

FRAMEWORK FOR LEAN MANAGEMENT IN ALUMINIUM COMPANY IN  
UNITED ARAB EMIRATES

NAWAF MOHAMMED AHMED ALSHEHHI

UNIVERSITI TEKNOLOGI MALAYSIA

FRAMEWORK FOR LEAN MANAGEMENT IN ALUMINIUM COMPANY IN  
UNITED ARAB EMIRATES

NAWAF MOHAMMED AHMED ALSHEHHI

A dissertation submitted in partial fulfilment of the  
requirements for the award of the degree of  
Doctor of Engineering (Engineering Business Management)

Razak Faculty of Technology and Informatics  
Universiti Teknologi Malaysia

JUNE 2019

## ABSTRACT

In a constantly-changing dynamic business environment, operating costs are the central theme at any company around the globe. Therefore, companies strive to perform their activities in the most optimum manner in terms of quality and operating costs. Lean management (LM) is applied in many companies to eliminate non-value added activities. LM implementation and cost savings (CS) do not always have a direct positive relationship, and are rather subject to the third variables that might impact them. There exist several LM-related publications in the literature, but only a few works were conducted to develop a lean management framework. In this study, a framework was developed for lean management implementation in the aluminum industry in UAE. Organizational culture (OC) has been recognized as a variable that impacts the relationship between LM and CS. This study employed a mixed method that is divided into two parts to strengthen and investigate the research objectives with support of the CEO of the company. The first part was conducted qualitatively via structured interviews with the senior management, and focus groups with the lean team (BTCI team). The second part was executed quantitatively via survey questionnaires for supervisory level employees in the operations department. To understand the relationships and contributions of LM, CS and OC, their correlation was used. Interviews were conducted with 10 senior management employees, and focus group sessions were conducted with eight lean engineers. Prior to actual distribution of the questionnaire, pilot tests and experts' validation were performed to measure the reliability and validate the questionnaire. Data were acquired from 220 supervisory employees from the operations department at Aluminum Company X, based in UAE, with a response rate of 85%. Correlation results reveal that LM has a positive influence on CS. Moreover, OC aspects (leadership, people engagement and problem solving culture) and LM implementation were found to be in a significant relationship. The findings imply that the relationship between LM implementation and CS will be weaker when OC is low; and the association between LM and CS is strong when OC is high. In addition, this study reveals that organizational culture needs to be further investigated. This study contributes to the field of lean management implementation and business excellence from both theoretical and practical standpoints in the aluminum industry, as well as in other fields. It provides the insights to supervisory employees (supervisors, heads, managers and directors) to enhance organizational culture aspects, which play a vital role in improving a company's overall performance.

## ABSTRAK

Dalam persekitaran perniagaan yang dinamik, kos operasi merupakan tema utama syarikat-syarikat aluminium seluruh dunia. Oleh itu, mereka berusaha untuk mengoptimumkan aktiviti mereka dari segi kualiti dan kos operasi. Sistem pengurusan lean (PL) digunakan di syarikat yang berbeza untuk menghapuskan aktiviti tanpa nilai ditambah. Pelaksanaan PL dan penjimatan kos (PK) tidak selalunya mempunyai hubungan positif secara langsung kerana ia bergantung kepada pembolehubah ketiga. Kajian-kajian lepas menunjukkan bahawa tidak banyak usaha yang telah dilakukan untuk membina rangka kerja PL dalam sektor perindustrian. Dalam kajian ini, sebuah rangkakerja perlaksanaan PL untuk perindustrian aluminium yang berpusat di UAE telah dibangunkan. Budaya organisasi (BO) telah dikenalpasti sebagai satu pembolehubah yang mempengaruhi hubungan antara PL dan PK. Kajian ini menggunakan kaedah campuran yang dibahagikan kepada dua bahagian untuk menguatkan lagi dan menyiasat matlamat kajian secara terperinci dengan sokongan CEO syarikat terbabit. Bahagian pertama telah dilakukan secara kualitatif melalui temubual bersama pengurusan kanan dan melalui kumpulan sasar bersama pasukan lean (pasukan BTCl) dan bahagian kedua telah dilaksanakan secara kuantitatif melalui soal selidik yang diedarkan kepada para pekerja di bahagian penyeliaan operasi. Untuk mengenalpasti hubungan dan kesan PL, PK dan BO, proses hubungkait telah digunakan. Temubual telah diadakan bersama 10 orang pengurus kanan dan sesi kumpulan sasaran telah dilaksanakan bersama 8 orang jurutera lean. Sebelum borang soal selidik diedarkan, ujian awal dan pengesahan pakar telah dilakukan untuk menilai dan mengesahkan soal selidik terbabit. Data telah diterima daripada 220 orang pekerja bahagian penyeliaan dari jabatan operasi di Syarikat Aluminium X yang berpusat di UAE dengan kadar maklumbalas sebanyak 85%. Keputusan korelasi menunjukkan bahawa PL mempunyai pengaruh langsung ke atas PK. Tambahan pula, didapati bahawa aspek BO (Kepimpinan, penglibatan kakitangan dan budaya penyelesaian masalah) dan pelaksanaan PL mempunyai hubungan yang penting. Penemuan tersebut mencadangkan bahawa hubungan antara PL dan PK akan menjadi lebih lemah apabila BO adalah rendah dan kaitan antara PL dan PK akan menjadi kuat apabila BO adalah tinggi. Selain itu, kajian tersebut mendedahkan bahawa kajian lanjut tentang budaya organisasi amat diperlukan. Walau bagaimanapun, kajian ini menyumbang kepada bidang pelaksanaan pengurusan lean dan kecemerlangan perniagaan dari segi ilmu dan amalan di industri aluminium dan bidang lain untuk memberikan pemahaman kepada pekerja penyeliaan (penyelia, ketua, pengurus dan pengarah), lalu meningkatkan aspek budaya organisasi yang menambahkan prestasi kilang.

## TABLE OF CONTENTS

	TITLE	PAGE
	<b>DECLARATION</b>	<b>iii</b>
	<b>ABSTRACT</b>	<b>iv</b>
	<b>ABSTRAK</b>	<b>v</b>
	<b>TABLE OF CONTENTS</b>	<b>vi</b>
	<b>LIST OF TABLES</b>	<b>xi</b>
	<b>LIST OF FIGURES</b>	<b>xii</b>
	<b>LIST OF ABBREVIATIONS</b>	<b>xiii</b>
	<b>LIST OF APPENDICES</b>	<b>xiv</b>
<b>CHAPTER 1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Background of the research	1
1.2	Aluminum Company (X) in United Arab Emirates	2
1.3	Problem Statement	3
1.4	Research Questions	5
1.5	Research Objectives	6
1.6	Research Scope	6
1.7	Significance of the Research	8
1.8	Structure of the Dissertation	9
<b>CHAPTER 2</b>	<b>LITERATURE REVIEW</b>	<b>11</b>
2.1	Introduction	11
2.2	Overview of lean manufacturing	12
2.3	Waste factors	14
2.4	Lean tools and techniques	16
2.4.1	Continuous Improvement Suggestion scheme	18
2.4.2	Kaizen event	19
2.4.3	A3 problem solving	20
2.4.3.1	Problem Solving Culture in LM	21

2.5	Lean manufacturing in Arab countries	24
2.6	Operational performance	28
2.7	Previous studies on lean implementation and operational performance	29
2.8	Organizational culture	30
2.9	Leadership	32
2.10	Lean Manufacturing and Cultural Change	35
2.11	People Engagement in LMS	36
2.12	Lean management framework	39
2.13	Research gap	42
2.14	Summary	43
<b>CHAPTER 3</b>	<b>RESEARCH METHODOLOGY</b>	<b>45</b>
3.1	Introduction	45
3.2	Research Paradigm	46
3.3	Research Design	46
3.4	Research Method	48
	3.4.1 Quantitative and Qualitative Data	48
3.5	Research Techniques	51
	3.5.1 Research Strategy	51
	3.5.2 Research Approach	52
	3.5.3 Role and Scope of the Researcher	53
3.6	Data Collection Method	54
	3.6.1 Data Collection Techniques	55
3.7	Development of Research Instrument	57
	3.7.1 Interviews	57
	3.7.1.1 Selection of Participants and Sample - Purposeful Sampling Strategy	57
	3.7.1.2 Interview process	59
	3.7.1.3 Transcribing and Archiving of Interview Data	60
	3.7.2 Focus group	61
	3.7.2.1 Selection of participants	61

3.7.2.2	Focus group process	62
3.7.3	Case studies	63
3.7.4	Survey- Questionnaire	64
3.7.4.1	Research sampling	65
3.8	Common Method Bias	67
3.9	Pre-testing of Questionnaire	67
3.9.1	Expert validation	67
3.9.2	Pilot Test	68
3.10	Data Analysis	69
3.11	Validity, reliability and Ethics	70
3.11.1	Validity	70
3.11.2	Reliability	72
3.11.3	Research Ethics	74
3.12	Summary	74
<b>CHAPTER 4</b>	<b>ANALYSIS AND DISCUSSION OF RESULTS</b>	<b>75</b>
4.1	Introduction	75
4.2	Preliminary Analysis	75
4.2.1	Data Examination	75
4.2.2	Background Analysis	76
4.2.3	Normality Tests	78
4.2.4	Reliability Tests	79
4.3	Demographic Profile of the survey respondents	79
4.3.1	Respondents gender	80
4.3.2	Respondents Age	80
4.3.3	Production section/stream	81
4.3.4	Years of Experience	82
4.3.5	Respondents' positions in the Organization	83
4.3.6	Number of employees in the team	83
4.4	Analysis and discussion of results	84
4.4.1	Objective 1: To examine the relationship between lean management implementation and cost saving at Aluminum Company X	85

4.4.2	Objective 2: To determine the relationship between LM implementation and Organizational Culture	88
4.4.3	Objective 3: To determine the Influence of Organizational Culture on the implementation of LM for Cost Saving	95
4.4.4	Objective 4: To develop framework of lean implementation for Aluminum Company in UAE	98
4.4.4.1	Interviews data	98
4.4.4.2	Focus group data	101
4.5	Case studies of 2 lean projects	108
4.5.1	Lean project A3 problem solving: Reduction of anodes stub damages in production line 1	108
4.5.1.1	Business case	108
4.5.1.2	Root cause Analysis	109
4.5.1.3	Results	111
4.5.2	Lean project Kaizen event: Reduction of the A/C units tripping of CTG excitation compartment at least by 50 %.	112
4.5.2.1	Business case of kaizen event project	112
4.5.2.2	Process of kaizen event project	113
4.5.2.3	Kaizen event execution results	115
4.6	Summary	116
<b>CHAPTER 5</b>	<b>CONCLUSION AND RECOMMENDATIONS</b>	<b>119</b>
5.1	Introduction	119
5.2	Theoretical contributions	119
5.3	Practical contributions	120
5.4	Fulfillment of research objectives	122
5.5	Recommendations for the company	124
5.6	Limitations of the research and Recommendations for future research	126
5.6.1	Data collection	126
5.6.2	Operationalized constructs	127



5.7	Conclusion	128
-----	------------	-----

<b>REFERENCES</b>	<b>129</b>
-------------------	------------

## LIST OF TABLES

<b>TABLE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
Table 2.1	Definitions of waste factors.	14
Table 2.2	Definitions of Some Lean Management tools	17
Table 3.1	Summary of differences between quantitative and qualitative research (Stake, 2010)	50
Table 3.2	Number of middle manager interviewed	58
Table 3.3	Background of interviewees	58
Table 3.4	Background of focus group participants'	62
Table 3.5	Cronbach Alpha Statistics for pilot test	69
Table 4.1	Summary of the quantitative dataset	76
Table 4.2	Descriptive Statistics of the dataset	77
Table 4.3	Skewness and Kurtosis	78
Table 4.4	Cronbach's Alpha for reliability test	79
Table 4.5	Number of Employees in Team	84
Table 4.6	Correlation between LM implementation and Leadership	92
Table 4.7	Correlation between LMS implementation and People engagement	93
Table 4.8	Correlation between LM implementation and Problem solving culture	94
Table 4.9	Details of focus group sessions	102
Table 4.10	Possible solution on identified causes	110
Table 4.11	Kaizen event schedule	115
Table 5.1	Summary of research objectives fulfillment	123

## LIST OF FIGURES

<b>FIGURE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
Figure 1.1	Aluminum smelter's operation	3
Figure 1.2	Conceptualization of problem statement	5
Figure 1.3	Status of LM implementation in the company	8
Figure 2.1	The Lean features (Rose <i>et al.</i> , 2009)	14
Figure 2.2	Kaizen event framework (Van <i>et al.</i> , 2010)	20
Figure 2.3	Lean Organization Culture (adopted: Van der Merwe <i>et al.</i> (2014))	36
Figure 2.4	Lean Framework of TPS	40
Figure 2.5	Lean implementation framework for higher education sectors. (adopted: Michele (2016))	41
Figure 3.1	Research design workflow	47
Figure 4.1	Respondents gender	80
Figure 4.2	Respondents Age	81
Figure 4.3	Respondents Experience	82
Figure 4.4	Respondents' Positions in Organization	83
Figure 4.5	Impact of LM implementation on Cost Savings	87
Figure 4.6	Lean management framework for Aluminum Company in UAE	104
Figure 4.7	Latest Lean management framework for Aluminum Company in UAE	107
Figure 4.8	Sample of anode stub damage	109
Figure 4.9	Root cause analysis- cause and effect diagram	110
Figure 4.10	Stub damage comparisons after 3 months trail period	111
Figure 4.11	Cause and effect diagram for A/C tripping units	114
Figure 4.12	Ideas generation target	114
Figure 4.13	Actual ideas generation	116
Figure 5.1	Status of LM implementation in the company up to March 2019	126

## LIST OF ABBREVIATIONS

AM	-	Autonomous Maintenance
BTCI	-	Business Transformation and Continual Improvement
CI	-	Continuous Improvement
CS	-	Cost Saving
CTQ	-	Critical To Quality
DV	-	Dependent Variable
FMS	-	Ford Manufacturing System
GCC	-	Gulf Cooperation Council
IT	-	Information Technology
IV	-	Independent Variable
K-SMMIS	-	Kuwaiti-Small Medium Industries
JIT	-	Just In Time
LM	-	Lean Management / Lean Manufacturing
LMS	-	Lean Management System / Lean Manufacturing System
MSP	-	Management System Process
OC	-	Organizational Culture
OE	-	Operational Excellence
QCO	-	Quick Changeover
RCM	-	Reliability Centered Maintenance
SLA	-	Service Level Agreement
SMED	-	Single Minute Exchange Die
SPC	-	Statistical Process Control
TPM	-	Total Productive Maintenance
TPS	-	Toyota Production System
TQM	-	Total Quality Management
UAE	-	United Arab Emirates
UWES	-	Utrecht Work Engagement Scale
VSM	-	Value Stream Mapping

## LIST OF APPENDICES

<b>APPENDIX</b>	<b>TITLE</b>	<b>PAGE</b>
Appendix A	Invitation for Interview	151
Appendix B	Semi-Structured interview Questionnaire and answers	152
Appendix C	Survey Questionnaire	169
Appendix D	Survey Invitation	178
Appendix E	Measurement items for LMS, Leadership, People engagement and problem solving culture	179
Appendix F	Summarized comments of experts validation	184
Appendix G	Harmon Single Factor Test and Man-Whitney Tests	185
Appendix H	Skewness and Kurtosis and Data distribution	189
Appendix I	Instrument Reliability	191
Appendix J	Lean management framework developed for 2018	197
Appendix K	Lean management framework developed for 2019	198
Appendix L	Samples of ideas implemented during kaizen event project	199
Appendix M	Summary of expert opinions on research findings	201

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the research

Intense global competition, rapid technological changes, relentless advances in all manufacturing sectors and information technology and highly demanding customers are the key drivers for manufacturers throughout the world to adopt new alternatives to continuously improve themselves in order to produce high quality products with low costs in a short lead time (Bepari *et al*, 2012). The companies seek competitiveness by improving their processes which involves eliminating waste, resulting in the sustainability and continuity of its business (Khripunova *et al*, 2014). After World War II, automotive industries in Japan were encountered with a dilemma of massive shortages of material, financial and human resource (Herron and Braiden, 2007). In the 1950's, Eiji Toyoda and Taiichi Ohno at the Toyota Motor Company in Japan pioneered the concept of Toyota Production system (TPS), or what is known today as "Lean Manufacturing ". The principal idea of TPS is waste elimination. Lean manufacturing is primarily utilized to assist manufacturers who have a desire to improve their organization's processes; therefore it can compete in a saturated market through the successful implementation of lean manufacturing tools and techniques (Harvey, 2004). Lean management system has been considered as the main factor for strengthening the competitiveness of enterprises and is increasingly gaining new opportunities in the market and / or corporate management efforts (Yile *et al*, 2008).

The successful implementation of lean manufacturing in Japan was the inspired cause to let the western world open their eyes from the sleep whereby the US's companies realized that lean tools were the secret behind Japanese high quality products with low cost. The term "Lean" as Womack and Jones (1994) define as a system that utilizes less, in terms of all inputs, to create the same output as those created by a traditional mass production system, while contributing increased varieties

for the end customer. Many improvement programs such as lean manufacturing can fail in implementation or lose its sustainability in different companies throughout the world due to several variables that may impact a lean implementation.

There are line managers or senior managers who are hesitant to adopt this philosophy in their departments as they believe that lean tools require more employees, time and money. In addition, some employees consider lean activities as a nightmare for an additional work/ threat. Organizational culture is the driving force for any continuous improvement initiatives, thus, this study considered aspects of organizational culture are leadership, people involvement and problem solving atmosphere. The said aspects were recognized via a survey conducted by the third party external consultants in Aluminum Company- based in UAE- in January 2012 to assess the overall employee satisfaction towards all division/departments in the company. Hence, this research assesses the impact of organizational culture on relationship of lean management techniques (Kaizen event, A3 problem solving & Suggestion scheme) and operational performance (cost saving). In addition, this research develops lean framework for Aluminum Company based in UAE.

## **1.2 Aluminum Company (X) in United Arab Emirates**

This study is conducted in Aluminum Company located in United Arab Emirates which started up its operation in the late 2009. It is a complex aluminum smelter contributing to the diversification of the UAE economy by supplying the world with high quality metal for the benefits of present and future generations with around 2400 employees. It was producing 750,000 tons of aluminum annually and this increased to 1.3 metric million tons at the end of year 2014 upon completion of phase 2, making it then the most productive single-site aluminum smelter and the fifth largest aluminum producer in the world. The smelter's cast house has the flexibility to produce primary aluminum extrusion billets, high-purity unalloyed aluminum ingot (sheet, tee and standard ingot) and sow (low profile and high profile) available in different shapes and sizes. Aluminum smelter's operation consists mainly on the following principal areas as shown in Figure 1.1.

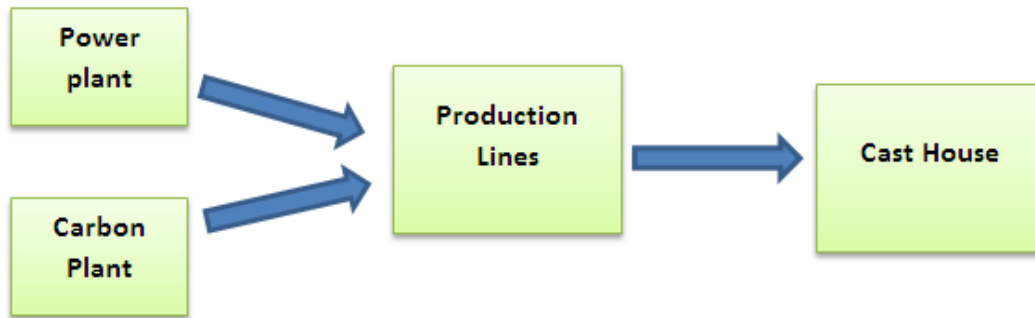


Figure 1.1 Aluminum smelter's operation

The coverage of this study is in the heart of Aluminum production lines which has almost 1800 non-supervisory employees and 220 supervisory employees' level. The primary function of production lines is to transform alumina powder into high purity liquid metal.

The company has significant worldwide competition, mainly, with potential customers which is known globally in demanding high quality product and low price. In order to build a mutual and continuous relationship with satisfied customers, the company strives to continuously improve its processes and products. In addition, the company has diversified employees from more than 50 nationalities where it can be great opportunity to tap the knowledge, skills & experience and utilize it the most appropriate way. To do so, it's not so easy to implement any methodology without making sure the required culture in the organization is ready to go in that direction as the term "lean" is still relatively unheard of in manufacturing sector at Arabian Gulf Cooperation Council (GCC) (Al-Najem *et al*, 2012).

### 1.3 Problem Statement

In today's volatile business world, Aluminum manufacturers must adapt with the changes to remain competitive and stay alive in the marketplace. Today's customers are too demanding on quality of the product and sales price (Fu-jin Wang,



*et al*, 2010). The company has several competitors and to stay ahead in the global market certain actions should be taken to control operating costs as the company is positioned in middle comparing to its competitors in terms of operating cost. Lean Manufacturing or Lean Management is one of those initiatives used in the current days as a powerful tool in manufacturing systems to improve productivity and enhance efficiency. In this study, the focus is to develop lean framework for Aluminum Company resulting in cost saving or cost reduction as operational performance and, in fact, it's the most difficult challenge for the company to lower the cost per ton. In addition, lean manufacturing has three principles to harvest the gains out of sustainable lean implementation; people are the core of the system, produce what is needed when it is needed and waste elimination.

Aydogdu and Asikgil (2011) asserted that the influence of healthy organizational culture is crucial to obtain high performance from any continuous improvement initiative. It has been argued that lean manufacturing has a negative impact on operational performance if it has been considered as an additional work; threaten employee's job and misunderstanding these tools as a waste of time (Badurdeen *et al*, 2011). Moreover, there was a resistance from supervisory level employees to change in adopting this philosophy due to the belief that it has no relation with minimizing total manufacturing cost. Team leaders were reluctant to encourage the implementation of lean techniques. Besides, it is known that continuous improvement initiatives are difficult to implement without developing the supportive organizational culture (Neha *et al*, 2013). As aforementioned, organizational culture aspects were suggested as a result of internal employee survey conducted in January 2012 by the quality department in the company to evaluate employees' satisfaction from overall departments including support form leadership, people engagement and problem solving culture.

In summary, the poor operational performance (high operating cost) is due to ineffective implementation of lean tools resulted from poor organizational culture. The ineffectiveness is caused by the difficulty in implementation and monitoring which are inherent. Organizational culture has been identified as the contextual factors that affect

the effectiveness of LM implementation at the organizations Albliwi (2014). The problem statement can be conceptualized as in Figure 1.2.

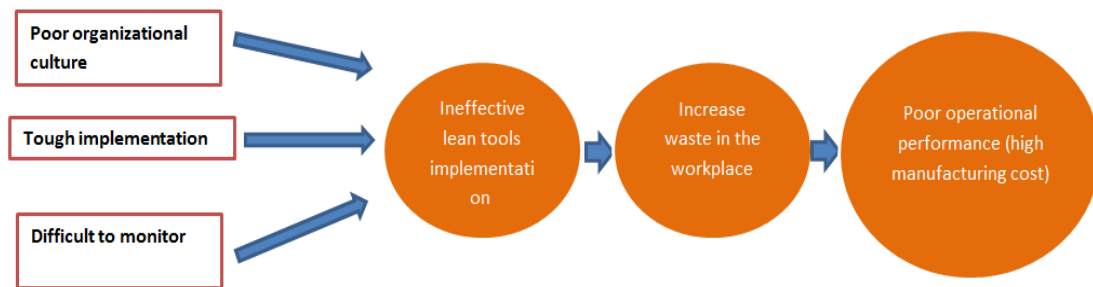


Figure 1.2 Conceptualization of problem statement

#### 1.4 Research Questions

The following are the research questions that will guide this study.

1. Does lean management implementation have relationship with cost saving at Aluminum Company (X)?
2. Does organizational culture have relationship with Lean manufacturing implementation at Aluminum Company (X)?
3. Does Organizational culture impact the relationships between implementing lean manufacturing tools and cost saving?
4. What is the framework of lean implementation for aluminum Company in UAE?

## **1.5 Research Objectives**

The following are the objectives for this study

1. To examine the relationship between lean management implementation and cost saving at Aluminum Company X
2. To determine the relationship between LM implementation and organizational culture.
3. To determine the influence of organizational culture on the implementation of LM for cost saving.
4. To develop framework of lean implementation for Aluminum Company in UAE

## **1.6 Research Scope**

This research will focus on the impact of organizational culture on relationship between lean management implementation and operation cost saving scheme in aluminum company. The respondents are supervisory level employees; supervisors, senior supervisors, superintendent, senior superintendent, heads of departments, managers, senior managers and directors. They are representing production operations department where the process of converting Alumina powder into molten aluminum then to solid shaped aluminum based on customer demand. The selection of this category is due its contribution to the entire company and leading more than 1800 employees in production lines which is equivalent to 70% of the workforce. Moreover, this category works as the linkage between leaders of the organization and shop floor employees where product made.

The list of 220 supervisory level employees belong to operation department is provided by Human resources department to serve the purpose of the study in evaluating the impact of organizational culture on lean management implementation-cost saving relationship in Aluminum Company. Hence, the results of this finding can be generalizable to aluminum companies in UAE and GCC countries. The semi-structured interviews are conducted with senior managers and directors who lead departments in operation of more than 100 employees. Next, purposive sampling - total population sampling - technique is used to collect data whereby the questionnaires are distributed in January 2017 among all supervisory levels in operation department to deeply understand and analyze the data.

It is surrounded in the region by many competitors who strive to attract more customers. Besides, management launched new initiatives to improve internal processes through lean manufacturing whereby this approach should have cost saving and quality improvement. The cost saving will be gained by highly motivated employees who will steer the change in the company in order to produce high quality product in a short period of time at the lowest cost. There was high level of resistance from most of management levels to go for the change and consider lean tools as waste of time and extra work that tight workforce. However, beside waste elimination, organizational culture is crucial issue to sustain and follow the new change. Hence, this study will explore the operational performance mainly cost saving at this company after Lean management implementation. Furthermore, it is a great opportunity to develop a framework of lean implementation in Aluminum Company in UAE and this framework will be the basis for Aluminum Company and overall manufacturing industries.

Five phases of LM progression were created at the early stage before LM implementation as agreed internally and this is based on knowledge and experience of Lean team in the company who also called Business Transformation and Continuous Improvement (BTCI) team. The phases are lean culture creation, stability and standardization, work redesign, flow improvement and stakeholders' processes. In January 2012, the internal assessment was conducted by BTCI team and results showed that LM implementation at the startup stage where lean glossary is defined,

lean journey launch was discussed with management and trial test was established for 5S and visual management as well as A3 problem solving training. In addition, the shop floor employees were trained on 5S, visual management, basic A3 and waste identification. At that moment, there was a tremendous resistance from management mainly middle management on LM implementation which motivated the researcher to start identifying the variables of the study. Figure 1.3 shows the status of LM implementation in the aluminum company up to January 2012.

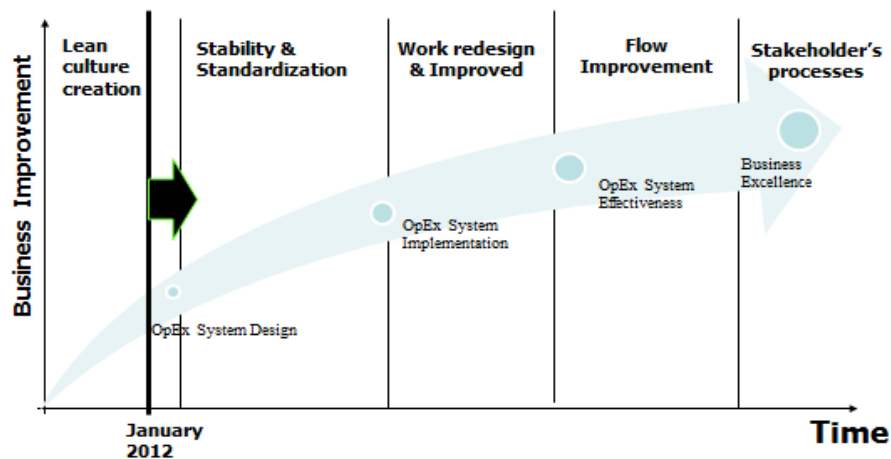


Figure 1.3 Status of LM implementation in the company

## 1.7 Significance of the Research

The research will serve the company and aluminum industry in both knowledge and practical. This study will develop lean management framework for Aluminum Company in United Arab Emirates (UAE). It is also will determine the impact of organizational culture on lean tools implementation which will be fit for operation process. Measuring effectiveness in reducing the defects in the manufacturing industry and reducing the manufacturing cost and improvements of overall performance are essential to be measured by deep understanding the sustainable implementation of lean management in the shop floor. Organizational culture has several aspects and in this study three aspects are considered; leadership, people engagement and problem

solving culture as an output of the internal survey conducted in the company at the beginning of 2012. The basic requirement for good measurements is good records so that the study will be based on data and information collection from the shop floor.

Furthermore, the results of this research will contribute to the relentless success of the company to produce high quality product in a short period of time with lowest manufacturing cost. Many constraints threaten aluminum smelters throughout the world, thus, adoption of lean manufacturing with proper organizational culture will play a key role to enhance and reinforce the company operation by utilizing skillful and talent employees to produce high quality metal with short time frame and at suitable cost.

## **1.8 Structure of the Dissertation**

This dissertation is divided into five chapters. Chapter one offers the background of the problem and problem statement. It provides also research questions, research objectives, scope and significance of the research. In chapter two, three principal variables of the study are addressed in the study, mainly, Lean management system, organizational culture and plant performance (cost saving) on aluminum Company in United Arab Emirates. Later on, chapter three covers research methodology which begins with research paradigm, research design, then; it addresses the variables of the study, research instrument, data collection and data analysis. In chapter four, results of data analysis are elaborated in terms of data examination, data preliminary analysis, profile of respondents, assessment of measurement model. Analysis and discussion of results will be provided also in chapter four supported with experts' opinion on the results findings. Finally, conclusion and recommendations are presented in chapter five.

## REFERENCES

- Abdulmalek, F.A and Rajgopal,J. (2002) 'Analyzing the benefits of lean manufacturing and value stream mapping via simulation: a process sector case study', *International journal of production economics*, 107: 223-236
- Ade,M . Nagpur,S. and Deshpande,V.S. (2012) 'Lean Manufacturing and Productivity Improvement in Coal Mining', *International Journal of Engineering Science and Technology (IJEST)*. 4(5): 0975-5462.
- Ade, M. and Deshpande, V. (2012) 'Lean Manufacturing and Productivity Improvement in Coal Mining Industry', *International Journal of Engineering Research and Development* 2 (10): 35-43.
- Ahmad,H, Ahmad, K and Ali Shah, I. (2010) 'Relationship between Job Satisfaction, Job Performance Attitude towards Work and Organizational Commitment', *European Journal of Social Sciences*. 18(2):257-267.
- Ahmad, K. Z., Veerapandian, K., and Ghee, W. Y. (2011), 'Person-environment fit: The missing link in the organisational culture-commitment relationship,' *International Journal of Business and Management*, 6(11), 110-115.
- Ahuja, I.P.S. and Khamba, J.S. (2008). 'Total productive maintenance: literature review and directions', *International Journal of Quality and Reliability Management*. 25 (7): 709-756.
- Al-Alawi I., A.,Al-Marzooqi Y., and Mohammed F., Y. (2007) 'Organizational culture and knowledge sharing: critical success factors,' *Journal of knowledge management*, 11(2), 22-42.
- Albliwi S., Antony J., Arshed N. (2017) Implementation of Lean Six Sigma in Saudi Arabian organizations: Findings from a survey. *International Journal of Quality and Reliability Management* 34 (4):508-529.
- Albliwi S, Antony J, Lim S. (2014) ' Critical failure factors of Lean Six Sigma: a systematic literature review', *International Journal of Quality and Reliability Management* , 31(9), 1012-1030.
- AlKahtani, A. (2013). 'Leader Charisma, Employee Organizational Commitment, and Organizational Change: A Proposed Theoretical Framework'. *International Journal of Academic Research in Business and Social Sciences*. 3(5): 377- 399

- Allen, N.J, and Meyer, J.P. (1990). 'The measurement and antecedents of affective, continuance, Leader Charisma as perceived by the followers Employee Organizational Commitment Affective Commitment Continuance Commitment Normative commitment Organizational Change and normative commitment to the organization', *Journal of occupation Psychology*, 63: 252-276.
- Al-Najem, M., Dhakal, H., and Bennett, N. (2012) 'The role of culture and leadership in lean transformation: a review and assessment model', *International Journal of Lean Thinking*, 3(1), 119-138.
- Alongy, I. and Jones, M. (2008). 'Lean supply chain, JIT and cellular manufacturing- the human side', *International Journal of Science and information technology*, 5(2), 80-88.
- Álvarez, R. Calvo, R. Peña, M.M. and 'Domingo, R. (2009). 'Redesigning an assembly line through lean manufacturing tools.' *International Journal of Advanced Manufacturing Technology*, 43(9): 949-958.
- Alves, A. C., Dinis-Carvalho, J., and Sousa, R. M. (2012). Lean production as promoter of thinkers to achieve companies' agility', *The Learning Organization*, 19(3), 219-237.
- Aly W (2014) Lean Production Role in Improving Public Service Performance in Egypt: Challenges and Opportunities. *Journal of Public Administration and Governance* 4(2): 90-105.
- Amal, C. and Umarali, K. (2017) 'Effect of Lean Manufacturing on Operational Performance: An Empirical Study of Indian Automobile Manufacturing Industry', *International Research Journal of Engineering and Technology*, 4 (6): 1940-1944.
- Anand, G. and Kodali, R. (2009) 'Development of a framework for lean manufacturing systems' *International Journal Services and Operations Management*, 5(5): 687-716.
- Angelis, J., Conti, R., Cooper C., and Gill, C. (2011) ' Building a high commitment lean culture', *Journal of Manufacturing Technology Management*, 22(5), 569-586.



- Antony, J. (2011) 'Six Sigma vs Lean: Some perspectives from leading academics and practitioners, *International Journal of Productivity and Performance Management*, 60(2), 185-190.
- Apel, W .Li, J.Y. and Walton, V. (2007). 'Value Stream Mapping for Lean Manufacturing Implementation', *Worcester Polytechnic Institute (WPI) and Central Industrial Supply (CIS)*, 2(3):19-56.
- Apreutesei, M. Suci, E. Arvinte, I.R. (2010). 'Lean manufacturing- a powerful tool for reducing waste during the processes', *Eftime murgu*. 2: 1453-7397.
- Artwork C. (2008) *Employee and Contractor Operational Excellence Handbook*. Asia South Strategic Business Unit (ASSBU).Thailand.
- Aydogdu, S. and Asikgil, B. (2011) 'The effect of transformational leadership behavior on organizational culture: An application in pharmaceutical Industry' *International Review of Management and Marketing*, 1(4), 65-73.
- Aziz, R. F., and Hafez, S. M. (2013). Applg lean thinking in construction and performance improvement. *Alexandria Engineering Journal*, 52(4), 679-695.
- Badurdeen, F., Wijekoon, K., and Marksberry, P. (2011) 'An analytical hierarchy process-based tool to evaluate value systems for lean transformations', *Journal of Manufacturing Technology Management*, 22(1), 46-65.
- Bajjou M and Chafi A (2018) ' Lean construction implementation in the Moroccan Construction industry: Awareness, benefits and barriers', *Journal of Engineering, Design and Technology*, 16 (4): 533-556.
- Bakker, M. (2013). *Corporate Foresight and its consequences for innovation performance: A literature study*. (Master thesis), Rijks universiteit Groningen, Groningen, The Netherlands.
- Becker, R. (2006). *Lean Manufacturing and the Toyota Production System*'. (1<sup>st</sup> Edition). Springer
- Benson, R. and Kulkarni, N. (2011). 'Understanding operational waste from a lean biopharmaceutical perspective', *The official magazine of ISPE*. 31(6): 1-7.
- Belhadi A Touriki F and Elfezazi S (2016) 'A framework for effective implementation of lean production in Small and Medium-sized Enterprises', *Journal of Industrial Engineering and Management*, 9(3): 786-810.
- Bell, J. (2014) 'Doing Your Research Project: A guide for first-time researchers,' McGraw-Hill Education (UK).

- Bepari ,M. M. Narkhede, B. E. and Vedak ,N. (2012). ‘The Lean Ahead – For Continuous Improvements’, *International Conference on Technology and Business Management*, 26<sup>th</sup>-28<sup>th</sup> March, Vol 26, pp.28.
- Berg (2009). *Qualitative Research Methods for the Social Sciences*. Boston: Allyn and Bacon.
- Bhamu, J., and Singh Sangwan, K. (2014) 'Lean manufacturing: literature review and research issues', *International Journal of Operations and Production Management*, 34(7), 876-940.
- Bonavita, N, Birkemoe, E, Slupphaug, O and Storkaas, E. (2008). ‘Operational performance excellence through production optimization in the upstream industry’. *10th Mediterranean Petroleum Conference“(MPC08):* 1-11.
- Bolman, L. G., and Deal, T. E. (2008). *Reframing organizations: Artistry, choice and leadership* (4th ed.). San Francisco: John Wiley and Sons.
- Bourne, M and Neely, A, Platts, K and Mills, J. (2002). ‘The success and failure of performance measurement initiatives Perceptions of participating managers’, *International Journal of Operations and Production Management*. 22 (11): 1288-1310.
- Brad N.(2009).'*Part 2: Key Concepts Of Lean Manufacturing*'. Harvard Business school.
- Brennan, M. (1992). ‘Techniques for Improving Mail Survey Response Rates’. *New Zealand Journal of Business*, in press.
- Cargan, L. (2007), '*Doing social research*' Rowman and Little field Publishers. ISBN-13: 978-0742547148
- Carney T (2006) *Social Security Law and Policy* Federation Press, Sydney.
- Chang, S. J., Van Witteloostuijn, A., and Eden, L. (2010) ‘ Common method variance in international business research', *Journal of International Business Studies*, 41(2), 178-184.
- Charles, A.A and Chucks, O.K. (2012). ‘Adopting the Kaizen Suggestion System in South African Lean Automotive Components Companies’. *Science Journal of Business Management*. Vol 2012, 2276-6316
- Chen G., R, and Kanfer. (2006). ‘Towards a system theory of motivated behavior in work teams’. *Research in Organizational Behavior*. 27:223-267

- Chen, L. Y. (2004). 'Examining the effect of organization culture and leadership behaviors on organizational commitment, job satisfaction, and job performance at small-and middle-sized firms of Taiwan', *Journal of American Academy of Business, Cambridge*. 5(1/2): 432-438.
- Chiarini, A., (2012), 'Lean production: mistakes and limitations of accounting systems inside the SME sector', *Journal of Manufacturing Technology Management*, 23(5) 681-700.
- Chong ,W.K. and Low ,S. P. (2005). 'Assessment of Defects at Construction and Occupancy Stages', *Journal of Performance of Constructed Facilities*. 19(4), 283-289.
- Chowdary B. and George D. (2012) 'Improvement of manufacturing operations at a pharmaceutical company: A lean manufacturing approach', *Journal of Manufacturing Technology Management*, 23 (1), 56-75.
- Claus Abildgren. (2006). 'Improving Manufacturing Business Operations with Wonderware Production and Performance Management Software Solutions'. *Invensys Systems, Inc.*: 1-10.
- Coghlan, D., and Brannick, T. (2014). *Doing Action Research in your own Organisation*. (4<sup>th</sup> ed.) London, UK: Sage Publications.
- Connelly, L. M. (2011), 'Cronbach's alpha,' *Medsurg Nurs*, 20(1), pp.45-47.
- Conway, J. M., and Lance, C. E. (2010), 'What reviewers should expect from authors regarding common method bias in organizational research,' *Journal of Business and Psychology*, 25(3), pp.325-334.
- Costley, C., Elliot G., and Gibbs, P. (2010). *Doing Work Based Research; Approaches to Enquiry for Insider-Researchers*. London: Sage Publication.
- Creswell, J. W. (2013), '*Research design: Qualitative, quantitative, and mixed methods approach*,'. London, UK: Sage publications.
- Daniel D Matthews., (2011). *The A3 workbook : Unlock your problem-solving mind*. (1<sup>st</sup> edition). Productivity press
- Dave,Y. and Sohani,N. (2012). 'Single Minute Exchange of Dies: Literature Review'. *International Journal of Lean Thinking*. 3(2): 27-37.
- Daymon, C., and Holloway, I. (2002). *Qualitative Research Methods in Public Relations and Marketing Communications*. Routledge, London.

- Deal T.E and Kennedy A.A (2000). *Corporate Cultures*. (Reading, MA: Addison-Wesley)
- Denison, D. R., and Mishra, A. K. (1995). *Toward a theory of organizational culture and effectiveness*. *Organization Science*, 6(2), 204–223.
- Dennis, P. (2007). *Lean production simplified*. New York, NY: Productivity Press.
- Dhakal , Alnajim M. , Labib A.(2013).' Lean readiness level within Kuwaiti manufacturing industries', *International Journal of Lean six sigma*,4(3), 280-320.
- Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P., and Kaiser, S. (2012), 'Guidelines for choosing between multi-item and single-item scales for construct measurement: a predictive validity perspective,' *Journal of the Academy of Marketing Science*, 40(3), pp.434-449.
- Dixit, V and Bhati, M. (2012). 'A Study about Employee Commitment and its impact on Sustained Productivity in Indian Auto-Component Industry'. *European Journal of Business and Social Sciences*. 1(6): 34 – 51.
- Drath, W. H, McCauley, C. D. Palus, C. J, Van Velsor, E, O'Connor, P. M. G, and McGuire, J. B. (2008). 'Direction, alignment, commitment: Toward a more integrative ontology of leadership'. *The Leadership Quarterly*.19: 635-653.
- Drew, J., Blair, M. and Stefan, R. (2004). 'Journey to Lean: Making Operational Change Stick'. *Gordonsville*: 5-25.
- Drost, E. A. (2011), 'Validity and reliability in social science research,' *Education Research and perspectives*, 38(1), 105.
- Dubrin, A. J. (2004). 'Leadership: Research findings, practice, and skills'. *New York: Houghton Mifflin Company*.
- Duckworth, A. L., and Kern, M. L. (2011), 'A meta-analysis of the convergent validity of self-control measures', *Journal of Research in Personality*, 45(3), pp.259-268.
- Easterby-Smith, M., Thorpe, R., and Jackson, P. R. (2012), '*Management research*,' Sage.
- El-Aty A, Farooq A, Barakat A (2015) ' Implementation of lean manufacturing principles in the process industry: a case study', *Applied Mechanics and Materials* 799-800: 1431-1435

- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., and Kyngäs, H. (2014), 'Qualitative content analysis: A focus on trustworthiness,' *Sage Open*, 4(1).
- Emiliani, M. L., (2006), "Origins of lean management in America: the role of Connecticut businesses", *Journal of Management History*, 12(2), 167-184.
- Farris, J.A., Van Aken., E.M., Doolen, T.L. and Worley J., (2008) ' Learning from less successful kaizen events: A case study' , *Engineering Management Journal*, 20(3),10-20.
- Ferdousi, F., and Ahmed, A. (2011, April). Supporting factors for the implementation of lean: A study on manufacturing firms, *Journal on Banking Financial Services and Insurance Research*, 1(1), 1-21.
- Flumerfelt, S., Bella Siriban-Manalang, A., and Kahlen, F. J. (2012) ' Are agile and lean manufacturing systems employing sustainability, complexity and organizational learning? ', *The Learning Organization*, 19(3), 238-247.
- Found, P. A., van Dun, D. H., and Fei, F. (2009, May). Multi-level management and leadership skills in lean organizations. *Production and Operation Management Society*, Orlando, FL, U.S.A.
- Fu-Jin Wang, Shieh Chich-Jen and Tang Mei-Ling (2010), "Effect of leadership style on organizational performance as viewed from human resource management strategy", *African Journal of Business Management*, 4(18), 3924-3936.
- Fuller, C. M., Simmering, M. J., Atinc, G., Atinc, Y., and Babin, B. J. (2016). Common methods variance detection in business research. *Journal of Business Research*, 69(8), 3192-3198.
- Funke, J. (2010). Complex problem solving: A case for complex cognition?. *Cognitive Processing*, 11(2), 133-142.
- Gallup (2015). Employee Engagement in U.S. Stagnant in 2015. Online available at< <https://news.gallup.com/poll/188144/employee-engagement-stagnant-2015.aspx>> Retrieved on 20/8/2018
- Ghasemi, A., and Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International journal of endocrinology and metabolism*, 10(2), 486.
- Ghosh M. (2013), 'Lean manufacturing performance in Indian manufacturing plants'. *Journal of Manufacturing Technology Management*, 24 (1), 113-122

- Gliem, J. A., and Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*. Columbus, 82-88.
- Glover, W. J., Farris, J. A., Van Aken, E. M., and Doolen, T. L. (2011), 'Critical success factors for the sustainability of Kaizen event human resource outcomes: An empirical study,' *International Journal of Production Economics*, 132(2), 197-213.
- Golicic, S.L. and Medland, S.S. (2007), 'Size might matter: a case study of lean implementation in an SME', *Society for Marketing Advances Proceedings*, pp. 261-264.
- Gregory, B. T., Harris, S. G., Armenakis, A. A., and Shook, C. L. (2009), 'Organizational culture and effectiveness: A study of values, attitudes, and organizational outcomes,' *Journal of Business Research*, 62(7), 673-679.
- Guilherme Tortorella., Samanta Viana., Diego Fettermann (2015).' Learning cycles and focus groups : A complementary approach to the A3 thinking methodology', *The Learning Organization*, 22(4), 229 – 240.
- Guimaraes, C. M., and de Carvalho, J. C. (2012, June).' Lean healthcare across cultures: State-of-the-Art', *American International Journal of Contemporary Research*, 2(6), 187-206.
- Gupta, McDaniel, A. J., and Herath, S. K. (2005). 'Quality Management in Service Firms: Sustaining Structures of Total Quality Service'. *Managing Service Quality*. 15(4): 389-402.
- Gupta V., Acharya P. and Patwardhan M., (2013).' A strategic and operational approach to assess the lean performance in radial tyre manufacturing in India'. *International Journal of Productivity and Performance Management*, 62 (6), 634-651.
- Gustavsen, B. (2011). 'The Nordic Model of Work Organization', *Journal of the Knowledge Economy*, 2(4), 463-480.
- Hadid, W., and Mansouri, A. (2014). 'The lean-performance relationship in services: A theoretical model', *International Journal of Operations and Production Management*, 34(6), 750-785.
- Hallgren, M. and Olhager, J. (2007). Lean and agile manufacturing: external and internal drivers and performance outcomes, Working Paper WP-347,

*Department of Management and Engineering, Linköping University, Linköping, Sweden.*

- Hancock, G. R., Mueller, R. O., and Stapleton, L. M. (Eds.). (2010), '*The reviewer's guide to quantitative methods in the social sciences*,' Routledge.
- Harvey, D.(2004). Lean, Agile. Paper for Workshop "The Software Value Stream" OT2004, 43, 1-7.
- Hasle, P. (2014). 'Lean production—an evaluation of the possibilities for an employee supportive lean practice', *Human Factors and Ergonomics in Manufacturing and Service Industries*, 24(1), 40-53.
- Hatch, M. (2000). 'The cultural dynamics of organizing and change'. In N. Ashkanasy, C. Wilderom, and M. Peterson (Eds.), *Handbook of organizational culture and change*. Thousand Oaks, CA: Sage: 245–260.
- Hayes, T. L., Harter, J. K., and Schmidt, F. L. (2002). 'Business-Unit-Level Relationship Between Employee Satisfaction, Employee Engagement, and Business Outcomes: A MetaAnalysis', *Journal of Applied Psychology*, 87(2), 268-279.
- Heinrich ,C. J. (2013). 'Improving Public-Sector Performance Management: One Step Forward, Two Steps Back?', *University of Wisconsin-Madison*
- Heinsman, H, Hoogh,A, Koopman, PandMuijen, J. (2006). 'Competency Management: Balancing Between Commitment and Control', *Rainer HamppVerlag*. 17(3):292-306.
- Henwood, K. (2014). Qualitative research. *Encyclopedia of Critical Psychology*, pp.1611-1614.
- Herron ,C. and Braiden, P. M. (2007). 'Defining the foundation of lean manufacturing in the context of its origins'. *IET International Conference on Agile Manufacturing*. Japan :148-157
- Hines, P., M. Holweg and N. Rich. (2004). 'learning to evolve: A review of contemporary lean thinking', *International Journal Operations and Production Management*, 24(10), 994-1011.
- Hodgetts R. and Luthans F. (2003)' *International Management: : Culture, Strategy, and Behavior*". McGraw-Hill
- Hofer, C., Eroglu, C., and Hofer, A. R. (2012). 'The effect of lean production on financial performance: The mediating role of inventory leanness', *International Journal of Production Economics*, 138, 242-253.

- Horváthová, P. and Davidová ,M. (2011). 'Operations Management as Practice of Organizations' Strategic Management in Relation to the Environment', *International Conference on Financial Management and Economics*. 11:8-12.
- Hung, R. Y. Y., Lien, B. Y. H., Yang, B., Wu, C. M., and Kuo, Y. M. (2011), 'Impact of TQM and organizational learning on innovation performance in the high-tech industry,' *International business review*, 20(2), pp.213-225.
- Hussain, M., Ajmal, M. M., Khan, M., and Saber, H. (2015). Competitive priorities and knowledge management: an empirical investigation of manufacturing companies in UAE. *Journal of Manufacturing Technology Management*, 26(6), 791-806.
- Hussain M. and Malik M. (2016) ' Prioritizing lean management practices in public and private hospitals', *Journal of Health Organization and Management* ,30 (3), 457-474.
- Iacobucci, D. (2010), 'Structural equations modeling: Fit indices, sample size, and advanced topics,' *Sample Size, and Advanced Topics*.
- Jackson, L. (2011). 'Leadership Framework'. *NHS Leadership Academy*: 1-20.
- James A Bassuk., and Ida M Washington (2013). The A3 problem solving report : A 10-step scientific method to execute performance improvements in an academic research vivarium. *Plos One*, 8(10).
- Jassawalla, A. R and Sashittal, H. C. (2003). 'Building collaborative new product processes: Why instituting teams are not enough'. *Advanced Management Journal*. 68(1): 27-36.
- Jha, N. K. (2008), '*Research Methodology*,' Chandigarh: Global Media
- Johanson, G. A., and Brooks, G. P. (2010) ' Initial scale development: sample size for pilot studies', *Educational and Psychological Measurement*, 70(3), 394-400.
- Jones,R. (2008). '*Proving continuous improvement with profit ability*'.73-151. [www.Gilbreaths.com](http://www.Gilbreaths.com) . Retrieved on 15/06/2018.
- Josephson, P.E., and Saukkoriipi, L. (2005). 'Waste in construction projects. Call for a new approach'. *The centre for Management of the Built Environment, Building Economics and Management, Chalmers University of Technology, Göteborg*.



- Kahn, W. A. (1990). Psychological Conditions of Personal Engagement and Disengagement at Work. *The Academy of Management Journal*, 33(4), 692-724.
- Karim, A., and Arif-Uz-Zaman, K. (2013). 'A methodology for effective implementation of lean strategies and its performance evaluation in manufacturing organizations', *Business Process Management Journal*, 19(1), 169-196.
- Kariuki, B. M., and Mburu, D. K. (2013) 'Role of Lean manufacturing on organization competitiveness', *Industrial Engineering Letters*, 3(10), 81-82.
- Karlsson, C. and Ahlstrom, P. (1997) 'Assessing changes towards lean production', *International Journal of Operations and Production Management*, 16(2), 22-41.
- Keen, R. (2011). The development of problem solving in young children: A critical cognitive skill. *Annual review of psychology*, 62, 1-21.
- Kerper, A., D. (2006). 'Lean Improvement Methodologies'. *Misty River Consulting*: 1-6.
- Kerrin, M. and Oliver, N. (2002). 'Collective and individual improvement activities: the role of reward system'. *Emerald Personnel Review*. 31(3): 320-337.
- Khripunova, A., Vishnevskiy, K., Karasev, O., Meissner, D. (2014). Corporate Foresight for corporate functions: impacts from purchasing functions. *Strategic Change*, 23(3-4), 147-160.
- Kilpartick, A, M. (1997). 'Lean Manufacturing Principles: A comprehensive Framework for Improving Production efficiency'. *Massachusetts Institute of Technology, USA*.
- Kilpatrick, J. (2003). 'Lean principles'. *Utah manufacturing extension partnership*.
- Kim, H. Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative dentistry and endodontics*, 38(1), 52-54.
- Kirkman, B. L, and Shapiro, D. L. (2001). 'The impact of culture values on job satisfaction and organizational commitment in self-management work teams: The mediating role of employee resistance', *Academy of Management Journal*, 44(3): 557-569.
- Klipp, P.(2011). 'Getting Started with Kanban'. *Kanbanery*: 10-18.

- Kotter, J. P., and J. L. Heskett (1992) *Corporate Culture and Performance*. New York: The Free Press.
- Krishnan, V., and Parveen, C. M. (2013, July). 'Comparative study of lean manufacturing tools used in manufacturing firms and service sector', In *Proceedings of the World Congress on Engineering*, 1,3-5.
- Krosnick, J. A. (2018), 'Questionnaire design,' In *The Palgrave Handbook of Survey Research* (pp. 439-455). Palgrave Macmillan, Cham.
- Kull, T. J., Yan, T., Liu, Z., and Wacker, J. G. (2014) 'The moderation of lean manufacturing effectiveness by dimensions of national culture: testing practice-culture congruence hypotheses', *International Journal of Production Economics*, 153, 1-12.
- Lee and Chuang (2009). '*The Impact of Leadership Styles on Job Stress and Turnover Intention: Taiwan Insurance Industry as an Example*'. Available at: [www.hclee@ttu.edu.tw](http://www.hclee@ttu.edu.tw) (accessed on 25/9/2013).
- Levinson, W.A. (2002). 'Henry Ford's Lean Vision: Enduring Principles from the First Ford Motor Plant'. *New York, NY: Productivity Press*.
- Levy, P. S., and Lemeshow, S. (2013), '*Sampling of populations: methods and applications*,' John Wiley and Sons.
- Lewchuck, W., Stewart, P. and Yates, C. (2001) 'Quality of working life in the automobile industry: a Canada – UK comparative study', *New Technology, Work, and Employment*, 16(2), p. 72-87.
- Li, S, Ragu-Nathan, B. Ragu-Nathan, T.S and Rao, S. S. (2006). 'The impact of supplychain management practices on competitive advantage and organizational performance'. *Omega*. 34: 107 – 124.
- Liker and Jeffery ,K. (2004). 'The Toyota Way – 14 Management Principles from the World's Greatest Manufacturer'. *McGraw Hill*. :27.
- Liker, J.K. (2004). 'The toyota way: 14 management principles from the World's greatest manufacturer'. *New York: McGraw-Hill*.
- Liker J.k. (2014). 'Developing Lean Leaders at all levels'. US, Lean leadership Institute.
- Little, B., and Little, P. (2006). Employee engagement: Conceptual issues. *Journal of Organizational Culture*, 10(1), 111-120.

- Luton, L. S. (2015), 'Qualitative research approaches for public administration,' (2<sup>nd</sup> Edition). Routledge.
- MacDuffie, J. (1995). 'Human resource bundles and manufacturing performance: Organisational logic and flexible production systems in the world auto industry', *Industrial and Labor Relations Review*, 48(2), 197.
- Mackelprang, A. W., and Nair, A. (2010). 'Relationship between just-in-time manufacturing practices and performance: A meta-analytic investigation', *Journal of Operations Management*, 28(4), 283-302.
- Manimay Ghosh., (2012). A3 process : A pragmatic problem-solving technique for process improvement in health care. *Journal of Health Management*, 14(1) 1-11.
- Mann, D. (2009). *The missing link: Lean leadership*. *Frontiers of Health Services Management*, 26(1), 15-26.
- Manuel F. Suarez-Barraza and Jose A. Miguel-Davila (2013). ' Assessing the design, management and improvement of kaizen projects in local governments', *Business Process Management Journal*, 20(3).
- Marchwinski ,C. and Shook ,J. (2003). 'Lean lexicon: A graphical glossary for lean thinkers, Brookline'. *MA: Lean Enterprise Institute*.
- Marks, M. A, Mathieu, J.E and Zaccaro, S.J.(2001), 'A temporally based framework and taxonomy of teams processes.' *The Academy of Management Review*. 26: 356-376.
- Martínez-Jurado, P. J., and Moyano-Fuentes, J. (2014). Lean management, supply chain management and sustainability: a literature review. *Journal of Cleaner Production*, 8(5), 134-150.
- Martínez, S., Jardón, A., Gonzalez, J., Balaguer, V.C, (2013), "Flexible field factory for construction industry", *Assembly Automation*, 33 (2), 175-183.
- May, D. R., Gilson, R. L., and Harter, L. M. (2004) 'The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work', *Journal of Occupational and Organizational Psychology*, 11-37.
- McGrath, G. R and MacMillan, I. C. (2000). 'Entrepreneurial Mindset: Strategies for Continuously Creating Opportunity in an Age of Uncertainty'. *Harvard Business School Press Books*.

- Mckinsey (2017). *Building a problem-solving culture that lasts*. Online available at <  
<https://www.mckinsey.com/~media/McKinsey/Business%20Functions/Operations/Our%20Insights/The%20lean%20management%20enterprise/Building%20a%20problem%20solving%20culture%20that%20lasts.ashx>> Retrieved  
on 20/8/2018
- McLachlan, R. (1997). 'Management initiatives and just-in-time manufacturing', *Journal of operations management*, 15(4): 271-292.
- McNiff, J., and Whitehead, J. (2000). *Action Research in Organisations*. Routledge, London.
- Meade, A. W., Watson, A. M., and Kroustalis, C. M. (2007, April). Assessing common methods bias in organizational research. In *22nd annual meeting of the society for industrial and organizational psychology, New York* (pp. 1-10).
- Mefford, R.N. (2009), "Increasing productivity in global firms: the CEO challenge", *Journal of International Management*, 15(3), 262-272.
- Melchar, D. E. and Bosco, S. M. (2010). 'Achieving High Organization Performance through Servant Leadership', *The Journal of Business Inquiry*, 9 (1), 74-88.
- Meyer and Allen. (1997). 'Commitment in the workplace, Theory, research and application'. *Thousand Oaks, CA: Sage*.
- Michele Cano (2016). A framework for implementing lean operations management in the higher education sector. PhD Thesis, University of Huelva, Spain
- Miller, K. D., and Tsang, E. W. (2011), 'Testing management theories: Critical realist philosophy and research methods,' *Strategic Management Journal*, 32(2), pp.139-158.
- Miltenburg, J. (2000). 'One piece flow manufacturing on U-shaped production lines: a tutorial'. *IIE Transactions*. 33: 303-321.
- Mironiuk, K.(2012). 'Lean Office Concept Implementation In R-Pro Consulting Company', *Bachelor's Thesis Business Management*:1-64.
- Mohammad,,A.A.S.andAlhamadani.S. Y. M. (2011) 'Service Quality Perspectives and Customer Satisfaction in Commercial Banks Working in Jordan', *EuroJournals Publishing*. 14: 60-71.

- Mohamed Z. and Smadi A. (2012) ' The Lean Supply Practices in the Garments Manufacturing Companies in Jordan'. *International Business Research*, 5(4), 88-102
- Montgomery, D. C., Peck, E. A., and Vining, G. G. (2012). *Introduction to linear regression analysis* (Vol. 821). John Wiley and Sons.
- Muslimen, R . Yusof, M.S. and Abidin ,A. S. Z.(2011). 'Lean Manufacturing Implementation in Malaysian Automotive Components Manufacturer: a Case Study'. *Proceedings of the World Congress on Engineering. 1* : 978-988.
- Muthuveloo,R and Rose,R.C.(2005). 'Typology of Organizational Commitment'. *American Journal of Applied Science. 2* (6). 1078-1081.
- Myers, M. D. and Newman, M. 2007. 'The Qualitative Interview in IS research: Examining the craft', *International Journal of Information and Organization*, 17(1): 2-26.
- Nasuhaa Lee (2014). *Operational complexity impact on Quality and Performance of Electrical and Electronics Industry in Malaysia*. Eng.D Dissertation, Universiti Teknologi Malaysia, KL.
- Neagoe, L.N. and Klein,V.M. (2009). Employee suggestion system (kaizen teian) the bottom-up approach for productivity improvement. *International Conference on Economic Engineering and Manufacturing Systems. 10*(3): 361-366.
- Neha,S ., Singh,M.G. Simran,K. and Pramod G. (2013). 'Lean Manufacturing Tool and Techniques in Process Industry'. *International Journal of Scientific Research and Reviews . 2*(1): 54-63.
- Ng, I. C., Maull, R., and Yip, N. (2009). Outcome-based contracts as a driver for systems thinking and service-dominant logic in service science: Evidence from the defence industry. *European management journal*, 27(6), 377-387.
- Norhairin S., Ahmed A., Essam., and Maksim M. (2013). 'A3 thinking approach to support problem solving in lean product and process development'. *ResearchGate*.
- Ogbonna, E., and Wilkinson, B. (2003). 'The False Promise of Organisational Culture Change: A Case Study of Middle Managers in Grocery Retailing', *Journal of Management Studies*, 40:5.
- Pakdil, F., and Leonard, K. M. (2015). 'The effect of organizational culture on implementing and sustaining lean processes', *Journal of Manufacturing Technology Management*, 26(5), 725-743.

- Paneru, N. (2011). 'Implementation of Lean Manufacturing Tools in Garment Manufacturing Process Focusing Sewing Section of Men's Shirt'. *Oulu University of applied science*.
- Paryani, K. (2011). 'Product quality, service reliability and management of operations at Starbucks'. *International Journal of Engineering, Science and Technology*. 3(7): 1-14.
- Pattanaik, L.N. and Sharma, B.P. (2009). 'Implementing lean manufacturing with cellular layout: a case study', *The International Journal of Advanced Manufacturing Technology*. 42: 772-779.
- Pepper, M. P., and Spedding, T. A. (2010). 'The evolution of lean Six Sigma', *International Journal of Quality and Reliability Management*, 27(2), 138-155.
- Pettersen, J. (2009). Defining lean production: some conceptual and practical issues. *The TQM journal*, 21(2), 127-142.
- Pirraglia, A. Saloni ,D . and Dyk ,H. (2009). 'Lean manufacturing'. *BioResources*. 4(4): 1341-1358
- Podsakoff, P. M., MacKenzie, S. B., and Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual review of psychology*, 63, 539-569.
- Purcell, C. (2006). 'Effective Organizational leadership (EOL): a framework for leader effectiveness'. *OED consulting Ltd*: 1-6
- Puvanasvaran, P., Megat, H., Hong, T. S., and Razali, M. M. (2009), 'The roles of communication process for an effective lean manufacturing implementation', *Journal of industrial engineering and management*, 2(1), 128-152.
- Radisic, M.(2006).'Just-In-Time concept'. *Faculty of Technical Sciences, University of Novi Sad , Department of Industrial Engineering and Management, Local group Novi Sad, Serbia*:1-9.
- Rahman S., Laosirihongthong T. and Sohal A. (2010)," Impact of lean strategy on operational performance: a study of Thai manufacturing companies", *Journal of Manufacturing Technology Management*, 21, 839-852.
- Ramachandran, L. and Alagumurthi, N.(2013). 'Appraisal of Equipments for Lean Manufacturing Environment- A MCDA Approach', *International Journal of Recent Technology and Engineering (IJRTE)*. 2(1): 2277-3878

- Ramnath, B.V, Elanchezian, C. and Kesavan, R. (2010). 'Application of Kanban System for implementing lean manufacturing (a case study)'. *Journal of Engineering Research and Studies*. 1 (1): 138-151.
- Rath, T., and Conchie, B. (2008). *Strength-Based Leadership: Great Leaders, Teams, and Why People Follow*. Michigan: Gallup Press.
- Reyner, A. Fleming, K. (2004). 'Heijunka Product and Production Leveling'. *MIT Leaders for Manufacturing Program (LFM)*
- Rice, C., Marlow, F., and Masarech, M. A. (2012). *The Engagement Equation: Leadership Strategies for an Inspired Workforce*. New Jersey: John Wiley and Sons, Inc .
- Richard, F. (2006). 'Does Globalization of the Scientific/Engineering Workforce Threaten US Economic Leadership?'. *Innovation Policy and the Economy volume. 6*.
- Robert, S. Kaplan and David, P. (2001). "*The Strategy-Focused Organization*," .Harvard Business School Press.
- Robson, C., and McCartan, K. (2016), '*Real world research*,' John Wiley and Sons.
- Rose A. Deros B., and Ab. Rahman M. (2013) 'Lean Manufacturing Perceptions and Actual Practice Among Malaysian SME'S in Automotive Industry', *International Journal of Automotive and Mechanical Engineering*, 7: 820-829.
- Rose,M. Deros, B and Abdul Rahman, D. (2009). 'A review on lean manufacturing practices in small and medium enterprises'. *UniversitiKebangsaan Malaysia*.
- Rosenthal, M. (2010, June 28). 2010/06/28. Retrieved from The Lean Thinker: <http://theleanthinker.com/2010/06/28/toyota-kata-the-how-of-engaged-leadership/>
- Rubin, A., and Babbie, E. R. (2016), '*Empowerment series: Research methods for social work*,' Cengage Learning.
- Sadri , R. Taheri , P. Azarsa, P. and Ghavam H. (2011). 'Improving Productivity through Mistake-proofing of Construction Processes'. *International Conference on Intelligent Building and Management*.5: 280-284.
- Sacks, R., Radosavljevic, M., and Barak, R. (2010). 'Requirements for building information modeling based lean production management systems for construction', *International Journal of Automation in construction*, 19(5), 641-655.

- Saks, A. M., and Gruman, J. A. (2014). What do we really know about Employee Engagement. *Human Resource Development Quarterly*, 25(2), 155-182.
- Salanova, M., Agut, S., and Peiró, J. M. (2005) 'Linking Organizational Resources and Work Engagement to Employee Performance and Customer Loyalty: The Mediation of Service', *Journal of Applied Psychology*, 90(6), 1217-1227.
- Salem, O., Solomon, J., Genaidy, A., and Luegring, M. (2005). 'Site implementation and assessment of lean construction techniques', *Lean Construction Journal*, 2(2), 1-21.
- Santora, J. C, Seaton, W, and Sarros, J. C. (1999). 'Changing Times: Entrepreneurial Leadership in a Community-based Nonprofit Organization'. *Journal of Leadership Studies*, 6(4): 101 – 109.
- Sarkar, D. (2008). *Lean for service organizations and offices*. (1<sup>st</sup> Edition). Milwaukee, Wisconsin: ASQ Quality Press.
- Saunders, M. N. (2011), '*Research methods for business students, 5/e*,' Pearson Education India.
- Saunders, M. N., and Lewis, P. (2012), '*Doing research in business and management: An essential guide to planning your project*,' Pearson.
- Saunders, M., Lewis, P. and Thornhill, A. (2012), '*Research methods for business students*,' Harlow: Financial Times/Prentice Hall.
- Schaufeli, W. B., Bakker, A. B., and Salanova, M. (2006). 'The measurement of work engagement of with a short questionnaire: A cross-national study'. *Educational and Psychological Measurement. Educational and Psychological Measurement*, 66(4), 701-716.
- Sekaran, U. and Bougie, R. (2013). *Research Methods for Business*. (6<sup>th</sup> Edition). John Wiley and Sons Ltd.
- Shah, R. and P.T. Ward. (2007). 'Defining and developing measures of lean production', *International Journal of Operations Management*. 25(4): 785-805.
- Shah, R. and Ward, P.T. (2003). 'Lean manufacturing: Context, practice bundles, and performance', *Journal of Operations Management*. 21 (2): 129-149.
- Shakshok M and Abu Kraiss O (2015) 'An Investigation of Quality Practices in Libyan Industrial Companies', *International Journal of Economics and Management Engineering*, 9(8), 2865-2871.



- Shuck, B., and Wollard, K. (2010). Employee engagement and HRD: A seminal review of the foundations. *Human Resource Development Review*, 9(1), 89-110.
- Silverman, D. (2016), *'Qualitative research'*. Sage,
- Simbürger, A., and Größlinger, A. (2014, January). On the variety of static control parts in real-world programs: from affine via multi-dimensional to polynomial and just-in-time. In Proc. of the 4th Inter. Workshop on Polyhedral Compilation Techniques, Vienna, Austria.
- Singh, B., Garg, S. K., and Sharma, S. K. (2011). 'Value stream mapping: Literature review an implications for Indian industry', *International Journal of Advanced Manufacturing Technology*, 53. 799-809.
- Singh, S. (2012), 'Ethics in research', *Indian Journal of Dermatology, Venereology, and Leprology*, 78(4), 411.
- Singh, G. Belokar, R.M. (2012). 'Lean Manufacturing Implementation in the Assembly shop of Tractor Manufacturing Company', *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*. 1(2): 2278-3075.
- Slack, N., Chambers, S. and Johnston R. (2004). *'Operations Management'* . (4<sup>th</sup> Edition).Financial Times/ Prentice Hall.
- Snee, R. D. (2010). 'Lean Six Sigma—getting better all the time', *International Journal of Lean Six Sigma*, 1(1), 9-29.
- Spann ,M. S, Adams ,M. Rahman ,M. Czarnecki , H. and Schroer, B.J.(2004). 'Transferring Lean Manufacturing to Small Manufacturers: The Role of NIST-MEP'. *University of Alabama in Huntsville, Huntsville, Alabama 35899*.
- Springer, P. J., Clark, C. M., Strohfus, P., and Belcheir, M. (2012) 'Using transformational change to improve organizational culture and climate in a school of nursing', *Journal of Nursing Education*, 51(2), 81-88
- Stake, R. E. (2010), *'Qualitative research: Studying how things work'*, Guilford Press.
- Stock, G,N., Greis, N.P., Kasarda, J.D. (2000). ' Enterprise logistics and supply chain structure'. *Journal of Operation Management*, 18 (15),531-547
- Stone, K.B. (2012), "Four decades of lean: a systematic literature review", *International Journal of Lean Six Sigma*, 3(2), 112-132.

- Suri, H. (2011), 'Purposeful sampling in qualitative research synthesis,' *Qualitative Research Journal*, 11(2), pp.63-75.
- Tabachnick, B. G., and Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.
- Taj S. and Morosan C. (2010), "The impact of lean operation on the Chinese manufacturing performance", *Journal of Manufacturing Technology Management*, 22, 223-240.
- Tannock, J. and Ahmed, K.S. (2008), "Quality management in the Arabic-speaking countries", *Journal of Transnational Management*, 13(2), 174-194.
- Tashakkori, A., and Teddlie, C. (Eds.). (2010), '*Sage handbook of mixed methods in social and behavioral research*,' Sage.
- Thakur A. (2016) 'A Review on Lean Manufacturing Implementation Techniques: A Conceptual Model of Lean Manufacturing Dimensions', *Journal on Emerging trends in Modelling and Manufacturing*, 2(3), 62-72
- Timothy, O, Andy, O, Victoria, A and Idowu, N. (2011). 'Effects of leadership style on organizational performance:a survey of selected small scale enterprises in ikosi-ketucouncil development area of lagos state, nigeria', *Australian Journal of Business and Management Research*, 1(7):100-111.
- Uzairiah Mohd Tolbi (2014). *Qualitative Research and NVIVO 10 Exploration*. Aras Publisher.
- Van Aken, E., Farris, J, Glover, W. and Letens, G. (2010), "A framework for designing, managing, and improving Kaizen event programs", *International Journal of Productivity and Performance Management*, 59(7), 641-667.
- Van der Merwe, K.R., Pieterse, J.J. and Lourens, A.S., (2014). 'The development of a theoretical lean culture causal framework to support the effective implementation of lean in automotive component manufacturers', *South African Journal of Industrial Engineering*, 25(1), 131-144.
- Vest, J. and Gamm L. (2009). *A critical review of the research literature on Six Sigma, Lean and StuderGroup's Hardwiring Excellence in the United States: the need to demonstrate and communicate the effectiveness of transformation strategies in healthcare*. *Implementation Science*, 435-44.

- Wang, W.Y and Chou, M.C. (2010). 'The Comprehension Modes of Visual Elements: How People Know About the Contents by Product Packaging'. *International Journal of Business Research and Management*, 1: 1-13.
- Wasti, S. A. (2003). 'Organizational commitment, turnover intentions and the influence of cultural values', *Journal of Occupational and Organizational Psychology*. 76(3): 303-321.
- Waters, C.D.J. (2007). ' Introduction to operations management'. (2<sup>nd</sup> Edition). Addison-Wesley.
- Watson, J. (2012). 'Operational Excellence Management System'. *Chevron Corporation*: 1-20.
- Wemmerlov,U. and Johnson,D.J. (1997). 'Cellular manufacturing at 46 user plants: implementation experiences and performance improvements', *International journal of production research*, 35(1): 29-49.
- William, M. H., Schneider, B., Barbera, K. M., and Young, S. A. (2009). *Employee Engagement: Tools for Analysis, Practice, and Competitive Advantage*. Oxford: Wiley-Blackwell.
- Wilson, L. (2015). '*How to Implement Lean Manufacturing*'.(2<sup>nd</sup> edition). McGraw-Hill Education.
- Womack, J. P., Jones, D. T., and Roos, D. (1990). *The machine that changed the world*. New York, NY: Free Press.
- Womack, J. P., and Jones, D. T. (1994). From lean production to the lean enterprise. *Harvard Business Review*, 72(2), 93-103
- Womack , J.P and Jones, D.T .(2003). 'lean thinking: banish waste and create wealth in your organization'. *First free press edition, New York*
- Wong, Y, C., Wong, K, Y. and Ali, A.(2009). ' A Study on Lean Manufacturing Implementation in the Malaysian Electrical and Electronics Industry'. *European journal of Scientific Research*, ISSN. 38(4),521-535.
- Worley J and Doolen T (2006) The Role of Communication And Management Support In A Lean Manufacturing Implementation. *Management Decision*44 (2): 228-245.
- Wu, Y.C. (2003). 'Lean manufacturing: a perspective of lean suppliers', *International journal of operations and production management*. 23: 1349-1376.

- Xu, J., and Thomas, H. C. (2011). How can leaders achieve high employee engagement? *Leadership and Organizational Development Journal* , 32(4), 399-416.
- Yang, Y., and Green, S. B. (2011), 'Coefficient alpha: A reliability coefficient for the 21st century?,' *Journal of Psychoeducational Assessment*, 29(4), pp.377-392.
- Yap, B. W., Rani, K. A., Rahman, H. A. A., Fong, S., Khairudin, Z., and Abdullah, N. N. (2014), 'An application of oversampling, undersampling, bagging and boosting in handling imbalanced datasets,' In *Proceedings of the First International Conference on Advanced Data and Information Engineering (DaEng-2013)* (pp. 13-22). Springer, Singapore.
- Yile L., Hang X.X., Lei Z., (2008). 'Lean Maintenance framework and its application in clutch maintenance', *International Conference on Information Management, Innovation Management and Industrial Engineering*, IEEE, 230-232.
- Yin, R. (1994), *Case Study Research, Design and Methods*, Sage Publications, Thousands Oaks, CA.
- Yin, R. K. (2009). *Case Study Research: Design and Methods 4<sup>th</sup> Edition*. Sage Inc., U.S.A.
- Yong, A. G., and Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in quantitative methods for psychology*, 9(2), 79-94.
- Zarbo, R.J. (2006). 'Determining customer satisfaction in anatomic pathology'. *Arch Pathol Lab Med*. 130: 645-649.
- Zarbo, R.J. MD. DMD. and D'Angelo , R. (2006). 'Transforming to a Quality Culture the Henry Ford Production System'. *Pathology Patterns Reviews*. 126(1): 21-29
- Zikmund, W.G. (2003) *Business Research Methods*. 7th Edition, Thomson South Western, Ohio. 'knowledge management,' *Journal of Business research*, 63(7), pp.763-771.

## **Appendix A Invitation for Interview**

Dear Sirs,

I am conducting interviews as part of a research study to increase our understanding of lean management system (LMS) practices (Kaizen event, A3 problem solving & suggestion scheme) in Aluminum Manufacturing Industry in UAE and to assess the relationship between lean implementation and productivity. As An expert in the Aluminum manufacturing industry, you are in an ideal position to give us valuable firsthand information from your own perspective.

The interview takes around 30-45 minutes and is very informal. We are simply trying to capture your thoughts and perspectives on best practice in lean management system and guiding our analysis of quantitative data. Your responses to the questions will be kept confidential.

Each interview has a number code to help ensure that personal identifiers are not revealed during the analysis and write up of findings. There is no compensation for participating in this study. However, your participation will be a valuable addition to our research and findings could lead to greater public understanding of impact of organizational culture on LMS practices. If you are willing to participate please suggest a day and time that suits you and I'll do my best to be available. If you have any questions please do not hesitate to ask.

Thank you

Best regards,

Nawaf

## Appendix B Semi-Structured interview Questionnaire and answers

### Respondent 1

1. What is your opinion about the current Lean management system LMS (Suggestion Scheme, kaizen event, A3 problem solving)?

*My opinions to get reasonable cost saving out of lean implementation the following aspects should be considered:*

- a. The present monetary rewards for suggestion scheme and other tools are not adequate.*
- b. Motivational rewards to Area Representative need to be introduced as they are contributing their resources for administrative and implementation process of the suggestion*
- c. No Reward or recognition system for Kaizen events and A3 problem solving.*
- d. Kaizen event takes a lot of time in the pre-planning stage*
- e. Not sufficient support from Lean office team*

2. Do you feel the employees are motivated enough for the participation in LMS?

*No, as I said earlier the present monetary reward is not adequate. But still employees may continue to participate in LMS as “something is better than nothing”. But some may ignore this employee participation platform. Our employees are not rewarded for any good kaizen event or if they solve potential problem.*

3. Do Suggestion Scheme, kaizen event & A3 problem solving have enough publicity within the organization?

*There is definitely further room for a better publicity. Focus more on non-supervisory level employees as they are the major work force in the organization. In addition, there are many channels can be used to promote all these concepts among our employees.*

4. Are you satisfied with the support from top management for LMS implementation?

*Top management support is fine and more is required to boost the entire system. But need to find innovate methods for better attraction of employees resulting quality and higher participation..*

5. Are you able to make cost reduction in your operating cost through LMS implementation?

*LMS implementation particularly require a budget mainly in the execution but main thing management should support and then only cost saving will be as a result. Company culture can help to implement LMS and harvest many tangible benefits such as cost saving. In my department we struggle in cost reduction and wherever the support is given to the project, our team is able to save and cut operating cost.*

## Respondent 2

1. What is your opinion about the current Lean management system LMS (Suggestion Scheme, kaizen event, A3 problem solving)?

*It is a good system and useful for the Company, It is giving importance for the all employees to participate. I suggest that we should increase the awareness for all supervisory employees covering all important points in suggestion scheme, kaizen event and A3 problem solving and their role into it.*

2. Do you feel the employees are motivated enough for the participation in LMS?

*Yes, our employees are eager to express whatever they have via these concepts even if there is no reward for them. Overall, they are motivated when they see their contribution into the process became our new standard.*

3. Do Suggestion Scheme, kaizen event & A3 problem solving have enough publicity within the organization?

*I think lean team doing their level best to publicize LMS tools but still it can be more publicized, for instance, using email, internal magazine, campaigns and outside newspapers for further publication.*

4. Are you satisfied with the support from top management for LMS implementation?

*Top management supports is at moderate level and here is the duty of lean team to convince management and get the buy in from them.*

5. Are you able to make cost reduction in your operating cost through LMS implementation?

*In my opinion, to get a cost saving project or suggestion require many chains mainly review from lean team and finance department for cost validation. We made many milestones by cost saving which has positive impact on our workplace.*



### Respondent 3

1. What is your opinion about the current Lean management system LMS (Suggestion Scheme, kaizen event, A3 problem solving)?

*Continuous efforts are necessary for survival and growth of the company and what I felt about the present system is excellent, this will motivate employee's creativity of improving company's efficiency, reduction of wastages and enhancing productivity. But the time frame for cost validation from finance department to be reduced. Moreover, rewarding system is to be reviewed.*

2. Do you feel the employees are motivated enough for the participation in LMS?

*Yes but It could be even better. Employees spend a lot of efforts from planning stage till get the action plan implemented or suggestions implemented as well as there is an opportunity to get more participation through proper awareness to team leaders and create good rewarding system.*

3. Do Suggestion Scheme, kaizen event & A3 problem solving have enough publicity within the organization?

*Yes, these concepts are well known to most the employees within the organization. Focused events for each concept will help in publicity and accelerate the implementation.*

4. Are you satisfied with the support from top management for LMS implementation?

*Top management support reflects on forming the committee to oversee the lean management system tools such as suggestion scheme, kaizen event & A3 problem solving. Moreover, one of the vital functions is to conduct regular meetings and take timely actions.*

5. Are you able to make cost reduction in your operating cost through LMS implementation?

*If there is employees' commitment, management support & clear business case to be solved, then, we can gain tangible and intangible benefits such cost saving, safety enhancement and quality improvement.*

## Respondent 4

1. What is your opinion about the current Lean management system LMS (Suggestion Scheme, kaizen event, A3 problem solving)?

*Lean management system is an excellent system to eliminate non-value added activities. There are highly worth projects or suggestions that related to productivity, EHS & quality but cannot be rewarded worth fully due to difficulty in quantification.*

2. Do you feel that the employees are motivated enough for the participation in LMS?  
*This depends on several factors mainly the manager of the department if he is encouraging their team to participate and motivate them to play a role in all lean manufacturing tools. Regular feedback from employees is essential to continuously improve the participation.*

3. Do Suggestion Scheme, kaizen event & A3 problem solving have enough publicity within the organization?  
*Our employees are well aware of different promotional activities launched by lean office. Communication channels are used and more can be done to get total employees involvement.*

4. Are you satisfied with the support from top management for LMS implementation?  
*I fully agree that with the top management support we can implemnt LMS well but then we need to get full commitment from middle managers and first line supervisors as they are the mediator between shop floor employees and top management directives. In addition, they are close to shopfloor employees and this gives them great opportunity to tap the creativity & innovation.*

5. Are you able to make cost reduction in your operating cost through LMS implementation?

*We strive to motivate employees to focus on cost saving ideas and projects. Our intention besides employees' motivation is to make substantial cost saving which has direct impact on our next year budget. Lean management system is great methodology to create an innovative working environment.*

## Respondent 5

1. What is your opinion about the current Lean management system LMS (Suggestion Scheme, kaizen event, A3 problem solving)?

*Suggestion scheme, Kaizen events & A3 problem solving are ideas driven tools to harness the power of employees' inputs. There are lots of opportunities to effectively utilize these tools aiming at increase in productivity, quality and promoting safe working environment.*

2. Do you feel that the employees are motivated enough for the participation in LMS?  
*Our employees are motivated to participate in these schemes but there is potential chance to increase the participation rate.*

3. Do Suggestion Scheme, kaizen event & A3 problem solving have enough publicity within the organization?  
*Lean office team is applying great efforts in publicizing lean tools via different means such as campaigns, emails, magazine and internal events.*

4. Are you satisfied with the support from top management for LMS implementation?  
*I think there is a support from top management which needs to be constant and the support level varies between managers. Lean team should find out ways to maximize the support and commitment from top management and middle managers.*

5. Are you able to make cost reduction in your operating cost through LMS implementation?  
*Off course, we can save huge amount of money if we manage LMS properly as it has a definition of doing more with less resources, less space, less inventory and less material.*

## Respondent 6

1. What is the relationship between LM implementation and CS?

*Cost saving is our today's spot topic as you well aware that due many conditions surround us as such as market condition, competition between aluminum companies not only in the region but the world. Raw materials cost and fuel on fluctuating trend which impact directly our operating cost. Lean management can help us in reducing operating cost if it is well adopted as a culture from top management till every employee in the shop floor. I believe if we are not going to implement lean management in a proper manner, it may give us undesirable results such as increase the operating cost and unsatisfied customers.*

2. What is the impact of organizational culture in your organization toward LM implementation?

*Organizational culture is the backbone for any continuous improvement mainly for Lean management as new methodology in the aluminum manufacturing in the Middle East. There are several aspects but the ones you mentioned leadership, people engagement and problem solving culture as I believe come in top priority to make lean management a success.*

*If area owners/leaders are not willing to support the implementation, it will not be sustained for longer term as lean what I know has its own culture which needed to be fostered. People engagement is very crucial is such tools and this has linked with employee empowerment to crate the atmosphere for giving opportunities to employees to solve workplace problems.*

3. How can the organization culture impact lean implementation for cost saving purpose?

*As mentioned earlier, since organizational culture aspects which I would call them pillars of success are the drivers of long run continuous improvement programs. If we adapt our organizational culture as lean culture, the certain outcome is tangible cost saving. Our internal goal is to reduce operating cost seamlessly and I think these tools suggestion scheme, Kaizen event and A3 problem solving can help us at achieving what we intend to. Overall, lean organizational culture can end up with tangible and intangible results.*

4. How do you implement LM in your department?

*In our department, we started assessing the existing situation in the shop floor and reports generated by process control on daily, weekly and monthly basis. The reports showed that we have several opportunities for Lean manufacturing in our processes. In addition, we have a representative as Lean engineer from BTCL unit. He helped us in gap analysis and put forward plan. We started basics training such as Lean foundation, 5S and visual management to all employees in the department. Continuous follow up from lean engineer with supervisors and middle management on implementation by coaching them and setting up plan for 5S and visual management implementation. As we all know that it is not easy to get acceptance from middle management and supervisors for the new way of work. Then, we were conducting leadership walk arounds and supervisors walk arounds to make sure what we changed has sustained.*

## Respondent 7

1. What is the relationship between LM implementation and CS?  
*Lean management is new method for us to improve our performance. Indeed, due to high resistance from our employees' especially supervisory levels, we were not able to get cost saving easily. Lean management can result in cost saving if all barriers are removed and picture is clear for all employees at all levels. Capturing such monetary gains from lean management can facilitate the implementation across the entire company as our top managers are focusing in cost cutting by any method and this is great chance for BTCI unit to apply efforts to show this.*
  
2. What is the impact of organizational culture in your organization toward LM implementation?  
*Nowadays, all aluminum producers around the world are suffering from the high production cost due the increase price in raw material and global challenges in the economy as well as fuel/gas availability. Organizational culture is the heart for any change in the company. Positive changes by adopting new methods such as lean management implementation requires dedicated leadership, various communication channels, well established training system and give our employees chance to lead and execute projects. Lean management depend on organizational culture 100 % and cannot be successful without it.*
  
3. How can the organization culture impact lean implementation for cost saving purpose?  
*Based on my knowledge, the main objective of lean management is waste identification and elimination. In turn, any waste elimination give us chance as a company to quantify the cost saving out of it. That means organizational culture will drive lean management implementation and cost saving will be as a consequence of the lean implementation. There will be adverse impact on cost and employees if there is no culture or carelessness toward the implementation. That's the reason of defining roles of each manager and supervisor or head on what he supposed to do to maintain the implementation.*
  
4. How do you implement LM in your department?  
*In our department, we as departmental management first understand what is lean and what the expected benefits are if we go for implementation. Then, we asked who implement it in the region and the level of implementation with our competitors. After*

*we understood what about it and how can we support it, we recommended to BTCI representative to divide lean journey into 3 levels starting with basic, intermediate and then advanced. This has been followed in training as well to let our employees understand it slowly and get the buy in from all employees. After that, training started to all employees for basic tools such as introduction to lean, lean foundation, 5S, Visual management and suggestion scheme. Several meetings were conducted with lean engineer to give us as management on update and feedback as well as sharing our feedback with him in order to be considered for the next days. We empowered our employees to improve and solve workplace problems and issues and to come up with solutions based in their experience, knowledge and education background. After the 3<sup>rd</sup> meeting with lean engineer, he proposed to nominate 2 employees from supervisory level as area committee members to support the implementation guide and provide to whoever require the support. This helps us more in focusing at lean implementation as the guidance was offered on the spot. In my department, I run an internal campaign of lean implementation incorporating it with our major safety campaign to show how crucial are lean management tools when get merged with safety culture in order to gain the buy in from all employees. Rewards and recognition also play major role to encourage shop floor employees and supervisory level employees to implement and sustain in addition to what they experience in terms of process efficiency.*

## Respondent 8

1. What is the relationship between LM implementation and CS?

*Cost reduction is utmost favorable factor after quality of the product at any type of business. In today's business, the challenge is to reduce operating cost in all departments mainly when the aluminum price is low around the world. We can't sustain our business with high production cost for longer time. I was not supporting lean implementation at the beginning because the central objective was not clear to me and later on I realized that Lean management implementation can help my team in doing the effectively and efficiently with same resources. After implementing suggestion scheme and A3 problem solving, I am convinced on the power of these common sense tools as cutting cost methodology. If we don't have a capable lean engineer from BTCI, we will not be able to execute properly lean to get cost saving.*

2. What is the impact of organizational culture in your organization toward LM implementation?

*To do any change in our life, 1<sup>st</sup> factor to enable the success for this change is culture. Likewise, organizational culture is the main for continuous improvement implementation such as lean management and other quality tools. Frankly speaking, no benefits from lean management implementation if the organizational culture is not ready to take charge to make sure the changes are sustained and not reverting back to old practice.*

3. How can the organization culture impact lean implementation for cost saving purpose?

*Aspects of organizational culture are varied but some of them are mandatory such as leader's commitment and support for lean implementation. Moreover, forming a team of leaders is vital toward monitoring the progress of lean implementation. The healthier the organizational culture, the better cost saving results from Lean management system.*

4. How do you implement LM in your department?

*Lean management journey was implemented by following the well-known approach of Plan-do-check-act. We started lean management in my department after we have been called by Director of BTCI when he explained lean and what will be the*



*benefits to our organization. At the beginning, I thought that lean will be counted as a way for workforce reduction in our plant. The second concern was that lean implementation will invite extra tasks to my team. After 3 years, I can say that Lean implementation will make the job easier and faster. We train our team in shop floor on basic tools and to keep advance tools for supervisory level where more focus and calculation is required. We as directors requested BTCI team to send us updated report of bi-weekly basis to show the progress in our departments. We develop internally regular safety and 5S walkaround which give spot and importance by incorporating safety and lean culture together. Beside workplace improvement, motivational awards encourage our team to keep sustaining lean management implementation. Our employees are the real driver of any continuous improvement initiative.*

## Respondent 9

1. What is the relationship between LM implementation and CS?

*According to my short experience in lean management implementation, it is an eye opening for us to improve quality and cycle time. Also, we use recently Lean management as problem solving tool for incidents investigation. As I said its improving quality and cycle time which means direct cost saving. Lean implementation has currently moderate support from few top managers and this certainly has negative impact on implementation and there will be very less saving. Involvement of top management and employees' involvement are important to assure the success of lean implementation. I remember the first lean session I attended addressed the main target for lean is to eliminate all non-value added activities named waste elimination. Lean is famous in Japan and Asian countries but it's new for us and we never heard earlier about it. Cost saving is one of the outcome for lean management if the leaders in the organization become the change agents for adopting lean management as a new way of doing things.*

2. What is the impact of organizational culture in your organization toward LM implementation?

*It is a great question. I think organizational culture means that it is not only specific department or specific level of employees but all levels of employees and all departments. Organizational culture is dependent on as I believe in many factors in the company especially top management and their support in terms of presence, persistence and willingness to allocate budget. I mean budget for implementation and for motivating employees. If top management wants to implement any improvement methodology, they should show the interest and walk the talk and give shop floor employees chance to take actions and facilitate the development of leadership culture among our shop floor operators and technicians. The result will be successful implementation of lean and any other improvement tool.*

3. How can the organization culture impact lean implementation for cost saving purpose?  
*People nowadays are talking about enhancements and artificial intelligence which means the change in our way of work is mandatory, not a choice. However, lean management implementation can be much valuable if incorporated in such*

*enhancements to prove its strength in cost saving and processes optimization. The linkage between organizational culture and relationship concerning lean management implementation and cost saving I think it is proportionally strong. If organizational culture allows lean implementation and consider the feedback from shop floor, this will boost it for the long run. I know one of my ex-colleague who is working in a big company struggling to implement lean due to non-clarity of roles in lean implementation and lack of management support. In our company, after we realize the tangible benefits then middle and senior managers buy-in the philosophy of lean as there was significant resistance for the first three years.*

4. How do you implement LM in your department?

*After rigid resistance of lean implementation, lean was accepted somehow in my department. At the inception, I highlighted to the team who start talking to us for implementation that we should not burden our employees and we should not spend from our budget unless CEO instructed us or allocate special budget for the implementation. We started the discussions with head of BTCI on how can implement lean tools in the workplace in a constant basis. We put a road map for 2 years to begin with trail section for 3 months period by implementing 5S, visual management with the same time training our departments' employees with lean basic tools such as 5S, visual management, basic A3 problem solving and suggestion scheme system throughout the trail period. I gave instructions to all managers; heads and supervisors in my department to continuously to focus in this topic on daily with shop floor team and highlight it during monthly safety meeting. Linkage between safety culture and lean culture I believe is essential to be communicated to all employees and all departments. We can use lean as proactive method and reactive method, so it is vital mainly the number of near misses and incidents occurred are the concern. Hence, most of employees in my department got the buy-in once we as management of the department turn the focus of lean from cost and quality to safety of our employees. The level of interest has been totally shifted comparing to the start of lean few years ago. But, there are still some of operational departments didn't accept the methodology due to several reasons and concerns. I advise BTCI team to go slowly for the implementation as we are creating a culture of continuous improvement. We were able to implement 5S and visual management but we still struggle to sustain them always resulted in development of schedule of walk arounds for all managerial and*

*supervisory level at least once per monthly to go to the shop floor. Going to the shop floor to check the sustainability of lean implementation and to discuss with shop floor employees and get their feedback and encourage them. One of the important step we did that we made sure that all our supervisory level employees (managers, heads and supervisors) got training on basic lean tools and a bit more advance tools such as A3 problem solving and quality tools to help them execute their projects.*

## Respondent 10

1. What is the relationship between LM implementation and CS?

*In today's competitive world, Innovation and creativity are the necessity for running the business smoothly. Lean management implementation doesn't have the power by itself to reduce the cost. Many other factors furnish and sustain the implementation such as organizational culture, leadership, employees' engagement and appreciation awards. The right lean culture results in cost saving and waste elimination. I mean there is no direct relationship between both factors unless healthy organizational culture is well maintained.*

2. What is the impact of organizational culture in your organization toward LM implementation?

*As I mentioned previously, organizational culture and its aspects are the core for pumping the success for any positive change in the organization. Lean is one of those methodologies which is adopted and adapted according to our internal organizational culture. We will not run successfully lean implementation if there is no training, various means of communication and defined roles. I read few weeks ago that many organizations failed to implement lean due to its organizational culture or they thought that lean is a matter of copy paste. We consider this point in our department that lean implementation should be in line with our industry nature and complexity. If the nature of the industry and aspects of organizational culture well taken care and supported, the success of lean management implementation will be the result, for instance, eliminating waste and making the job faster.*

3. How can the organization culture impact lean implementation for cost saving purpose?

*Organizational culture you can say it's the fundamental aspect for Lean implementation and its spirit for high results. Cost saving is the desire for all aluminum companies in the region and all of us apply efforts to decrease the expenditures and entire operating costs. We as leaders of the company have a full responsibility to establish and maintain the problem solving culture for employees in both levels supervisory and non-supervisory. Regular follow up and involvement from all levels of management is necessary in order to make sure Lean implementation is in the correct way and if any deviation occurred, timely action can be taken. Close monitoring on progress of the implementation help us in decision making and*

*understand lean requirements. Lean implementation won't be able to stand alone to result in cost saving without culture of the organization.*

4. How do you implement LM in your department?

*We had followed several steps to implement lean management in our department starting from planning stage where all needed information was presented to our employees on what we are going to do and how. Kick-off session helps us to pave the direction of lean implementation and then start training our workforce on lean concepts from elementary level. I met few attendees to these training sessions to get their feedback and highlight it to lean engineer assigned to our department. Monthly meeting is conducted on lean progress in our department as requested by me to know where we are and push the implementation. I instruct my team to prepare routine walkaround schedule for all supervisory level based on 5S and visual management background. Internal challenge competition in the sections reporting to me assisted us in the department to reinforce lean implementation.*

## Appendix C Survey Questionnaire



UTM Razak school of Engineering and  
Advanced Technology,  
Universiti Teknologi Malaysia International  
Campus,  
54100 Kuala Lumpur.

### **A Survey on Lean Management (LM) (kaizen event, A3 problem solving & suggestion scheme) in Aluminum Manufacturing Industry in UAE**

The objective of this survey is to verify the impact of organizational culture on LMS practices cost saving relationships. The study hopes to enhance cost saving efficiency of aluminum manufacturing industry in UAE through effective LMS practices. There are no right and wrong answers. **All responses will be treated with utmost confidence and anonymity.** The findings will be used solely for academic research purpose. The targeted respondents of this study are the company supervisory level employees , may be the supervisors, Superintendents , directors, managers or senior executives who are directly involved in decision making of daily operations. There are 7 pages in this questionnaire and it is organized into 3 sections. Kindly answer ALL questions, your honest opinion is very much appreciated.

#### **Note:**

- Lean Manufacturing system (LMS) & Continuous Improvement (CI)
- Lean Manufacturing system practices are Kaizen event, A3 problem system & Suggestion scheme.

## SECTION 1: General Information

1. What is your gender?

- M
- F

2. What is your age?

- (a)
- 24-35
  - 36-45
  - 46-55
  - Above 55

## SECTION 2: Lean Management Practices

3. Which stream you belong to?

- Upstream
- Midstream
- Downstream

4. How many years of experience you have?

- 1-5 years
- 6-10 years
- 11-20 years
- 21 and above

5. What is your position in the organization?

- Senior Executive / Executive
- Senior Manager / Manager
- Head of department
- First line supervisor

6. What is the approximate number of full time employees in your team?

- 1-20
- 21-50
- 51-150
- More than 150

This section requires your opinion on the state of lean management practices in your company. Please indicate the degree of agreement by circling the most suitable number based on the scale of 1 to 5 for each of the statement below where 5= Strongly agree , 4= Agree , 3= Neither agree nor disagree , 2= Disagree ,1=Strongly disagree.



		Strongly disagree				Strongly agree
<b>1</b>	Each team leader believes that improvement via LMS as a way to increase profits	1	2	3	4	5
<b>2</b>	The management proactively pursues continuous improvement rather than fire-fighting	1	2	3	4	5
<b>3</b>	The management creates work environment that helps employees to do their job effectively	1	2	3	4	5
<b>4</b>	Recognition is given to employees who give ideas in suggestion scheme	1	2	3	4	5
<b>5</b>	Recognition is given to employees who participate in kaizen event	1	2	3	4	5
<b>6</b>	Recognition is given to employees who solve problem through A3 problem solving approach	1	2	3	4	5
<b>7</b>	Company mission has a clear focus on CI and/or LMS	1	2	3	4	5
<b>8</b>	The employees work as a team	1	2	3	4	5
<b>9</b>	LMS to the company is about a continuous improvement journey that work in tandem to achieve the larger vision of the company	1	2	3	4	5
<b>10</b>	The company believes that lean is not just about tools and techniques but a philosophy for building operational excellence	1	2	3	4	5
<b>11</b>	Operational excellence in the organization is about bringing	1	2	3	4	5

	customer convenience, revenue enhancement, and cost efficiency, and building a culture of continual improvement					
<b>12</b>	There is a general belief among the employees in the organization that even the best of processes can be further improved.	1	2	3	4	5
<b>13</b>	Lean thinking is an integral part of the organizational fabric	1	2	3	4	5
<b>14</b>	The components of the lean management system are known to all employees	1	2	3	4	5
<b>15</b>	There is a continual endeavor to improve the overall effectiveness of the LMS	1	2	3	4	5
<b>16</b>	All employees in the organization are trained on fundamentals of LMS	1	2	3	4	5
<b>17</b>	There is a regular assessment in your department to ascertain the health of LMS	1	2	3	4	5
<b>18</b>	The company has a well-defined communication strategy for institutionalizing lean across the organization	1	2	3	4	5
<b>19</b>	Multiple channels of communication are being used to promote lean within the company such as meetings, intranets, brown bag sessions, events, brochures, merchandise, and so on	1	2	3	4	5

<b>20</b>	There is positive trending of financial impact from LMS implementation	1	2	3	4	5
-----------	--	---	---	---	---	---

## Section 3: Organizational Culture

### 1. Leadership

This section requires your opinion on leadership in your company and their role in LMS implementation. Please circle on the selection based on scale 1-5. There is no right or wrong answer.

		Strongly disagree				Strongly agree
1	Lean transformation in the organization is driven by the top management	1	2	3	4	5
2	A committee comprising top management of the organization oversees the implementation of LMS	1	2	3	4	5
3	Top Management team of the company is using lean as a strategy for business improvement and just not another quality methodology to be used by CI project teams	1	2	3	4	5
4	The LMS committee reviews progress of implementation at least once a month	1	2	3	4	5
5	The organization has a vision, mission, and values that echo the principles of LMS	1	2	3	4	5
6	The top management team demonstrates its commitment to the lean transformation by voluntarily investing time whenever required	1	2	3	4	5

7	Each member of the management team and LMS committee has participated in a lean breakthrough & milestones	1	2	3	4	5
8	Top management and middle management energize & encourage their employees to contribute to the lean movement	1	2	3	4	5
9	Top management and middle management review the status of implementation of the lean management system	1	2	3	4	5
10	Top management and middle management review the status of financial cost saving from the lean management system	1	2	3	4	5
11	Managers spend a lot of time coaching, mentoring, leading by example, and helping individuals to achieve their goals	1	2	3	4	5
12	Top management constantly focuses on creating a new generation of leaders who understand and drive the principle of LMS	1	2	3	4	5
13	Top management supports continuously Kaizen event team to accomplish their project.	1	2	3	4	5
14	Top Management supports and encourages their employees to use A3 problem solving approach.	1	2	3	4	5
15	Top Management preach and practice the A3 framework for strategy deployment	1	2	3	4	5
16	Each team leader in the organization knows and manage his team for the successful implementation of the LMS	1	2	3	4	5
17	There is follow up report every quarter on cost saved from LMS	1	2	3	4	5

## 2. People

This section requires your opinion on people engagement in your company and their role in LMS implementation. Please circle on the selection based on scale 1-5. There is no right or wrong answer

		Strongly disagree				Strongly agree
1	Employees clearly know why the company has embarked on a journey of LMS deployment	1	2	3	4	5
2	The employees know the vision of the company (where it is trying to go in future)	1	2	3	4	5
3	The employees know the mission of the company (what it is trying to achieve)	1	2	3	4	5
4	The entire leadership team, middle management, and bulk of the employees believe that people are the most important asset in the company and they have to be treated with respect	1	2	3	4	5
5	Each employee spends at least 3 days on training that improves their effectiveness in LMS implementation	1	2	3	4	5
6	All employees have been trained on problem identification and elementary problem-solving tools	1	2	3	4	5
7	All employees have been trained on suggestion scheme and ideas generation.	1	2	3	4	5
8	Employees are supported, not reprimanded, when they identify problems	1	2	3	4	5
9	Processes and procedures are designed with the participation of employees	1	2	3	4	5
10	There is a great amount of trust between the team leaders and employees working on the process, shop floor or workplace	1	2	3	4	5
11	Employees in a process regularly participate in improvements	1	2	3	4	5
12	Employees look at audits and finding non conformities as opportunities to trigger improvement	1	2	3	4	5
13	Each employee knows his or her customer and the end consumer and exactly what both of them expect	1	2	3	4	5
14	When something goes wrong in a process, employees discover the root cause of the problem	1	2	3	4	5

15	Employees proactively look for wastes in their workplace or business and take the initiative to eliminate them	1	2	3	4	5
16	Employees actively collaborate with members of other functions and departments to solve business problems	1	2	3	4	5
17	Regular feedback from employees is solicited to ascertain employee engagement in LMS	1	2	3	4	5
18	Employees at all levels in the organization have appraisal linked to outcomes of the lean management system	1	2	3	4	5
19	There is positive trending of employee engagement results over the last 8 successive quarters	1	2	3	4	5

### 3. Problem Solving

This section requires your opinion on problem solving culture in your company and its role in LMS implementation. Please circle on the selection based on scale 1-5. There is no right or wrong answer

		Strongly disagree				Strongly agree
1	Problems are looked at as an opportunities in the organization	1	2	3	4	5
2	Problem solving is looked at by all employees as a journey toward getting the best for the company	1	2	3	4	5
3	Each and every member of the organization is exposed to problem-solving tools and techniques	1	2	3	4	5
4	Top management ,middle management, junior management, and shop floor employees are using A3 problem solving to get solutions	1	2	3	4	5
5	Team leaders at all levels are concerned when problems are not identified in a process or workplace	1	2	3	4	5
6	Employees are encouraged and rewarded for identifying problems	1	2	3	4	5

7	The company has an approach for solving problems with the right methodology based on the complexity and type of problem statement	1	2	3	4	5
8	Employees spend adequate time understanding and defining the problem followed by a structured approach to resolution	1	2	3	4	5
9	From the top management to the janitor, every employee is familiar with 5 whys analysis	1	2	3	4	5

## **Appendix D Survey Invitation**

Dear colleagues,

Hope this email finds you well

My name is Nawaf, I am an engineering Doctorate candidate studying at UTM university in Malaysia. I am also working as engineer at EGA. You can check my profile from intranet website.

I would like to kindly request your cooperation to answer the online survey or hard copies which are kept with your department's admin. The study is based on lean management system (LMS) practices (Kaizen event, A3 problem solving & Suggestion scheme) in the Aluminum Manufacturing Industry. All the responses will remain confidential and secure.

Please complete the attached survey and I shall highly appreciate your participation.

Kindly contact me for any questions.

Thank you

Best Regards,

Nawaf



**Appendix E Measurement items for LMS, Leadership, People engagement and problem solving culture**

<b>Measurement items for LMS</b>	<b>References</b>
1. Each team leader believes that improvement via LMS as a way to increase profits	Sarkar (2008)
2. The management proactively pursues continuous improvement rather than fire-fighting (b)	Nasuha lee (2014)
3. The management creates work environment that helps employees to do their job effectively	Nasuha lee (2014)
4. Recognition is given to employees who give ideas in suggestion scheme	Sarkar (2008)
5. Recognition is given to employees who participate in kaizen event	Aluminum Company Survey (2012)
6. Recognition is given to employees who solve problem through A3 problem solving approach	Aluminum Company Survey (2012)
7. Company mission has a clear focus on CI and/or LMS	Nasuha lee (2014)
8. The employees work as a team	Nasuha lee (2014)
9. LMS to the company is about a continuous improvement journey that work in tandem to achieve the larger vision of the company	Sarkar (2008)
10. The company believes that lean is not just about tools and techniques but a philosophy for building operational excellence	Sarkar (2008)
11. Operational excellence in the organization is about bringing customer convenience, revenue enhancement, and cost efficiency, and building a culture of continual improvement	Sarkar (2008)
12. There is a general belief among the employees in the organization that even the best of processes can be further improved.	Sarkar (2008)
13. Lean thinking is an integral part of the organizational fabric	Sarkar (2008)

14. The components of the lean management system are known to all employees	Sarkar (2008)
15. There is a continual endeavor to improve the overall effectiveness of the LMS	Sarkar (2008)
16. All employees in the organization are trained on fundamentals of LMS	Sarkar (2008)
17. There is a regular assessment in your department to ascertain the health of LMS	Sarkar (2008)
18. The company has a well-defined communication strategy for institutionalizing lean across the organization	Sarkar (2008)
19. Multiple channels of communication are being used to promote lean within the company such as meetings, intranets, brown bag sessions, events, brochures, merchandise, and so on	Sarkar (2008)
20. There is positive trending of financial impact from LMS implementation	Sarkar (2008)
<b>Measurement items for organizational culture- Leadership</b>	<b>References</b>
1. Lean transformation in the organization is driven by the top management	Sarkar (2008)
2. A committee comprising top management of the organization oversees the implementation of LMS	Sarkar (2008)
3. Top Management team of the company is using lean as a strategy for business improvement and just not another quality methodology to be used by CI project teams	Sarkar (2008)
4. The LMS committee reviews progress of implementation at least once a month	Sarkar (2008)
5. The organization has a vision, mission, and values that echo the principles of LMS	Sarkar (2008)
6. The top management team demonstrates its commitment to the lean transformation by voluntarily investing time whenever required	Sarkar (2008)
7. Each member of the management team and LMS committee has participated in a lean breakthrough and milestones	Sarkar (2008)
8. Top management and middle management energize and encourage their employees to contribute to the lean movement	Sarkar (2008)
9. Top management and middle management review the status of implementation of the lean management system	Sarkar (2008)

10. Top management and middle management review the status of financial cost saving from the lean management system	Sarkar (2008)
11. Managers spend a lot of time coaching, mentoring, leading by example, and helping individuals to achieve their goals	Sarkar (2008)
12. Top management constantly focuses on creating a new generation of leaders who understand and drive the principle of LMS	Sarkar (2008)
13. Top management supports continuously Kaizen event team to accomplish their project.	Sarkar (2008)
14. Top Management supports and encourages their employees to use A3 problem solving approach.	Sarkar (2008)
15. Top Management preach and practice the A3 framework for strategy deployment	Sarkar (2008)
16. Each team leader in the organization knows and manage his team for the successful implementation of the LMS	Sarkar (2008)
17. There is follow up report every quarter on cost saved from LMS	Sarkar (2008)
<b>Measurement items for organizational culture-people engagement</b>	<b>References</b>
1. Employees clearly know why the company has embarked on a journey of LMS deployment	Sarkar (2008)
2. The employees know the vision of the company (where it is trying to go in future)	Nasuha lee (2014)
3. The employees know the mission of the company (what it is trying to achieve)	Nasuha lee (2014)
4. The entire leadership team, middle management, and bulk of the employees believe that people are the most important asset in the company and they have to be treated with respect	Rath and Conchie (2008)
5. Each employee spends at least 3 days on training that improves their effectiveness in LMS implementation	Sarkar (2008)
6. All employees have been trained on problem identification and elementary problem-solving tools	Alves <i>et al.</i> (2012)
7. All employees have been trained on suggestion scheme and ideas generation.	Aluminum Company Survey (2012)
8. Employees are supported, not reprimanded, when they identify problems	Sarkar (2008)

9. Processes and procedures are designed with the participation of employees	Sarkar (2008)
10. There is a great amount of trust between the team leaders and employees working on the process, shop floor or workplace	Sarkar (2008)
11. Employees in a process regularly participate in improvements	Sarkar (2008)
12. Employees look at audits and finding non conformities as opportunities to trigger improvement	Sarkar (2008)
13. Each employee knows his or her customer and the end consumer and exactly what both of them expect	Sarkar (2008)
14. When something goes wrong in a process, employees discover the root cause of the problem	Sarkar (2008)
15. Employees proactively look for wastes in their workplace or business and take the initiative to eliminate them	Sarkar (2008)
16. Employees actively collaborate with members of other functions and departments to solve business problems	Sarkar (2008)
17. Regular feedback from employees is solicited to ascertain employee engagement in LMS	Sarkar (2008)
18. Employees at all levels in the organization have appraisal linked to outcomes of the lean management system	Sarkar (2008)
19. There is positive trending of employee engagement results over the last 8 successive quarters	Sarkar (2008)
<b>Measurement items for organizational culture- problem solving culture</b>	<b>References</b>
1. Problems are looked at as an opportunities in the organization	Sarkar (2008)
2. Problem solving is looked at by all employees as a journey toward getting the best for the company	Phililp <i>et al.</i> (2011)
3. Each and every member of the organization is exposed to problem-solving tools and techniques	Sarkar (2008)
4. Top management ,middle management, junior management, and shop floor employees are using A3 problem solving to get solutions	Phililp <i>et al.</i> (2011)
5. Team leaders at all levels are concerned when problems are not identified in a process or workplace	Sarkar (2008)

6. Employees are encouraged and rewarded for identifying problems	Sarkar (2008)
7. The company has an approach for solving problems with the right methodology based on the complexity and type of problem statement	Phililp <i>et al.</i> (2011)
8. Employees spend adequate time understanding and defining the problem followed by a structured approach to resolution	Sarkar (2008)
9. From the top management to the janitor, every employee is familiar with 5 whys analysis	Sarkar (2008)

## Appendix F Summarized comments of experts validation

	Name /position	comments
1	Shafeeq, supervisor in production lines	<ul style="list-style-type: none"> <li>• Several abbreviations not defined.</li> <li>• "Benefits" should be scoped down further.</li> <li>• Unclear statement of " organizational fabric"</li> <li>• Organizational culture has not been classified properly</li> <li>• In problem solving culture, encouragement of employees</li> </ul>
2	Tareeq, Head of production lines	<ul style="list-style-type: none"> <li>• Some items in Lean management are not clear, it is better to be simplified.</li> <li>• Item 15 in organizational culture A3 strategic, it should be rephrased.</li> <li>• Recognition and training were highlighted several times, if this is has been done purposely then it is fine.</li> <li>• Item 18 people for organizational culture, KPI is not clear to everyone, I suggest to replace it with appraisal.</li> <li>• "Low level employees" can be replaced with janitor.</li> </ul>
3	Khaled Saeed, Manager of production services	<ul style="list-style-type: none"> <li>• Item 1 " reduce cost" , can be replaced with increase profits as this statement carry all associated costs.</li> <li>• Item 12 can be more generalized, currently pointing out management but can be rephrased to all employees.</li> <li>• It is better to declare the abbreviation prior to questions' items.</li> <li>• Some items under LMS are not clear</li> </ul>
4	Adam smith, Snr Manager, casthouse process control manager	<ul style="list-style-type: none"> <li>• " training " word has been repeated in several places</li> <li>• It is more than 70 items, it is advisable to call my department at once and be with them to clear any doubt, if any.</li> <li>• Hard copies to be distributed with double side print</li> <li>• Item 14 in people category, " RCA" is not clear, better to be " root cause"</li> <li>• Item 4, progress of implementation as mentioned once per quarter, suggest to keep it once per month</li> </ul>
5	Aji Mathew, Superintendent, production operations	<ul style="list-style-type: none"> <li>• Many terminologies should be simplified</li> <li>• Unclear statement " mentoring" and " CI"</li> <li>• LMS have 22 questions; it can be shortened to maximum of 20.</li> <li>• Recognition repeated for each approach (c)</li> </ul>
6	Dr. Ali, Assist prof in Ajman University	<ul style="list-style-type: none"> <li>• Leadership need more items</li> <li>• Font of the questionnaire to be uniform</li> <li>• Item 14 in leadership, double barreled question</li> <li>• Item 7 leadership, achievements can be replaced with breakthrough and milestones</li> </ul>
7	Dr. Khaled, university of Sharjah	<ul style="list-style-type: none"> <li>• Not clear statement of item 15 of LMS</li> <li>• Recognition of each targeted lean concepts are better to be separated</li> <li>• Training of each concept can be separated</li> <li>• Item 15 people, double barreled statement.</li> </ul>

## Appendix G Harmon Single Factor Test and Man-Whitney Tests

### 1- Harmon Single Factor Test (d)

<b>Total Variance Explained</b>						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.086	17.056	17.056	11.086	17.056	17.056
2	3.445	5.300	22.356			
3	3.191	4.909	27.265			
4	2.156	3.317	30.582			
5	1.897	2.918	33.500			
6	1.766	2.716	36.216			
7	1.723	2.651	38.867			
8	1.610	2.477	41.344			
9	1.577	2.426	43.770			
10	1.506	2.317	46.087			
11	1.496	2.301	48.388			
12	1.411	2.171	50.559			
13	1.362	2.096	52.655			
14	1.330	2.046	54.700			
15	1.253	1.927	56.627			
16	1.246	1.917	58.544			
17	1.157	1.780	60.324			
18	1.129	1.737	62.061			
19	1.113	1.712	63.773			
20	1.037	1.595	65.368			
21	1.023	1.574	66.942			
22	.977	1.503	68.445			
23	.952	1.465	69.910			
24	.903	1.390	71.299			
25	.878	1.351	72.651			
26	.852	1.311	73.962			

27	.808	1.244	75.205			
28	.796	1.225	76.431			
29	.795	1.223	77.654			
30	.770	1.185	78.838			
31	.755	1.162	80.000			
32	.717	1.102	81.102			
33	.669	1.029	82.132			
34	.649	.998	83.130			
35	.603	.928	84.058			
36	.584	.898	84.956			
37	.570	.877	85.833			
38	.550	.847	86.680			
39	.541	.833	87.512			
40	.519	.798	88.311			
41	.505	.777	89.088			
42	.485	.746	89.833			
43	.478	.735	90.569			
44	.434	.668	91.237			
45	.432	.665	91.902			
46	.417	.642	92.544			
47	.394	.607	93.151			
48	.384	.591	93.742			
49	.369	.568	94.309			
50	.350	.538	94.848			
51	.335	.515	95.363			
52	.314	.483	95.846			
53	.309	.475	96.321			
54	.287	.442	96.763			
55	.276	.425	97.188			
56	.274	.421	97.609			
57	.239	.368	97.977			
58	.224	.345	98.322			
59	.200	.307	98.629			



60	.198	.305	98.934			
61	.172	.264	99.198			
62	.167	.257	99.455			
63	.139	.214	99.669			
64	.124	.190	99.860			
65	.091	.140	100.000			
Extraction Method: Principal Component Analysis.						

(e)

(f)

(g)

(h)

(i)

(j)

(k)

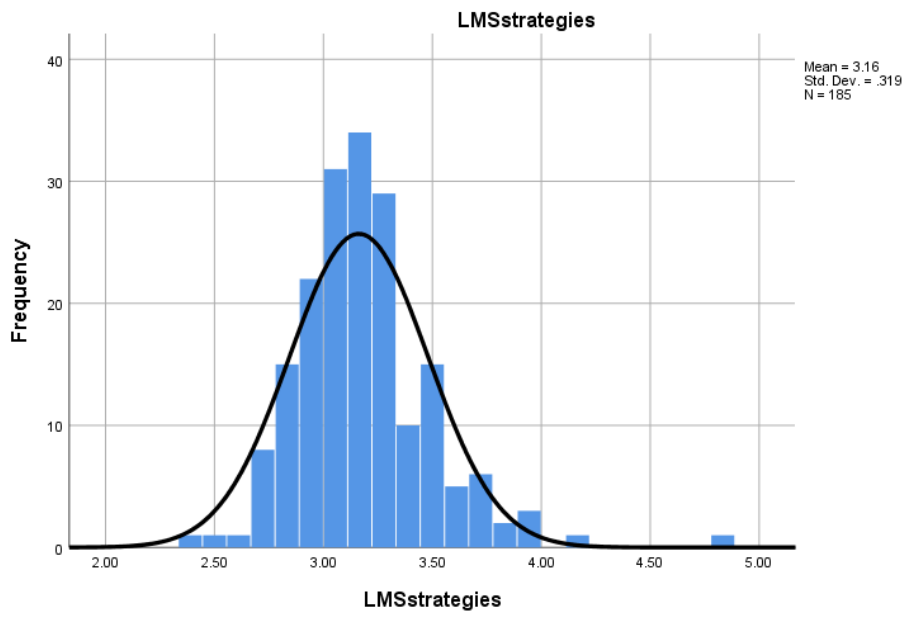
## 2- Man-Whitney Tests

<b>Ranks</b>				
	Gender	N	Mean Rank	Sum of Ranks
LMS strategies	Male	169	92.33	15603.00
	Female	16	100.13	1602.00
	Total	185		
Leadership	Male	169	91.87	15526.00
	Female	16	104.94	1679.00
	Total	185		
People	Male	169	91.91	15533.50
	Female	16	104.47	1671.50
	Total	185		
Problem solving	Male	169	91.92	15535.00
	Female	16	104.38	1670.00
	Total	185		
Cost saving	Male	169	91.34	15436.00
	Female	16	110.56	1769.00
	Total	185		
Organisational culture	Male	169	91.77	15509.00
	Female	16	106.00	1696.00
	Total	185		

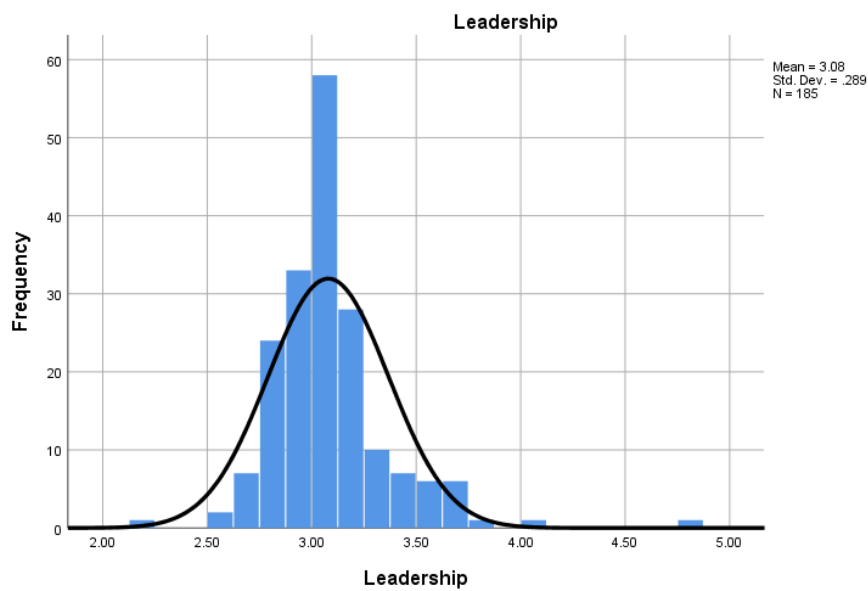
(l)

<b>Test Statistics</b>						
	LMS strategies	Leadership	People	Problem solving	Cost saving	Organizational culture
Mann-Whitney U	1238.000	1161.000	1168.500	1170.000	1071.000	1144.000
Wilcoxon W	15603.000	15526.000	15533.500	15535.000	15436.000	15509.000
Z	-.558	-.936	-.900	-.898	-1.399	-1.016
Asymp. Sig. (2-tailed)	.577	.349	.368	.369	.162	.310
a. Grouping Variable: Gender						

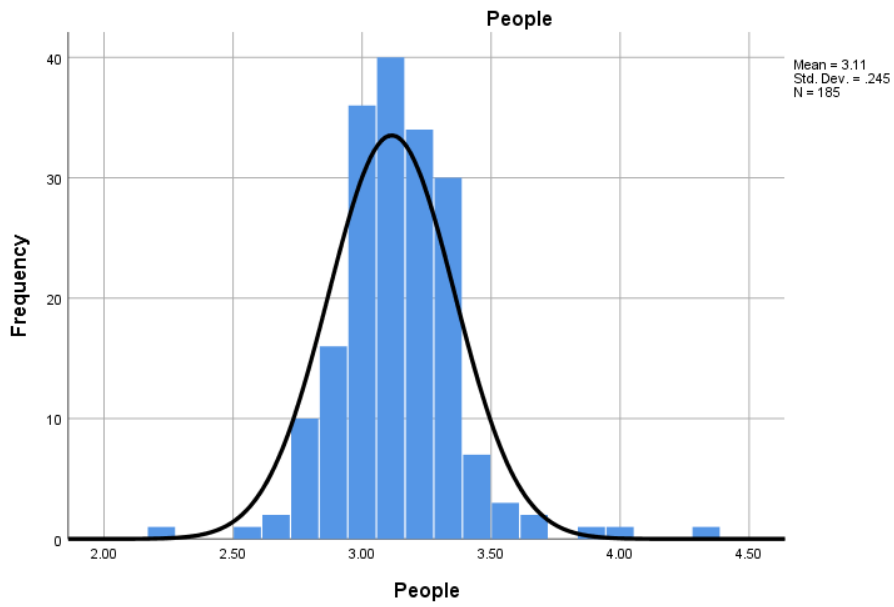
## Appendix H Skewness and Kurtosis and Data distribution



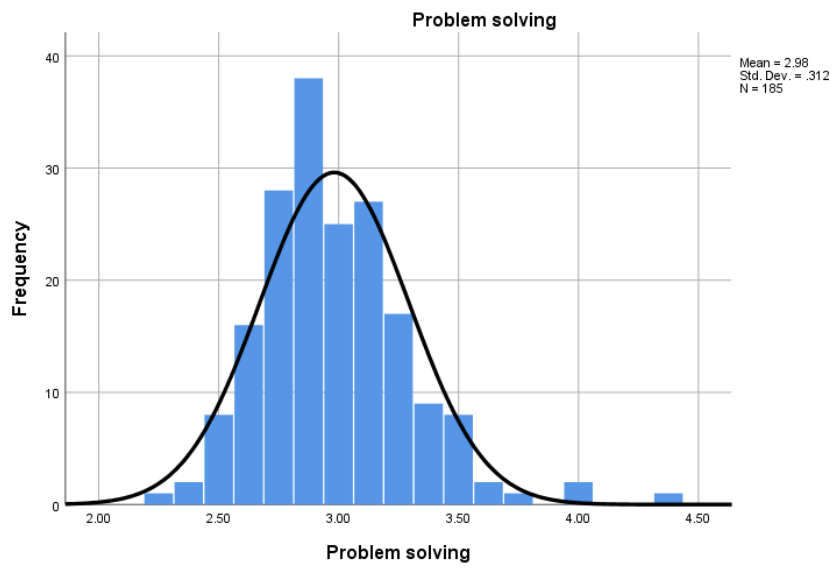
**Figure 1:** Data distribution of Lean Management



**Figure 2:** Data distribution of leadership



**Figure 3:** Data distribution of people engagement



**Figure 4:** Data distribution of problem solving culture

## Appendix I Instrument Reliability

<b>Lean Management System</b>	<b>Alpha Cronbach</b>			<b>Original</b>
	<b>Inter-item correlation</b>	<b>Pilot study data</b>	<b>Actual data</b>	
Improvement via LMS increase profits	.265	.324	.458	.780
Management proactively pursues continuous improvement	.351	.455	.538	.775
Management creates work environment helpful to employees	.260	.345	.416	.783
Recognition given to employees giving ideas on suggestion scheme	.254	.345	.362	.787
Recognition given to employees participating in kaizen event	.468	.345	.404	.785
Recognition given to employees using A3	.438	.343	.455	.782
Company mission direct focus on CI and or LMS	.237	.334	.315	.789
Employee work as a team	.260	-.234	-.164	.817
LMS improved for achieving vision	.170	.123	.015	.805
Lean is about tools and philosophy	.299	.343	.457	.781
Operational excellence components	.376	.453	.521	.777
Best process can be further improved	.466	.323	.519	.776
Lean thinking an integral part in organizational fabric	.438	.489	.560	.774

Components of lean management systems known to all employees	.281	.345	.373	.786
Continual endeavor for effectiveness in LMS improvement	.288	.245	.369	.786
All employees trained on LMS fundamentals	.216	.343	.268	.792
Regular assessment in department for ascertaining LMS health	.269	.412	.408	.784
Well defined communication strategy	.256	.123	.208	.795
Multiple channels of communication	.325	.399	.401	.784
Positive trending of financial impact from LMS	.287	.335	.349	.787

<b>Leadership</b>	<b>Alpha Cronbach</b>			<b>Original</b>
	<b>Inter-item correlation</b>	<b>Pilot study data</b>	<b>Actual data</b>	
Lean transformation driven by top management	.428	.343	.355	.804
Top management oversee LMS implementation	.533	.321	.375	.797
Top management team using lean for business improvement	.598	.212	.436	.793
LMS committee reviews progress monthly	.166	.098	.135	.821

Vision Mission Values echo principles of LMS	.268	.043	.141	.814
Top management voluntarily invest on time	.529	.345	.358	.798
Management team and LMS participated in breakthrough	.281	.021	.151	.813
Top management and middle management energize and encourage employees	.423	.212	.237	.804
TM and MM review status of implementation	.566	.399	.404	.798
TM and MM review status of financial cost saving from LMS	.519	.321	.350	.800
Managers spend time coaching mentoring leading by example	.224	.023	.131	.819
TM create new leaders principles of LMS	.434	.324	.336	.803
TM supporting continuously Kaizen event	.485	.372	.384	.802
TM supporting and encouraging A3 problem solving	.478	.343	.384	.801
TM preach and practice A3 strategy deployment	.359	.324	.233	.809
TL support successful implementation of LMS	.369	.343	.209	.808
Follow up report quarterly on cost savings LMS	.477	.323	.328	.802

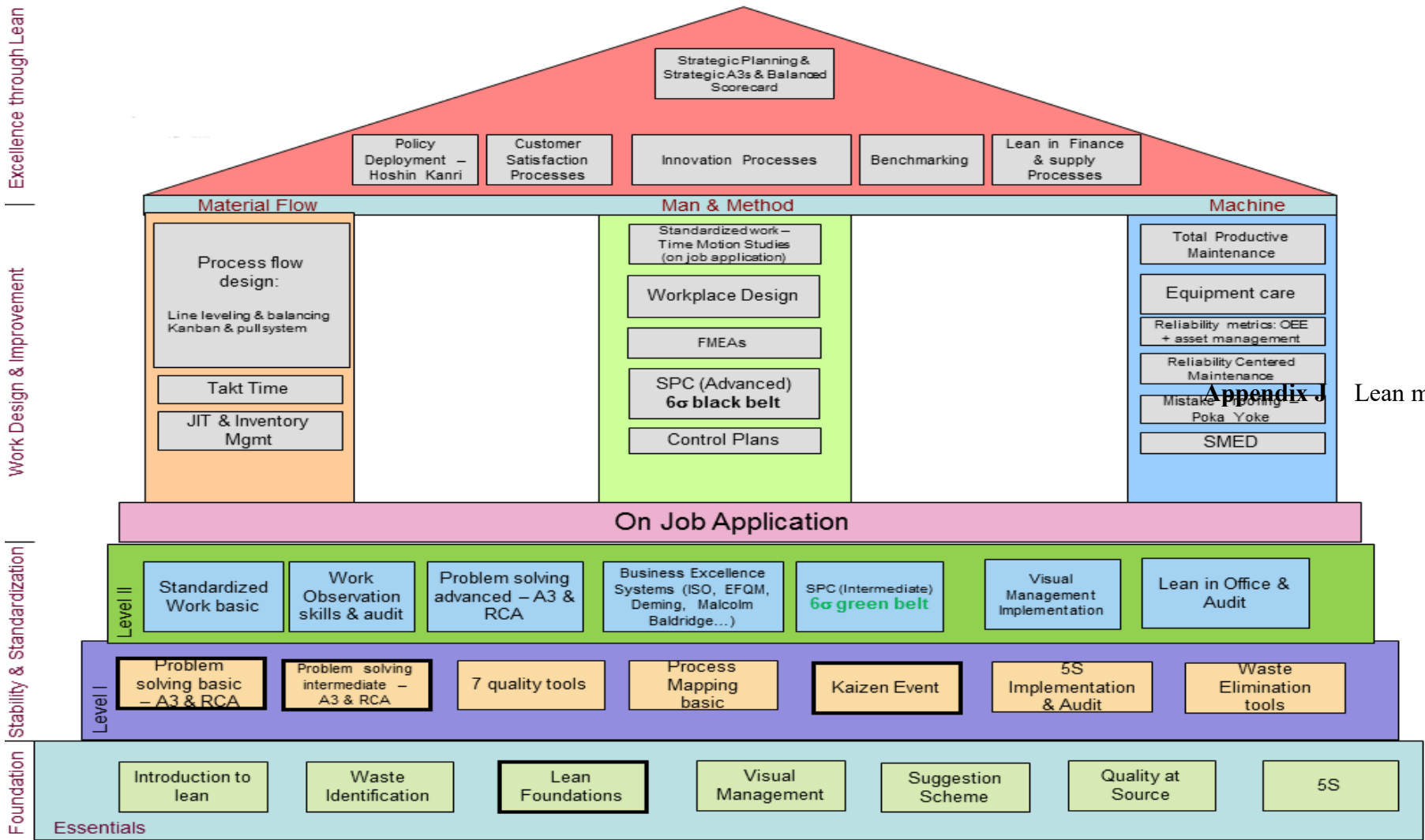
<b>People</b>	<b>Alpha Cronbach</b>			<b>Original</b>
	<b>Inter-item correlation</b>	<b>Pilot study data</b>	<b>Actual data</b>	
Employees understanding need for LMS deployment	.225	.143	.183	.666
Employees understand company vision	.308	.543	.687	.656
Employees know company mission	.359	.543	.694	.650
Leadership team MM and employees believing people important asset	.286	.012	.152	.660
Employee spend 3 days on training	.279	.054	.169	.661
Employees trained on problem identification and elementary	.246	.124	.198	.664
Employees trained on suggestion scheme	.086	.233	.231	.685
Employee supported not reprimanded	.410	.299	.305	.647
Employees involved in designing of processes and procedures	.314	.214	.248	.656
Great trust among team leaders and employees	.377	.198	.286	.650
Employees regularly participating in improvements	.292	.132	.159	.659
Audits and findings nonconformities as opportunities for improvement	.315	.198	.220	.657



Employees understand customer and expectations	.131	.132	.123	.677
Employees discover root cause of problem wrong process	.240	.134	.230	.664
Employees look for wastes in workplace or business	.342	.014	.190	.652
Employees collaborate in solving business issues	.280	.343	.239	.661
Regular feedback solicited to ascertain engagement in LMS	.061	.342	.304	.688
Appraisal linked to outcomes	.207	.194	.206	.669
Positive trending of employee engagement results	.263	.277	.294	.662

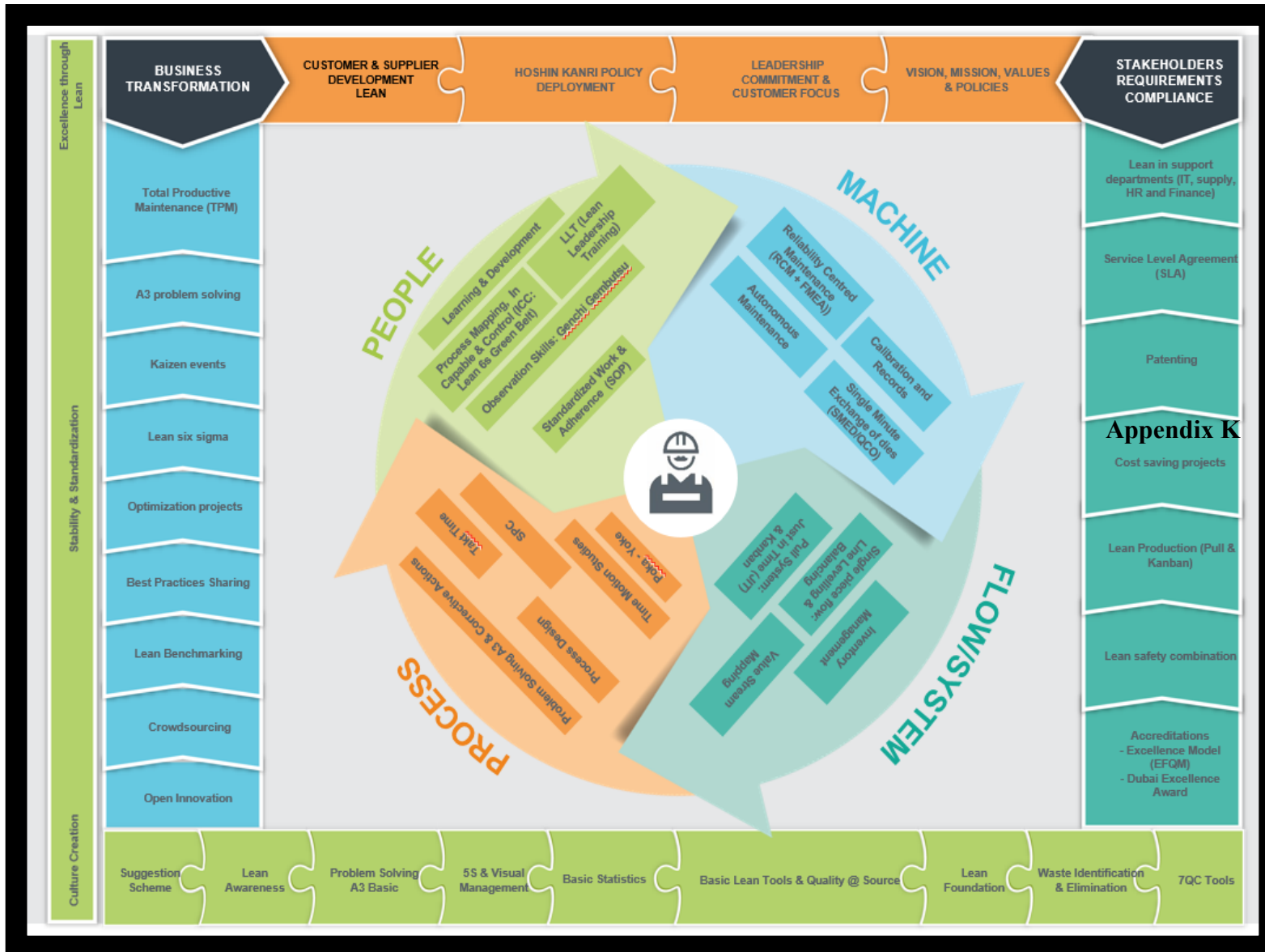
<b>Problem solving</b>	<b>Alpha Cronbach</b>			<b>Original</b>
	<b>Inter-item correlation</b>	<b>Pilot study data</b>	<b>Actual data</b>	
Problems looked as opportunities	.292	.173	.183	.584
Problem solving a journey toward getting best for company	.227	.587	.687	.598
Members exposed to problem solving tools and techniques	.170	.643	.694	.614
TM MM JM use A3 problem solving for solutions	.343	.021	.152	.570
TL concerned when problems not identified	.377	.069	.169	.561

Employees encouraged and rewarded for problem identification	.170	.145	.198	.615
Approach for problem solving with right methodology	.362	.212	.231	.568
Employees spend adequate time defining and understanding problem	.408	.312	.305	.554
All familiar with 5 whys analysis	.325	.231	.248	.575



Appendix J



Lean management framework 2018



Appendix K Lean management framework for 2019

## Appendix L Samples of ideas implemented during kaizen event project

Implemented suggestions	Before	After
<p>Painting the cubic box and Provision of air deflector to prevent hot air circulation.</p>		
<p>Fixing appropriate pressure gauges with enough access to see working parameters. Provision of shade for gauges and pressure switches.</p>		
<p>an audio/visual alarm in case of any fault occurring in the all system</p>		

<p>Sticking important normal operation parameters and report any abnormality.</p>	<p>Operations parameters were not available in the</p> 	
---	--	--

### Appendix M Summary of expert opinions on research findings

No	Designation of the expert	Selected comments
1	Senior manager, Production line 1	<ul style="list-style-type: none"> <li>• It is interesting study which gives us blueprint on Lean implementation to increase the profit</li> <li>• Lean team should support us closely to establish and sustain the implementation and define the exact roles of managerial levels.</li> <li>• We struggle to do cost saving projects and it shows in your study culture is important otherwise, we waste time and resources</li> </ul>
2	Snr manager, production line 2	<ul style="list-style-type: none"> <li>• Study gives the importance of leadership and people engagement as organizational culture aspects for productivity improvement.</li> <li>• In addition, it is difficult to sustain the proper culture if improvements rewards are not fair.</li> <li>• Building lean culture needs lots of commitment from everyone in the company</li> </ul>
3	Snr manager production services	<ul style="list-style-type: none"> <li>• Implementing lean just for the name purpose will not help us in the shop floor so, every leader in the company must understand the impact on the productivity</li> <li>• I advise the researcher to conduct brief session to all supervisory levels starting from the top to bottom to show the need for leaders to furnish lean implementation</li> </ul>

4	Head of Fume Treatment plant	<ul style="list-style-type: none"> <li>• It is expected that the level of organizational culture toward lean implementation will vary from sub department to other. Here lean team should help in make it uniformed.</li> <li>• Some managers may not support lean because they think it is only cutting manpower. this should be clear to them.</li> </ul>
5	Head of production repair	<ul style="list-style-type: none"> <li>• Research in organizational culture and links it to the sensitive factor cost saving is crucial to our industry.</li> <li>• Generally, low organizational culture will raise adverse impact to employees and result in lower profit.</li> <li>• Suggestion scheme, kaizen event and A3 problem solving are powerful tools if there is suitable culture but there are lots of challenges impeding this culture. For instance, tight manpower and no time to free up our employees to participate.</li> </ul>