.2 Problem Statement	8
1.3 Objective of Study	12
1.4 Scope of the Study	13
1.5 Layout of Thesis	14
	14
2 LITERATURE REVIEW	15
2.1 Introduction	15
2.2 Lean Process Management	16
2.2.1 The Trend of Competitive Manufacturing	17
2.2.2 The System of World-Class Manufacturing	19
2.2.3 Lean as Implementing Strategy to achieve Company Goals	24
2.2.4 Implementation of Lean as Process	26
2.2.5 Challenges in Lean Adoption	36
2.2.6 Performance Measurement	43
2.2.7 Improvement Needs towards New System	55
2.2.8 Conclusion	58
2.3 People Development System	59
2.3.1 Proposed the People Development System Framework	63
2.3.2 Development of People Development System's Measurement Model	68
2.3.3 Ten Steps of People Development System Application Model	85
2.3.4 Conclusion	101
	102



3	METHODOLOGY	103
3.1	Introduction	103
3.2	Description of CTRM AC Company	104
3.3	Research Methodology	106
3.3.1	Overview of Methodology	108
3.3.2	Data Collection Procedure	113
3.3.3	Method in Measurement Cycle	116
3.3.4	Methods of data Analysis	122
3.3.5	Value Stream Procedure	123
3.3.6	Data Collection Limitation	132
3.4	Conclusion	133
4	A CASE STUDY OF AEROSPACE INDUSTRY	134
4.1	Introduction	134
4.2	Expert Suggestion	135
4.3	Leanness Level and Top Management Commitment survey	136
4.4	Conclusion	145
4.4.1	Reflection on Research Question	146
4.4.2	Validation of PDS manuals by Expert Group	147
4.5	Kitting Pilot Team	147
4.6	PDS Implementation	149
4.6.1	Project Description	151
4.7	Phase I (Waste Identification with Value Stream Mapping)	152
4.7.1	Step 1 – Visualization of VM for each product	153
4.7.2	Step 2 – Current Value Stream Mapping	155
4.7.3	Step 3 – Future State Value Stream Mapping	158
4.7.4	Kaizen Improvement on Future State Value Stream Mapping	159
4.7.5	Summary on continuous improvement	165
4.8	Phase II Primary Measurement (Performance Metrics)	165
4.8.1	Step 4 – Communication between to top, middle and bottom management	166
4.8.2	Step 5 – Base on QCDAC principles (Primary and Secondary Data)	167
4.8.3	Step 6 – Visual Indicators	197
4.8.4	Step 7 – Problem Solving Capability	199
4.8.5	Step 8 – Implement Solutions	200
4.8.6	Step 9 – Phase III Primary and Secondary Measurement comparison with KPI	200
4.8.7	Step 10 – Control and Monitor for Sustainability	203
4.9	Discussion and Conclusion	216
		221
5	CONCLUSION AND RECOMMENDATIONS	222
5.1	Conclusion	222
5.1.1	Achievement of Objective	223
5.1.2	Benefits and Positive Scenario Brought on in the Kitting Department	224
5.2	Novelty and Contribution of the research	225



5.3 Further application	226
5.3.1 Implementation of lean process and the resultant PDS in Service Industries	227
5.3.2 Important of benchmarking other companies' lean practice while implementing lean process	228
5.3.3 Further incorporation of Information Technology	229
5.3.4 Role of leaders for further optimization of lean process	230
REFERENCES	231
APPENDICES	249
BIODATA OF STUDENT	269
LIST OF PUBLICATIONS	270
	272



LIST OF TABLES

Table		Page
2.1	The Need of New Performance Measurements by Authors	49
2.2	Comparison table of few authors on Performance Measurement metrics	53
2.3	Lean goals Measuring Mechanism impact to Quality, Cost and Delivery	75
2.4	An Analytical Framework for Measuring Problem Solving Capability in Lean Process Management	84
2.5	Definition of 11 wastages as per Case study practices	86
3.1	Main Steps of the research program	109
4.1	Inter-correlation for DOA and predictors variables (N=40)	137
4.2	Simultaneous Multiple Regression Analyses Summary for EW, CI, ZD, JIT, PULL, MFT, DEC, IF, and VIF (N=40)	137
4.3	Reliability analyses of DOA of lean manufacturing principles (N=40)	138
4.4	Mean and standard deviation of DOL and DOC (N=40)	138
4.5	Inter-correlation for management commitment and predictors variables (N=40)	140
4.6	Stepwise regression for Management commitment to 5's and General Visual Management with SMI (N=40)	141
4.7	Project Team	148
4.8	Current vs. Future State VSM values	165
4.9	Scrap Measuring Mechanism Data	171
4.10	Percentage of improvement for Scrap PM	171



4.11	WIP Packing Measuring Mechanism Before & After Data with improvement	181
4.12	Kitting Department KPI for the year 2007	202
4.13	Kaizen Activities with cost saving results	206
4.14	Mean values and standard deviation of degree of leanness and management commitment	209
4.15	Degree of Leanness and Degree of Management Commitment Survey results	210



LIST OF FIGURES

Figure		Page
2.1	The Lean House: An Integrated Framework of Lean Thinking	20
2.2	Integrating Principles for Manufacturing System (Source: Recardo & Peluso, 1992)	22
2.3	Linkage between performance measurements with organizational strategy (Source: Graham, 2005)	25
2.4	The tools and practices of lean management	31
2.5	The interaction of the tools and rules of lean management based on rules of the Toyota Production System (Source: Spear & Bowen, 1999)	35
2.6	Individual measures when integrated will developed a Performance Measurement System (Source: Neely et al., 2000)	45
2.7	Illustration of Lean Success Model	62
2.8	Framework for Enhancing the Problem Solving Capabilities of the Employees	65
2.9	PDS Performance Measurement Model	69
2.10	Relationship between the measurement mechanisms with each QCDAC elements	71
2.11	PDS Ten Steps Application model	85
2.12	Flow chart on Determine Measuring Mechanism for each wastage	87
2.13	Flow chart on Team Leader and members' selection	89
2.14	Flow chart on Team Leader and members' formation	90
2.15	Team Hierarchy and roles of Team Leader and members'	91



2.16	Individual roles of Team Leader and members'	91
2.17	Flow chart on How to communicate Top to Bottom	94
2.18	Flow chart on how to determine waste indicators	96
2.19	Classification of two different levels of visual indicators	97
2.20	Flow chart on how to develop V.I for Shop floor and Management level	97
2.21	Flow chart on how to develop solutions	98
2.22	Flow chart on how to interpret the obtained results to KPI	99
2.23	Flow chart on how to control & continue monitoring on wastages	100
3.1	Methodology flow chart	111
3.2	Flow Chart on methodology execution for PDS implementation	117
4.1	Process flow for the Performance Measurement in PDS Application Model	150
4.2	Typical products Airbus A320 undergo Phase I till Phase III	153
4.3	Process steps on how VSM are generated	155
4.4	Travel time wastages (Thawing to Cutting)	160
4.5	Travel time wastages (stacking to packing)	161
4.6	Travel time wastages (packing to paperwork)	163
4.7	Travel time wastages (packing to paperwork)	164
4.8	Flow map on how Performance Measurements linked to Organizational KPI	167
4.9	Scrap Measuring Mechanism Graph	170
4.10	Customer Complaint Measuring Mechanism Graph	172



4.11	OEE Measuring Mechanism Graphs and Data for each machine monitored	175
4.12	Overall Nesting Backlog Measuring Mechanism Graph and improvement	177
4.13	Overall Stacking Backlog Measuring Mechanism Graph and improvement	177
4.14	Overall Packing Backlog Measuring Mechanism Graph and improvement	178
4.15	WIP Packing Measuring Mechanism Graphs for DCS	180
4.16	WIP Stacking Measuring Mechanism Graphs for S91	181
4.17	Attendance Measuring Mechanism Data and Graph with improvement	183
4.18	Overtime Measuring Mechanism Data and Graph with improvement	185
4.19	Do it Right First Time Measuring Mechanism Data & Graphs	187
4.20	Stacking Area People Productivity Measuring Mechanism Graph and Data	188
4.21	Packing Area People Productivity Measuring Mechanism Graph and Data	189
4.22	Stacking Area Stock Turn Measuring Mechanism Graph and Data	190
4.23	Packing Area Stock Turn Measuring Mechanism Graph and Data	191
4.24	Delivery Schedule Achievement Measuring Mechanism Graph and data for nesting process	192
4.25	Delivery Schedule Achievement Measuring Mechanism Graph and data for stacking process	192
4.26	Delivery Schedule Achievement Measuring Mechanism Graph and Data for packing process	193



4.27	Value Added per Person Measuring Mechanism Graph and Data	195
4.28	Floor spaced freed for Value added activity	196
4.29	Ideas generated by various level of employees	205
4.30	Types of wastages of the Kitting Department eliminated	207
4.31	Lean Tools used in problem solving	208
4.32	Comparison Survey results for January and December 2007	209
4.33	Spider Chart shows Top Management commitment Before PDS Implementation	215
4.34	Spider Chart shows Top Management commitment After PDS Implementation	216
4.35	Incorporating 3 elements of PDS to Performance Measurement Model	220



ABBREVIATIONS

CI	Continuous Improvement
CNC	Computer Numeric Control
CRM	Customer Relationship Management
CTRM AC	Composites Technology Research Malaysia Sdn. Bhd
DEC	Decentralized Responsibilities
DOA	Degree of Adoption
DOC	Degree of Management Commitment
DOL	Degree of Leanness
DRFT	Do it Right First Time
DSA	Delivery Schedule Achievement
EI	Employee Involvement
EW	Elimination of Waste
FSU	Floor Space Utilization
GLC	Government Lease Company
GM	General Manager
GR	Goods Report
GROUP	Group Involvement
GUI	Graphical User Interface
HRD	Human Resources Development
HRM	Human Resource Management
IF	Integrated Functions
IQC	Incoming Quality Control
IT	Information Technology
JIT	Just In Time
KPI	Key Performance Index
LPM	Lean Process Management
MD	Managing Director
MFT	Multifunctional team
MIT	Massachusetts Institute of Technology
MNC	Multinational Company



MRN	Material Review Number
MRP	Material Requirement Planning
NDT	Non Destructive Test
NRFT	Not Right the First Time
NVA	Non Value Added
OEE	Overall Equipment Efficiency
OEM	Original Equipment Manufacturers
PDCA	Plan Do Check Action
PDS	People Development System
PM	Performance Measurement
PO List	Purchasing Order List
PP	People Productivity
PSC	Problem Solving Capabilities
PULL	Pull instead of Push
QA	Quality Assurance
QC	Quality Control
QCC	Quality Control Circle
QCDAC	Quality, Cost, Delivery, Accountability, and Continuous Improvement
QLEAD	Quality Leadership
R&D	Research and Development
SCM	Supply Chain Management
SD	Standard Deviation
SDD	Strategy Development Department
SMT	Self Management Team
SPSS	Statistical Package for Social Sciences
ST	Stock Turns
TNA	Training and Analysis
TPM	Total Productive Maintenance
TQM	Total Quality Management
TRAIN	Training
UK	United Kingdom
USA	United State of America



VA	Value Added
VAPP	Value Added per Person
VCS	Visual Control System
VI	Visual Indicator
VIF	Vertical Information Functions
VPC	Visual Production Control
VSM	Value Stream Mapping
VSM/FM	Value Stream Manager/ Functional Manager
WEMP	Workers Empowerment
WIP	Work in Progress
ZD	Zero Defects

