

**INVESTIGATION OF IMPORTANT ENABLERS OF LEAN
IMPLEMENTATION IN FINANCIAL SERVICES**

by

Nattapan Buavaraporn

School of Business, University of the Thai Chamber of Commerce, Thailand

E-mail: nattapan_bua@utcc.ac.th

UTCC
*International Journal of
Business and Economics* **IJBE**

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Abstract

Purpose - This research aims primarily at investigating the relationships among lean enablers, lean practices and organizational performance. This research is carried out in Thai leading financial institutions that experienced adopting lean concept for enhancing their organizational performance.

Design/ methodology/ approach - The questionnaire survey was developed and employed as the primary data collection method. The questionnaire was distributed to three leading financial institutions adopted the Lean concept for enhancing organizational performance. Confirmatory factor analysis (CFA) was conducted to ensure the reliability and validity of the measurement model. The structural equation modelling (SEM) was employed for investigating relationships and testing the hypotheses proposed concerning the research conceptual model.

Findings - The results provided substantial evidence that financial institutions require to implement both lean enablers and lean practices in order to achieve the better organizational performance resulted from lean implementation. The findings also supports the socio-technical system theory that organizations planned to adopt management approach should consider implementing both supportive and technical practices for attaining better results.

Research limitations/ implications - The research conceptual model was tested utilizing data gathered from financial institutions implemented lean as improvement initiatives. The limited population and difficulties in gaining access effect on the response rate. Further study should therefore considered collecting empirical data from other service businesses; and testing the model for achieving the generalization objective.

Practical implications - Financial institutions that plan to adopt lean concept should consider implementing both lean enablers and lean practices for pursuing better organizational performance outcomes.

Originality/ value - This study extends the prior research of lean implementation in financial services by empirically investigating relationships of Lean practices and organizational performance. Considering the theory of socio-technical system, lean enablers were incorporated in the conceptual model for investigating the importance of lean enablers towards lean implementation for enhancing the organizational performance. The statistical findings indicates the importance for financial services in implementing both lean enablers and lean practices for pursuing better organizational performance.

Paper type: Research paper

Keywords: Lean, Organizational Performance, Quality Management, Financial Services, Socio-technical system

1. Introduction

Concerning the highly competitive market, it becomes more imperative that organization requires improving their business continuously for achieving the sustainability of the organization. Organizations are currently facing many challenges in sustaining the competitive advantages. There are growing external pressures in reducing costs, increasing flexibility, improving quality and cutting down the lead times. This increasing competition forces organizations to reconsider their operations and strategies (Karmarkar, 2004). Particularly in the services sector in Thailand, financial services has played an important role in the Thai economy. As of 2015, the total assets of the Thai financial institutions amounted to Baht 17,191 billion (Bank of Thailand, 2015). Particularly in term of sales and service, the financial institutions have increased the importance of a customer-focused approach for delivering customers with the highest value services, responding to their demands and increasing expectations. With this regards, many improvement programs are initiated and adopted with the aim of delivering the superior product and service to customers. “Lean” is therefore one of the most powerful improvement methods which is widely adopted with the aim of enhancing the organizational performances in the financial institutions.

Particularly in the scholarly literature in operations management, lean concept is of vital important in attaining the goal of sustaining the organization. Recently, Lean has become became one of the most important improvement initiatives that was disseminated to both manufacturing and service industries. Nevertheless, it has sometimes been questioned, regarding the limited applicability and suitability of Lean adoption in the service sector (Hines et al., 2004). Financial and healthcare services are two important service sector areas that have adopted lean as a strategic initiative (Hammer and Goding, 2001; Hoerl, 2004). The academic research related to the adoption and implementation of Lean in the service sector is, however, still at a fairly early stage, the available literature being dominated by manufacturing-related work. This calls for empirical research to understand the way in which a Lean concept could be adopted successfully for enhancing organizational performance. Despite the increasing level of interest in adopting lean in service organizations (Hadid and Mansouri, 2014, Kosuge et al. 2010), it seems lack of empirical research using survey method to explore different aspect of lean service. Most of the extant researches related to lean adoption in services were conducted using case studies method (Malmbrandt and Ahlstrom, 2013). There is lack of theoretical framework to establish the concept of lean service and investigated impact on organizational performance (Statts et al., 2011). This lack of understanding about the relationships between lean service adoption and performance may hinder the development and spread of lean service across industries (Hadid and Mansouri, 2014). This calls for the importance in understanding these relationships for further contributing to the practitioners who plan to adopt and implement lean concept efficiently and effectively in the services sector.

Therefore the primary aim of this research is not only to understand the outcomes of the lean practice to organizational performance, but also to explore the importance of lean enablers towards the lean adoption in service environment, particularly in the financial services. Hence, this research aims at contributing to the knowledge on understanding the relationship among lean enablers, lean adoption practices, and organizational performance. Four research questions are as follows;

RQ1. What are important enablers of lean implementation success in financial institutions?

RQ2. To which enablers of Lean implementation are important for implementing lean practice successfully for enhancing the organizational performance of financial services.

RQ3. What are the relationships between lean practices, lean enablers for enhancing the organizational performances?

2. Literature Review

Considering research questions and objectives, relevant literature was reviewed as follows

2.1 Lean adoption in services

Many business process improvement and quality management methodologies have long tended to expand far beyond the manufacturing arena into the service sector. To date, the majority of academic papers related to lean implementation are based on the manufacturing sector. Lean implementation in service is still considered under research area. In service sector, lean is, however, considered one of the improvement methodologies that has been growing strongly in adopting for improvement strategy for enhancing service excellence. Bowen and Youngdahl (1998) discuss the transferring of Lean to service operations, revisiting the production-line approach of Levitt (1972). Bowen and Youngdahl (1998) argued for the applicability of lean adoption in services. In the early stage, the literature related to lean services is dominant by conceptual and case studies papers. The first stream of conceptual paper focused on the applicability of lean practices transferred from manufacturing to services operations and potential outcomes (Bowen and Youngdahl, 1998). Whereas, the case study papers emphasize on understanding how lean concept can be adopted for improving some performance indicators of services organization (i.e., Staats et al., 2011; Allway and Corbett, 2002 and Swank, 2003). The studies of Allway and Corbett (2002) and Swank (2003) illustrated the success of Lean implementations, through case studies in financial services, showing that a company can benefit both in terms of cost reduction and better service quality for the customer. However, Hadid and Mansouri (2014) point out that it appears to be a lack of comprehensive list of lean practices for being used to empirically test relationships with organizational performance.

Despite the rising level of interest in lean service in both academician and practitioners, there seems to be a lack of suitable theoretical framework in establishing the concept of lean service and impact on organizational performance (Hadid and Mansouri, 2014; and Suarez-Barraza et al., 2012). This lack of understanding in the relationships between lean service and organizational performance may hinder the development and expansion of lean across service industries (Staats et al., 2011; Hadid and Mansouri, 2014). This calls for the importance in conceptualizing the research framework of lean implementation for enhancing the organizational performance. The proposed model will be mainly used for empirically investigating the relationships between lean implementation and organizational performance in a specific context of service organizations.

Considering the appropriate approach for investigating the relationships between lean adoption and organizational performance, Hadid and Mansouri (2014) conceptualized the model based on the socio-technical system with the aim of understanding the role of lean practices for enhancing the performance of the organization. Regarding the conceptualized model, lean practices can be viewed as lean technical practices (LTPs) and Lean supportive practices (LSPs). This model is developed considering three main theories of the contingency theory (CT), Universal theory (UT), and socio-technical theory (STS). Similarly, Mambrandt

and Ahlstrom (2012) developed and empirically validated an instrument for assessing lean service adoption. The instrument is refined and validated through an iterative process considering both theoretical and practical insights. The instrument consists of 34 items for assessing enablers of lean adoption, lean practices, and operational performances (Mambrandt and Ahlstrom, 2012). This will allow researchers to measure the level of lean service adoption to develop the body of knowledge related to the adoption of lean service. This instrument also provides practitioners with a tool for tracking the progress during lean adoption, thereby identifying and acting on deviations from planned progress.

Based on the extant literature, it seems there is a lack of survey methodology to explore the interrelationships between lean adoption and organizational performance particularly in the service sector (Hadid and Mansouri, 2014). This unproven association between lean service and performance may affect how service organizations adopt lean successfully. By considering the importance of adopting lean successfully, this research therefore takes a view of socio-technical system theory for developing an appropriate model for investigating lean adoption in financial services. Emery (1990) and Cua et al., (2001) point out that both social and technical systems should be jointly optimized to achieve the best possible performance. According to the socio-technical systems theory, it is imperative that organizations consider both socially and technically-oriented practices for optimizing the performance resulting from implanting management practice (Cua et al. 2001). Hence, lean practices will be reviewed concerning two aspects of lean enablers (lean supportive practices) and lean technical practices in the following sections of 2.2 and 2.3 consecutively.

2.2 Enablers of lean adoption

Comprehensive literature review on factors enabling lean practices for enhancing organizational performance was conducted, four main enablers are reviewed as follows:

2.2.1 Leadership and Management

An excellent leadership and management is one of the crucial factors that enable lean to be implemented successfully (Anchanga et al., 2006). Managers and their actions can result in the difference between successful and unsuccessful lean adoption efforts (Suarez-Barraza et al., 2012; Mambrandt and Ahlstrom, 2012). Without the continuous support and commitment from top management, the true importance of the initiative will be in doubt and the energy behind it will be weakened (Pande et al., 2000). In the early stage of quality management implementation, it is vital that management communicate the goal and clear strategic direction for implementing quality initiatives effectively (Dale, 1999). Naslund (2013) also points out that management should communicate the change and provide employees with understanding regarding the benefits of improvement methodology adoption (Naslund, 2013). This can help inspire and motivate employees in participating in lean implementation (Naslund, 2013). Leadership and management effectiveness allows employee involvement in continual improvement activities of the organization (Habidin and Yusof, 2013).

Not only offering the support to the lean adoption, Chakravorty (2010) highlighted the importance of management in directly participating in the adoption of improvement methodology. Kaynak (2003) asserts that organizations with high levels of top management commitment and involvement tend to produce higher quality products and to deliver higher service quality to their customers. In terms of management support, Kaynak (2003) suggests the importance that management provides required resources related to quality management implementation and ensure that necessary resources for quality-related training are available.

In the study of critical success factors of Lean Six Sigma for Malaysian automotive industry, Habidin and Yusof (2013) highlight importance of leadership from aspects of commitment, involvement and active support that affect how organizational implement continuous improvement program successfully. The survey results indicate that leadership is considered the highest score by respondents concerning the important factor for enhancing the success of lean Six Sigma implementation. Leadership and management are therefore considered the essential enabler in successfully implemented the desired improvement initiatives (Antony and Banuelas, 2001; Coronado and Antony, 2002; Henderson and Evans, 2000). Overall, leadership and management construct addresses imperative aspects of leadership commitment, communication, involvement and support.

2.2.2 Organizational Culture

Organizational culture is considered another important aspect that enable organization in implementing quality management practices successfully. A number of studies have argued that organizational culture is a key significant driver to quality management implementation success (Hackman and Wageman, 1995, Powell, 1995; Kujala and Lillrank, 2004). Hackman and Wageman (1995) pointed out that QM initiatives require further than implementing technical practice, but need a fundamental change of underlying culture and attitude of people in the organization. Wu et. al. (2011) stated that quality management implementation is more likely to be success if the organizational culture is compatible with the value and basic assumptions proposed by QM practices. Organizational culture values are considered important as they drive attitudes and behaviors of employee thereby unconsciously impact how practices are implemented and institutionalized in the organization (Detert et al.,2000).It is therefore important that QM practices needs to be embedded in supportive culture for generating positive impact on organizational performance (Wu, 2015).

The impact of organizational culture on operational management practices has been studied in the existing literature (Kaynak, 2003; Naor et al. 2008; Sabella et al. 2014). The study of Wu (2015) indicates the importance of quality culture as an antecedent of quality core practice for generating positive impact on organizational performance. When implementing operations management practices, Naor et al. (2008) indicated that organizational culture has a stronger influence on quality management practices based on gathered data from manufacturing plants. Whereas several studies have long been argued the importance of cultural factor in enhancing the success of quality management success, service seems to be under research area. Detert et al. (2000) suggest that the relationship between culture and implementation of quality management practice has not been adequately studied. It is therefore of interest in investigating relationships between organizational culture, lean practices and organizational performance.

2.2.3 Employee relations

Considering the high degree of customer contact in services, employees play important roles in delivering valued service to customers. The highly skilled labors of the organization are important to ensure company growth and success (Jeyaraman and Teo, 2010). Taking the view of organizational development (OD) techniques to facilitate changes in the organization, employee relations is considered imperative in enabling the success of quality management implementation (Kaynak, 2003). Malmbrandt and Ahlstrom (2013) point out that employee play a critical role in lean adoption. Adequate employee training, commitment and understanding of lean adoption effort are considered important enablers in driving lean to become success (Malmbrandt and Ahlstrom, 2013; Balle and Regnier, 2007; Bowen and Youngdahl, 1998). In a study of critical factors of quality management, Badri et

al. (1995) empirically examine critical factors synthesized from previous research using data gathered from 424 firms implemented quality management practices. The results confirm that employee relations are one of the critical factors that directly related to success of quality management implementation.

Besides the necessary aspects of employee commitment and involvement, it is important that employee receive formal training related to concepts and tools of quality management practices for being implemented successfully Malmbrandt and Ahlstrom (2013). The employee training has been emphasized as the key important factor driving the success of quality management implementation (Snell and Dean, 1992). Hence, it is necessary that service Company pays more attention on providing employee training in order to achieve the goal of lean implementation.

Considering the importance of employee relations towards lean implementation, Cua et al. (2001) argued that human-oriented practices serve as supportive mechanism in implementing quality management practices in the organization. With this regards, the studies of Flynn et al. (1995) and Noar et al. (2008) show empirical evidence to support that supporting practices have positive effect on core practices adopted for improving organizational performance. As such, four aspects of employee relations addressed are employee commitment, employee empowerment, employee involvement and employee training.

2.2.4 Customer focus

Customer focus of lean concerns with supporting practices that enable the implementation of lean by taking customers into consideration. The increasing importance of mass customization and personalized services drives organization to focus on customer for surviving in the highly competitive situation. Having a good understanding of customer allows organization to differentiate its products and services from competitors, sustain customer loyalty, and deliver the highest value to customers (Margretta, 1998). Focusing on customer need and satisfaction are important practices in implementing quality improvement initiatives successfully (Habidin and Yusof, 2013; Antony et al., 2005). The study of Habidin (2013) highlight the importance that organization pay attention on customer focus practices in order to implement Lean Six Sigma more successfully, which is in line with studies of Antony et al. 2005; Kumar et al., 2009.

There are some empirical studies revealed that customer focus of quality improvement initiative has a significant relationships with organizational performance (Ittner and Larcker, 1997; Dow et al., 1999). The survey study of quality improvement approach and firm performance of Adam et al. (1997) indicates that customer focus is the most imperative approach in successfully implement quality improvement initiatives in all regions. This is in line with the study of Samson and Terziovski (1999) that proves the significant relationship between customer focus and operational performance resulted from TQM implementation. Hence, becoming a customer oriented organization has a major challenges of organization in tailoring and implementing strategies with the aim of improving customer satisfaction at the heart of the organization (Sabella et al., 2014). In order to achieve this goal, organization must pay attention on customer focus practices that addresses how the organization determines the existing and emerging requirements and expectations of customers, how customer requirement involved in product and service design, and how the organization effectively take customers requirement for improving operational process effectively.

Based on the literature review above, four main important enablers of lean implementation are leadership and management, organizational culture, employee relations, and customer focus. All these four important enablers are considered imperative for implementing lean for enhancing the organizational performance more successfully and effectively, rather than implementing lean practices separately. With this regards, the author hypothesize that:

H1: Lean enablers are positively related to lean practices

H2: Lean enablers are positively related to organizational performance

2.3 Lean practices in service organization

Lean practices focus on the way of working that is seen as consistent with lean principles (Malmbrandt and Ahlstrom, 2013). A wide range of lean practices has been identified related to lean implemented in manufacturing sector, considering the basic set of lean principles (Shah and Ward, 2007; Malmbrandt and Ahlstrom, 2013). Hadid and Mansouri (2014) argued that extant literature related to lean adoption in service does not provide a comprehensive list of lean practices related to specific context of service. Hence, it is imperative that researchers review the literature and adapt a specific measures concerning the context being studied.

Reviewing practices adopted in healthcare services, Bernstein (2008) studied lean practices in hospital, which included on patient flow, value-stream mapping and kaizen events. Min et al. (2012) investigated the extent of lean implementation in US hospitals in four dimensions involving patient focus, standardized work, seamless and coordinated work flow, and continuous improvement culture. It is important to note that these four dimensions are similar to four bundles in manufacturing sector. Punnakitikashem (2012) proposed 21 lean practices in healthcare setting as follows: Lot size reduction, JIT/Continuous flow/Seamless and coordinated work flow. This clearly show the approach that service organizations proposed the lean practice considering the basic principle of lean concept.

Considering as the under research area of empirical study of lean implementation in financial services, lean practices will be therefore proposed considering core principles of lean by adapting from the extant literature related to lean adoption and implementation. In this research lean adoption practices will be developed considering 7 lean service principles extracted from extant literature consisting of; specify customer value, identify value stream (value stream mapping), create value flow, standardize work, attain zero defects, visualize process, pursue continuous improvement, and ensure pulling system.

2.4 Lean practices and organizational performance

In order to measure the results of lean implementation, it is imperative that organization identify appropriate measures for investigating the relationships between lean practices and organizational performance. Most of research studies related to lean adoption were used the case study and qualitative research approach rather than gathering empirical data. Little empirical research in the extant literature examined the relationships between lean adoption and organizational performance (Chavez et al., 2013; Vinodh and Dino, 2012). To deepen the knowledge related to lean implementation in services, there is a need in understanding the relationships between quality practices and performance using empirical data in particularly of the service sectors. This would help practitioners in understanding how organizational performance can be improved resulted from the improvement practices for further improving organization continuously (Elg et. al., 2014; Sabella and Kashou, 2014).

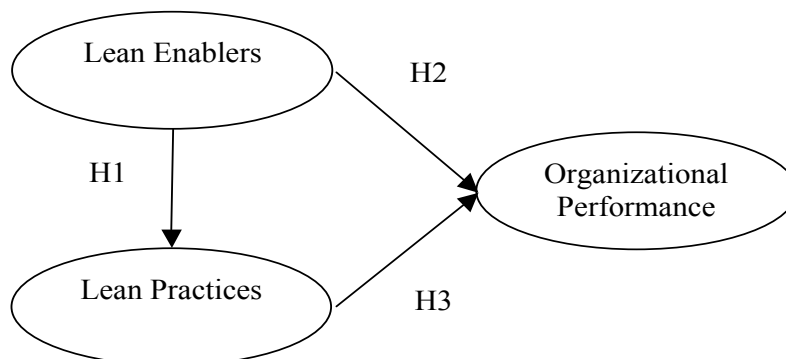
Traditionally, the financial measures are used for evaluating the success of process improvement initiatives such as lean services. However, Schonberger (2008) and Swank (2003) argued that to use the financial measure may not be appropriate and well-equipped in assessing the outcomes of improvement initiatives. As lean concept is primarily adopted in manufacturing sector, the measures of lean adoption in service is still in the early stage. Most of the academic research that aims at developing the measurement tools were based on manufacturing sector. There still lack of empirical research in developing the measures of lean adopted in service organization specifically. Hence, it is imperative that organization adopted lean needs to develop an appropriate measure for enhancing the success of lean implementation.

With this regards, some researchers have been trying to develop the measures of lean implementation success considering the improvement of organizational performance. Shah and Ward (2003) point out that lean practices are generally shown to be associated with performance in number of previous studies. The extant literature indicates that lean practices is frequently associated with the improvement in operational performance measures such as productivity, quality, reduction of lead time, cycle time, manufacturing costs (Shah and Ward, 2003). Hadid and Mansouri (2014) review further the extant literature for proposing a theoretical model for investing lean-performance relationship, drawing from the universal theory, socio-technical systems theory, and contingency theory (CT). In their research, lean constructs are identified and operationalized to establish their relationship and impact on organizational performance. The paper highlights the potential impact of lean service on operational and financial performance (Hadid and Mansouri, 2014). In order to develop the organizational performance measures, Mambrandt and Ahlstrom (2012) suggest that organization need to define their own definition of their operational measures to be well suit for assessing the performance of their specific process. Considering literature reviewed above, organizational performance measures will be developed considering extant literature and suggestions from practitioners who experienced in lean adoption in a specific context of financial services. We hypothesize that:

H3: Implementation of lean practices in financial services will have a positive impact on organizational performance.

Based on literature review in previous sections, the research model is conceptualized to explore the relationships between lean enablers, lean practices and organizational performance. This model is developed mainly concerning the works of Malmbrandt and Ahlstrom (2013) and Hadid and Mansouri (2014). Considering the perspectives of socio-technical system theory, the conceptual model is developed for understanding how financial institutions implement lean practices for enhancing organizational performance.

Figure 1: Research conceptual model



3. Research Methodology

To answer the research questions on investigating the relationships among lean enablers, lean practices and organizational performance based on the research conceptual model, the research methodology is described in this section as follows;

3.1 Research instrument

Based on the research conceptual model proposed in the previous section, the questionnaire survey was developed considering the previous literature. The measurement of each part in the questionnaire instrument were justified and adapted from previous studies related to lean implementation. With this regards, the questionnaire consisted of four sections in order to cover objectives of this research including: demographic, lean enablers, lean practices, and organizational performance. One academic and two practitioners helped in refining the survey instrument for this study. Modification of the questions was done upon the experts' advice. A five-point Likert scale was used to ask respondents for scoring (items) ranging from 1 = strongly disagree to 5 = strongly agree. The questionnaire used in this study is provided in Appendix 1. The pilot test was conducted with 30 respondents who experienced involving in lean implementation in financial institutions to ensure that the survey instruments are easy to understand by the respondents.

To enhance the internal consistency of the research instrument, reliability test was conducted. DeVellis (1994) suggests that construct reliability is the proportion of variance attributable to the true score of the latent variable. In order to justify the scale's reliability of the research instrument, Cronbach's alpha coefficient will be estimated. With this regards, Cronbach's Alpha is calculated based on SPSS program. Zinkmund et al. (2013) suggest that the scales with coefficient α value between 0.80-0.95 are considered having very good reliability, whereas the scales that have coefficient α value lower than 0.6 are considered poor reliability. In order to test the reliability of the research instrument, thirty questionnaires were distributed and gathered. The Cronbach's alpha coefficient of individual constructs is therefore analysed to ensure the quality of the measurement scales. The Cronbach's Alpha coefficients resulted from the pre-test are provided as the following table 1.

Table 1: Cronbach's Alpha coefficients from Pre-test

No	Variables	Amount of items	Cronbach's Alpha Value
1	Specify Customer Value	4	0.868
2	Identify Value Stream	4	0.708
3	Create Value Flow	4	0.715
4	Standardize Work	3	0.795
5	Ensure the High Level of Quality	4	0.825
6	Visualize Processes and Performance	3	0.869
7	Pursue Continuous Improvement	4	0.883
8	Ensure that all activities are pulled	3	0.847
9	Top Management and Leadership	5	0.858
10	Organization Culture	9	0.827
11	Employees Relations	9	0.917
12	Custom Focus	4	0.787
13	Organizational Performance	10	0.907

Based on the Cronbach's Alpha coefficients of each variable calculated, all the values of Cronbach's Alpha coefficients are higher than 0.60. Nunnally (1978) suggests that the

reliability of each variable should be assessed using Cronbach's Alpha with a minimum value of 0.6. Hence, the reliability of all variables in the research instrument are considered having good reliability (Nunnally, 1978; Zinkmund et al., 2013). The data collection process will be therefore elaborated in details as the following section.

3.2 Data collection

Considering the objective in investigating relationships among lean enablers, lean practices, and organizational performance resulted from lean implementation in financial services, it is important that researcher collected the empirical data from the financial institutions implemented lean. With this regards, not all financial institutions in Thailand adopted lean as the strategic improvement initiatives. There are only some financial institutions adopted lean as strategic improvement initiatives. Researcher therefore formally requested for the permission in collecting the questionnaire survey. Only three leading financial institutions in Thailand allowed in gaining access as the target site. In total, 400 questionnaires were distributed.

During the data collection process, the objectives and instructions were explained clearly to the respondents. In total, 185 completed questionnaire survey were received, considering as 46.25 percentage response rate. The underlying reasons of low response rate resulted from the limited samples as the key participants are required to be the employees involved in lean implementation in the financial institutions. Gathered questionnaire will be utilized in analysis process in which is going to describe in details in the next section

3.3 Data analysis

In this study, descriptive statistics analysis was conducted to explain demographic information of respondents. Agreement level of all constructs in the study was also examined. Correlation analysis and Confirmatory factor analysis (CFA) were employed to access construct reliability, convergent validity, and discriminant validity of the respective constructs of the conceptual framework. Adopting two-step modelling approach suggested by James et.al. (1982), structural equation model (SEM) were employed after CFA for testing the goodness of fit of the model; and investigating relationships among constructs proposed in the research conceptual model. All the hypotheses were tested utilizing results from SEM analysis.

4. Data analysis results

In this research, descriptive statistics was analysed to explain the demographic data of respondents. Confirmatory factor analysis (CFA) and structural equation model (SEM) were employed to test model fit and relationships between independent and dependent variables of the proposed model. Hypotheses were tested based on SEM analysis. Detailed analysis results are as follows.

4.1 Demographic of respondents

The total number of respondents were 185 with 55.1% of female and 44.9% of male. The percentage of respondents' age range between 21 and 30 was 21.1, 31.9% between the ages of 31 and 40, 28.1% between the ages of 41 and 50; and 18.9% between the ages of 51 and 60. In terms of educational background, 51.9% hold bachelor degree, 46.5 % hold a master degree, and doctoral degree graduated was 1.6%. The respondents' were from different positions; 15.1% of respondents were vice president, 8.1% of assistant vice

president, 27.6% of senior manager, 15.7% of team leader, and 33.5% of operations staffs. In term of working experience, 22.7% of respondents had experiences less than 3 years; 15.1% between 4 and 6 years; 16.8% between 7 and 10 years, and 45.4% of respondents had working experiences more than ten years. Lastly, respondents were asked to identify experiences of being part of lean implementation; 14.6% had experiences in lean implementation less than 6 months, 13% between 6 and 12 months, 27.6% between 1 and 3 years, 29.2% between 4 and 5 years, 11.9% between 6 and 10 years, and 3.8% had experiences in lean implementation more than 11 years. The respondent's profile is summarized as the following Table 2 below.

Table 2: Respondents' profiles

Description	N	Percentage
<i>Gender of respondents:</i>		
Male	83	44.9
Female	102	55.1
<i>Ages of respondents:</i>		
21-30	39	21.1
31-40	59	31.9
41-50	52	28.1
51-60	35	18.9
<i>Educational background:</i>		
Bachelor degree	96	51.9
Master degree	86	46.5
Doctoral degree	3	1.6
<i>Job position:</i>		
Vice president	28	15.1
Assistant vice president	15	8.1
Senior manager	51	27.6
Team leader	29	15.7
Operations staffs	62	33.5
<i>Working experiences:</i>		
0-3 years	42	22.7
4-6 years	28	15.1
7-10 years	31	16.8
More than 10 years	84	45.4
<i>Experiences in lean implementation:</i>		
0-6 months	27	14.6
7-12 months	24	13.0
1-3 years	51	27.6
4-5 years	54	29.2
6-10 years	22	11.9
11 years or above	7	3.8

4.2 Correlation analysis

Correlations analysis of was conducted to examine relationships among all variables in the research conceptual model. The analysis showed that all variables are significantly correlated with each other. The correlation coefficients were generally between 0.35-0.70 indicating the significant relationships among constructs. The results also highlight the high correlations between lean enablers (LM, OC, ER, CF) and lean practices (SC, IV, CV, SW,

EH, VI, PU, EN) towards organizational performance (OP). This indicated that financial institutions, which are advanced in their lean enablers and lean practices, tend to be more advanced on their organizational performance. Correlation matrix of all the constructs was summarized in the Table 3.

Table 3: Correlations analysis

	LM	OC	ER	CF	SC	IV	CV	SW	EH	VI	PU	EN	OP	Cronbach α
LM	1	.675**	.678**	.626**	.472**	.444**	.375**	.408**	.517**	.394**	.555**	.538**	.606**	0.87
OC	.675**	1	.783**	.647**	.547**	.540**	.468**	.476**	.532**	.437**	.570**	.553**	.636**	0.77
ER	.678**	.783**	1	.706**	.607**	.534**	.544**	.534**	.548**	.474**	.635**	.546**	.657**	0.84
CF	.626**	.647**	.706**	1	.583**	.436**	.350**	.426**	.532**	.281**	.544**	.418**	.623**	0.79
SC	.472**	.547**	.607**	.583**	1	.624**	.541**	.583**	.529**	.400**	.632**	.570**	.580**	0.80
IV	.444**	.540**	.534**	.436**	.624**	1	.515**	.578**	.560**	.482**	.608**	.582**	.521**	0.68
CV	.375**	.468**	.544**	.350**	.541**	.515**	1	.570**	.491**	.415**	.537**	.551**	.554**	0.66
SW	.408**	.476**	.534**	.426**	.583**	.578**	.570**	1	.632**	.434**	.584**	.543**	.533**	0.59
EH	.517**	.532**	.548**	.532**	.529**	.560**	.491**	.632**	1	.519**	.636**	.584**	.574**	0.75
VI	.394**	.437**	.474**	.281**	.400**	.482**	.415**	.434**	.519**	1	.546**	.583**	.479**	0.75
PU	.555**	.570**	.635**	.544**	.632**	.608**	.537**	.584**	.636**	.546**	1	.707**	.647**	0.79
EN	.538**	.553**	.546**	.418**	.570**	.582**	.551**	.543**	.584**	.583**	.707**	1	.587**	0.75
OP	.606**	.636**	.657**	.623**	.580**	.521**	.554**	.533**	.574**	.479**	.647**	.587**	1	0.89

Remark 1: **. Correlation is significant at the 0.01 level (2-tailed).

Remark 2: LM = Leadership and management; OC = Organizational culture; ER = Employee relation; CF = Customer focus; SC = Specify customer value; IV = Identify value stream; CV = Create value flow; SW = Standardize work; EH = Ensure the high level of quality; VI = Visualize processes; PU = Pursue continuous improvement; EN = Ensure that all activities are pulled

4.3 Reliability and validity analysis

In order to reduce and summarize the data for establishing the unidimensionality of each variable, the exploratory factory analysis (EFA) was conducted using principle components method with Direct Oblimin rotation. Kaiser-Meyer-Olkin (KMO) test for sampling adequacy was adopted at a scale and individual item level with a minimum value of 50 percent (Hair et al., 2010). With this regards, items those have cross-loading issue significantly were statistically and theoretically eliminated. In total, 4 factors of lean enablers, 7 factors of lean practices, 8 factors of organizational performance were extracted and considered appropriate in measuring each latent variable. The reliability of each factor was assessed considering the Cronbach's α with a minimum value of 0.6 (Nunnally, 1978). The α coefficients of all constructs are shown in Table 3 above.

Confirmatory factor analysis (CFA) was conducted in order to evaluate the measurement model (Gerbing and Anderson, 1988). The analysis process follows the two-step modelling approach suggested by James et.al. (1982) for assuring the goodness of fit of measurement model before examining the full structural model in further stage. CFA therefore provides the assessment of convergent and discriminant validity of the measurement model. The maximum likelihood (ML) approach of AMOS22 was adopted for testing the measurement model. Considering suggestions by Hair et al. (2010), the measurement model fit was evaluated concerning a number of fit indices including: the Chi-square (X2) and the ratio of X2 to degrees of freedom; root mean square of error of approximation (RMSEA); goodness of fit index; Adjusted Goodness-of-Fit Index (AGFI); comparative fit index (CFI); and Tucker Lewis Index (TLI).

The goodness of fit indices resulted from CFA using AMOS programs are as follows; The p-value of the Chi-square (Degrees of freedom= 142) is 0.445, indicating the exact fit of the model at 0.001 significant level. The Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and the Comparative Fit index (CFI) stand at .926, .901, and .999, which show that the specified model fits well. The root mean square of approximation (RMSEA) is .008, which provides evidence of close fit of the model in relation to the degrees of freedom because RMSEA is less than .05. The Tucker Lewis Index (TLI) is .999, while CFI is .999. Both belong to incremental fit indices and their values are well above the recommended threshold level of .90, which further supported the close fit of the model. The norm Chi-square (χ^2/df) has a value of 1.012. This falls within the recommended range of 3 to 1 which indicated conditional support for model fit (Carmines and McIver, 1981).

In summary, the various indices of overall goodness-of-fit for the model provided sufficient support for the results to be accredited as an acceptable representation of the hypothesized constructs and the model as a whole. (See also the Table 4.XX below)

Table 4: Model fit indices for confirmatory factor analysis (CFA)

FIT Index	Acceptable threshold levels	Value
χ^2	χ^2 relative to df with p-value (>.05)	Chi-square = 143.66 CMIN = 1.012
GFI	GFI is less than or equal to 1. A value of 1 indicates a perfect fit.	0.926
AGFI	AGFI Values is less than or equal to 1. A value of 1 indicates a perfect fit.	.901
CFI	CFI is truncated to fall in the range from 0 to 1. CFI values close to 1 indicate a very good fit.	.999
RMSEA	Values < 0.05	.008
TLI	range for TLI lies between zero and one	.999

Source: (Hair et. al., 2010)

As a results from CFA analysis, the standardized factor loadings of each variable, the critical ratio (C.R.) in which is the parameter estimated by the ratio between factor loadings value and standard errors are provided as the following table below. With this regards, Byrne (2001) suggested that t-value (C.R.) which is greater or smaller than 1.96 will indicate the statistical significance. The higher the factor loadings or coefficients compared to their standard errors, the stronger the evidence of relationship between the observed indicators to their respective latent factors (Koufteros, 1999). Table 5 shows the factor loadings of all items in the measurement model. The values which exceed the critical ratio are considered significantly related to their specific constructs, indicating the relationships between with latent variables. Details are presented as the following table 5.

Table 5: Parameter estimates, standard errors, critical ratios

Construct indicators	Standardized factor loading	S.E.	C.R.
<i>Lean enablers</i>			
CF	0.784		
ER	0.896	0.092	13.709
OC	0.860	0.083	13.035
LM	0.779	0.104	11.488
<i>Lean practices</i>			
PU	0.813		

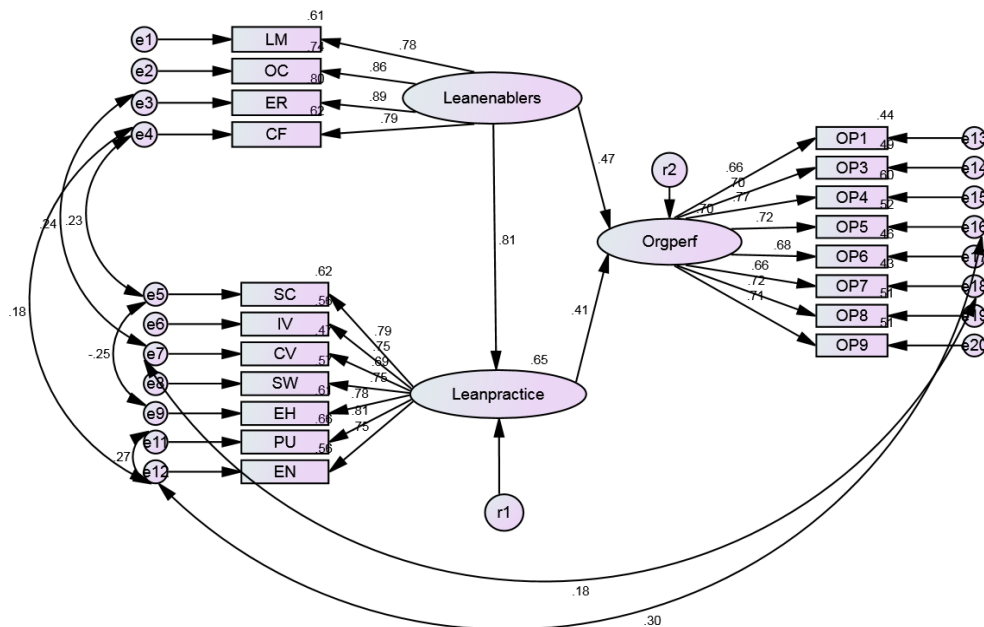
EH	0.776	0.07	11.676
SW	0.752	0.08	11.353
CV	0.692	0.081	10.185
IV	0.751	0.092	11.323
SC	0.788	0.078	11.953
EN	0.751	0.07	13.437
<i>Organizational performance</i>			
OP1	0.668		
OP3	0.705	0.123	8.53
OP4	0.771	0.146	9.204
OP5	0.717	0.125	8.696
OP6	0.682	0.129	8.286
OP7	0.662	0.116	8.068
OP8	0.709	0.124	8.584
OP9	0.711	0.141	8.606

Concerning the two-step model suggested by James et.al. (1982), the next section will present the analysis of full structural model and hypothesis testing results.

4.4 Model adjustment and Hypothesis testing

After conducting confirmatory factor analysis in the prior stage, some variables were removed concerning the underlying theory and goodness of fit of each construct. This section, therefore, describes the adjustment of the model fit resulted from SEM analysis. AMOS program was utilized for analyzing and testing the research conceptual model. The final model is shown as the following figure 2.

Figure 2: The final research model



The final model was gradually adjusted for achieving the goodness of fit of the model. The analysis results provide absolute goodness-of-fit measures as follows: The p-value of the Chi-square (Degrees of freedom= 142) is at .405 meaning that the model is statistically significant. The Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and the Comparative Fit index (CFI) stand at .924, .899, and .998, which show that the specified model fits well after gradually adjusted. The root mean square of approximation (RMSEA) is .011, which provides evidence of close fit of the model in relation to the degrees of freedom because RMSEA is less than .05. The Tucker Lewis Index (TLI) is .998, while CFI is .998. Both belong to incremental fit indices and their values are well above the recommended threshold level of .90, which further supported the close fit of the model. The norm Chi-square (X^2/df) has a value of 1.024. This fell within the recommended range of 3 to 1 which indicated conditional support for model fit (Carmines and McIver, 1981).

In summary, the various indices of overall goodness-of-fit for the model provided sufficient support for the results to be accredited as an acceptable representation of the hypothesized constructs and the model as a whole. The model fit indices are shown in table 6.

Table 6: Model fit indices for SEM analysis

FIT Index	Acceptable threshold levels	value
X^2	x^2 relative to df with p-value (>.05)	Chi-square = 145.417 p-value= .405
GFI	GFI is less than or equal to 1. A value of 1 indicates a perfect fit.	0.924
AGFI	AGFI Values is less than or equal to 1. A value of 1 indicates a perfect fit.	0.899
CFI	CFI is truncated to fall in the range from 0 to 1. CFI values close to 1 indicate a very good fit.	0.998
RMSEA	Values < 0.05	0.011
TLI	range for TLI lies between zero and one	0.998

Source: (Hair et. al., 2010)

Based on the research conceptual model, three main hypotheses were tested utilizing the results from SEM analysis using AMOS program. The results of hypothesis testing were provided as Table 7 below:

Table 7: Standardized regression weights

Standardized Regression Weight			B	S.E.	C.R.	P
Lean practices	<---	Lean enablers	.805	.088	9.871	***
Organizational performance	<---	Lean enablers	.468	.112	4.203	***
Organizational performance	<---	Lean practices	.341	.101	3.771	***

Note: *** is significant at the 0.01 level (2-tailed)

S.E = Standard Error; C.R = $\beta / S.E.$; P = Significance level

Based on the hypotheses testing results shown in Table 7 above, there appears to be significant positive relationships among all constructs proposed in the research conceptual model. With this regards, the results indicated that lean enablers are significantly correlated with lean practices (H1), which is in turn enhancing the organizational performance of the financial institutions implemented lean. The results also showed that lean enablers are significantly correlated with organizational performance directly (H2). Lastly, the statistical analysis of the model indicate the positive effect of lean practices towards organizational performance resulted from lean implementation in financial institution (H3).

5. Discussion and Conclusions

Considering the importance in sustaining businesses, it is imperative that organizations seek the way for improving their organizational performance. Lean became one of the most successful initiative that has been widely adopted in manufacturing arena, however, it appears to be in the early stage in services sector. The academic research related to the adoption and implementation of Lean in the service sector is still at an early stage as the available literature is dominated by manufacturing-related work. Practically, lean has been rapidly disseminated to services sector in particularly of financial and healthcare services. However, it seems lack of empirical research to understand the lean adoption in financial services. The extant literature of lean implementation in financial services do not provide a clear foundation of the relationships between lean implementation and organizational performance. This lack of understanding about the relationships between lean service adoption and performance may hinder the development and spread of lean service across industries (Hadid and Mansouri, 2014). It is therefore very imperative in broadening and extending the existing body of knowledge. Hence, this research aimed to fill this gap by investigating the relationships among lean enablers, lean practices and organizational performance.

In order to investigate the relationships between constructs in the research conceptual model, two-step approach suggested by James et.al. (1982) was employed. Empirical data was gathered from employees involved CFA was conducted to ensure the reliability and validity of the measurement model by assessing the goodness of fit indices as shown in previous table 4. In order to test all hypotheses, SEM was conducted for investigating all relationships in the proposed model. The SEM model was gradually adjusted until reaching the goodness of fit criteria. As a result, findings suggest that positive relationships exist among all constructs of lean enablers, lean practices, and organizational performance. This overall results supports the empirical findings of previous literature that investigated the relationship between quality management practices and organizational performance (Hadid et al., 2016; Hadid and Mansouri, 2014; Chavez et al., 2013; Vinodh and Dino, 2012). Examining the level of lean enablers implementation, employee relations has the highest standardized weight indicating the significance that organization pay attention on providing adequate training and enhancing employee commitment which are important enablers in driving lean to become success (Ahlstrom, 2013; Malmbrandt and Ahlstrom, 2013; Balle and Regnier, 2007; Bowen and Youngdahl, 1998). Focusing in employee relation enabler is therefore significant in supporting the implementation of lean practices as suggestion by Cua et al. (2001). To deepen further, the statistical findings indicated a strong relationship between lean enablers and lean practices, with standardized regression weight of 0.805. This strengthens the importance in implementing all lean enablers (LE) of leadership and management, organizational culture, employee relations, and customer focus to support lean practices (LP) implementation for improving the organizational performance.

This research contributes to the existing body of knowledge of lean implementation in financial services by empirically investigating the importance of lean enablers in implementing lean practices for enhancing the organizational performance. The findings highlight and confirm the significance that organizations implement both lean enablers and lean practices for attaining the better organizational performance. This finding supported the underlying theory of socio-technical system (STS) suggested by Trist and Bamford (1951) that indicates the importance that organizations considered both supporting and technical practices for achieving better outcome of practice implementation. This research further extended the work of Malmbrandt and Ahlstrom (2014) that systematically developed the

measures of lean service practices by adapting and refining measures for a particular context of lean implementation in financial services. Additionally, this study attempted to adapt the conceptual model suggested by Hadid and Mansouri (2014) for empirically investigating the relationship between lean and performance in a particular context of financial services. The statistical findings indicated the significant relationships among lean enablers, lean practices and organizational performance. These findings provide the managerial implications by shedding some light for financial services intended to adopt lean concept in implementing both lean enablers and lean practice for synergizing the performance outcomes resulted from lean implementation. In order to implement lean successfully in financial institutions, four important enablers of leadership and management (LM), organizational culture (OC), employee relations (ER), and customer focus (CF) are required. Concerning the limitation in gaining access and limited number of financial institutions adopted lean as improvement initiative, this affect the response rate of questionnaire data gathered. The author therefore suggests in adopting this model and measures developed for empirically investigating relationships among all constructs in other services context such as healthcare and insurance companies. Lastly, the study of moderator effect of lean enablers would be of interest for broadening the existing body of knowledge of lean implementation for enhancing organizational performance in financial services.

References

- Achanga, P., Shehab, E., Roy, R. & Nelder, G. (2006), "Critical success factors for lean implementation within SMEs", *Journal of Manufacturing Technology Management*, 17 (4): 460-471.
- Allway, M. & Corbett, S. (2002), "Shifting to Lean Service: Stealing a Page from Manufacturers' Playbooks", *Journal of Organizational Excellence*, 21 (2): 45-54.
- Antony, J., Kumar, M. & Madu, C. (2005), "Six Sigma in small and medium sized UK manufacturing enterprises: some empirical observations", *International Journal of Quality and Reliability Management*, 22 (8): 860-874.
- Antony, J. (2002), "Design for Six Sigma: A Breakthrough Business Improvement Strategy for Achieving Competitive Advantage", *Work Study*, 51 (1): 6-8.
- Antony, J. & Banuelas, R. (2001), "A strategy for survival", *Manufacturing Engineer*, 80 (3): 119-121.
- Badri, M.A., Davis, D. & Davis, D. "A study of measuring the critical factors of quality management", *International Journal of Quality and Reliability Management*, 12 (2): 36-53.
- Balle, M. & Regnier, A. (2007), "Lean as a learning system in hospital ward", *Leadership in Health services*, 20 (1): 33.
- Bowen, D.E. & Youngdal, W.E. (1998). "Lean service in defense of a production-line approach", *International Journal of Service Industry Management*, 9 (3): 207.
- Chakravorty, S.S. (2010), "An Implementation model for lean programmes", *European Journal of Industrial Engineering*, 4 (2): 228-248.
- Chavez, R., Gimenez, C., Fynes, B., Wiengarten, F. & Yu, W. (2013), "Internal lean practices and operational performance", *International Journal of Operations and Production Management*, 33 (5).

- Coronado, R. B. and Antony, J. (2002), "Critical Success Factors for the Successful Implementation of Six Sigma Projects in Organisations", *The TQM Magazine*, 14 (2): 92-99.
- Cua, K.O., Mckoe, K.E. & Schroeder, R.G. (2001), "Relationship between implementation of TQM, JIT, and TPM and manufacturing performance", *Journal of Operations Management*, 19: 675-694.
- Detert, J.R., Schoroeder, R.G. & Mauriel, J.J. (2000), "A Framework for linking culture and improvement initiatives in organizations", *Academy of Management Review*, 25 (4): 850-863.
- Devellis, R.F. (1994), "Scale development: Theory and applications", *Journal of Educational Measurement*, *Spring 1994*, 31 (1): 79-82.
- Dow, D., Samson, D. & Ford, S. (1999), "Exploding the myth: do all quality management practices contribute to superior quality performance?", *Production and Operations Management*, 8 (1): 1-27.
- Elg Mattis, Broryd Klara Palmberg & Kollberg Beata (2014), "Performance measurement to drive improvements in healthcare practice", *International Journal of operations and production management*, 33 (11/12): 1623-1651.
- Emery, F. (1990), "The nine-step model. In: Trist, E.L. and Murray, H. 'The social engagement of social science, A Tavistock anthology", *The Socio-technical perspective*, 2, University of Pennsylvania Press, Philadelphia, PA: 569-579.
- Flynn, B.B., Sakakibara, S. & Schroeder, R.G. (1995), "Relationship between JIT and TQM: practice and performance", *Academy of Management Journal*, 38 (5): 1325-1360.
- Gerbing, D.W. & Anderson, J.C. (1988), "An undated paradigm for scale development incorporating unidimensionality and its assessment", *Journal of Marketing Research*, 25 (2): 186-192.
- Habidin, N.F. & Yusof, S.M. (2013), "Critical success factors of Lean Six Sigma for Malaysian automotive industry", *International Journal of Lean Six Sigma*, 4 (1): 60-82.
- Hackman, R.J. & Wageman, R.(1995), "Total Quality Management: empirical conceptual and practical issues", *Administrative Science Quarterly*, 40 (2): 309-342.
- Hadid, W., Mansouri, S.A. & Gallear, D. (2016), "Is lean service promising? A socio-technical perspective", *International Journal of Operations and Production Management*, 36 (6): 618-642.
- Hadid Wael & Mansouri S. Afshin (2014), "The lean-performance relationship in services: a theoretical model", *International Journal of Operations and Production Management*, 34 (6): 750-785.
- Hair, J. F. et al. (2010), "Multivariate data analysis: A global perspective", *Upper Saddle River, NJ: Pearson Education*.
- Hammer, M. & Goding, J. (2001). Putting Six Sigma in Perspective. *Quality*, 40, 58-62.
- Henderson, K. M. and Evans, J. R. (2000). 'Successful Implementation of Six Sigma: Benchmarking General Electric Company.' *Benchmarking: An International Journal*, Vol. 7(4), pp. 260-281.

- Hines, P., Holweg, M. & Nick, R. (2004), "Learning to Evolve: A Review of Contemporary Lean Thinking", *International Journal of Operations and Production Management*, 24 (10): 994-1011.
- Hoerl, R. (2004), "One perspective on the future of Six-Sigma", *International Journal of Six Sigma and Competitive Advantage*.
- James, L.F., Mulaik, S.A. & Brett, J.M. (1982), "Causal analysis assumptions, models, and data", Sage, Beverly Hills, CA.
- Jeyaraman K. & Teo L. K. (2011), "A conceptual framework for critical success factors of lean Six Sigma Implementation on the performance of electronic manufacturing service industry", *International Journal of Lean Six Sigma*, (3): 191-215.
- Karmarkar, U. (2004), "Will you survive the services revolutions?", *Harvard Business Review*, 82 (6): 100-107.
- Kaynak, Hale (2003), "The relationship between total quality management practices and their effects on firm performance", *Journal of Operations Management*, 21: 405-435.
- Kosuge, R., Modig, N. & Ahlstrom, P. (2010), "Standardization in lean service: exploring the contradiction", *Proceeding of the 17th International Annual EurOMA conference June*.
- Koufteros, X.A. (1999), "Testing a model of pull production: a paradigm for manufacturing research using structural equal modelling", *Journal of Operations Management*, 17 (4): 467-488.
- Kujala J. & Lillrank P. (2004), "Total Quality Management as a cultural phenomenon", *Quality Management Journal*, 11 (4): 43-55.
- Levitt, T. (1972), "Production-Line Approach to Service", *Harvard Business Review*, 50 (5): 41-52.
- Malmbrandt, Malin & Ahlstrom, Par (2012), "An instrument for assessing lean service adoption", *International Journal of Operations and Production Management*, 33 (9): 1131-1165.
- Margretta, J. (1998), "The power of virtual integration: an interview with Dell computer's Michael Dell", *Harvard Business Review*, 76 (2): 72-84.
- Naor, Michael, Goldstein, Susan M., Linderman, Kevin W. & Schroeder, Roger G. (2008), "The Role of Culture as Driver of Quality Management and Performance: Infrastructure and Core Quality Practices", *Decision Sciences*, 39 (4): 471-702.
- Nunnally, J. (1978), "Psychometric Theory", 2nd Ed., McGraw-Hill, New York, NY.
- Pande, P. S., Neuman, R. P. & Cavanagh, R. R. (2000), *The Six Sigma Way: How Ge, Motorola and Other Top Companies Are Honing Their Performance*, New York: McGraw-Hill.
- Powell, T. C. (1995), "Total Quality Management as Competitive Advantage: A Review and Empirical Study", *Strategic Management Journal*, 16 (1): 15-37.

Sabella Anton, Kashou, Rami & Omar Omran (2014), "Quality Management Practices and their relationship to organizational performance", *International of Operations and Production Management*, 34 (12): 1487-1505.

Samson, D. & Terziovski, M. (1999), "The relationship between total quality management practices and operational performance", *Journal of operations management*, 17: 393-409.

Schonberger, R.J. (2008), "Lean performance management (metrics don't add up)", *Cost Management*, 22 (1): 5.

Shah, Rachna & Ward, Peter T. (2003), "Lean manufacturing: context, practice bundles, and performance", *Journal of operations management*, 21: 129-149.

Shah, Rachna & Ward, Peter T. (2007), "Defining and developing measures of lean production", *Journal of Operations Management*, 25: 785-805.

Snell, S.A. & Dean, J.W. (1992), "Integrated manufacturing and human resource management: a human capital perspective", *Academy of Management Journal*, 35 (3): 467-504.

Staats, B.R., Bruner, D.J. & Upton, D.M. (2011), "Lean principles, learning and knowledge work: evidence from software services provider", *Journal of Operations Management*, 29 (5): 376-390.

Suarez-Barraza, M.F., Smith, T. & Dahlgaard-Park, S.M. (2012), "Lean service: A literature analysis and classification", *Total Quality Management*, 23 (4): 359-380.

Swank, C. K. (2003), "The Lean Service Machine", *Harvard Business Review*, 81 (10): 123-129.

Trist, E.L. & Bamford, K.W. (1951), "Some social and psychological consequences of the longwall method", *Human Relations*, 4 (1): 3-38.

Vinodh S. & Dino Joy (2012), "Structural equation modeling of lean manufacturing practices", *International Journal of Production Research*, 50 (6): 1598-1607.

Ward, P.T., McCreery, J.K. & Ritzman, L.P. (1998), "Competitive priorities in Operations Management", *Decision Sciences*, 29 (4).

Wu, S.J., Zhang, D. & Schroeder R.G. (2011), "Customization of quality practices: the impact of quality culture", *International Journal of Quality and Reliability Management*, 28 (3): 263-279.

Wu, S.J. (2015), "The impact of quality culture on quality management practices and performance in Chinese Manufacturing firms", *International Journal of Quality and Reliability Management*, 32 (8): 799-814.

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

Appendices

Questionnaire survey instrument

1. Lean practices

No.	Items	References
<i>Specify customer value</i>		
1.	Your company put effort in understanding customer value	Malmbrandt and
2.	You Start searching for ways to understand customer value using informal approach	Ahlstrom (2013) Leyer and
3.	You can see and describe what activities are value adding for the customers	Moormann (2014)
4.	You can define what part of your work add value to customer or not	
<i>Identify value stream</i>		
5.	Your working processes have been mapped	Malmbrandt and
6.	In the process mapping, non-value added activities are identified based on customer perspective	Ahlstrom (2013) Hadid and
7.	Process maps are visualized, reviewed and updated more often than once a year	Mansouri (2014) Leyer and
8.	There are key performance indicator of for my activities which reflect the satisfaction of the customers	Moormann (2014)
<i>Create value flow</i>		
9.	You start searching for a way to organize the workplace, discussions around location of information and resources availability	Malmbrandt and Ahlstrom (2013)
10.	Information and resources have been sorted and organized for easy retrieval when and where they are needed in the process in order to facilitate flow	Shah and Ward (2007)
11.	There is a continuous coordination with every relevant employee with regard to products or service you are involved	
12.	Most areas of the organization working together to connect cross functional processes	
<i>Standardize work level</i>		
13.	You start using standardized tasks in some areas, may not be written down or in forms of simple checklists	Malmbrandt and Ahlstrom (2013)
14.	Work procedure standards are well written and appearing in most areas of the organizations	Hadid and Mansouri (2014)
15.	The standard time is set up for balancing the workloads along the service processes (i.e., standard time and SLA)	
<i>Ensure the high level of quality</i>		
16.	Supervisor re-checks your work again before deliver to other departments	Malmbrandt and Ahlstrom (2013)
17.	Organization starts searching for instruments and methods to assure quality is built-in, but informal approach in few areas	Hadid and Mansouri (2014)
18.	Most areas are actively working to assure built-in quality. Use poke-yoke solutions and employees control quality themselves before finishing a job	
19.	Company encourages all staff to achieve zero errors along the service operations process	

No.	Items	References
<i>Visualize processes and performance results</i>		
20.	Visual signals used to facilitate work in some areas, signaling not only location of resources but also process progress and starting to visualize some deviations.	Malmbrandt and Ahlstrom (2013) Hadid and Mansouri (2014)
21.	Systematic visualization in all areas of the organization of information needed in the right place	
22.	In most areas, improvements are visualized in central locations. Information is updated and there is experimentation with regards to what to visualize	
<i>Pursue continuous improvement</i>		
23.	Employees participate actively in determining improvement area for lean implementation, regarding the processes that they are part of it	Malmbrandt and Ahlstrom (2013) Dimitrios et al. (2015)
24.	Root cause analysis and other problem solving tools are being used regularly. Employees are proficient in problem solving techniques	
25.	All areas have a way of assuring that agreed upon improvements are sustained over time such as setting up monitoring and feedback systems	
26.	Developing organizational structure supporting the continuous improvement	
<i>Ensure that all activities are pulled by customers</i>		
27.	Organization starts to use pull system and create efficient handovers between different parts in the chain, but with varying degree of effectiveness.	Malmbrandt and Ahlstrom (2013) Hadid and Mansouri (2014)
28.	Use of pull in all areas and processes. Each step in the chain is aware of the status of the previous and next step and has a signal for when to start working.	Shah and Ward (2007)
29.	Experimentation with signals for when each step should start working to avoid overproduction and other types of wastes. Most areas are involved and the notion of internal customers is becoming more and more known	

2. Lean enablers

No.	Items	References
<i>Leadership and Management</i>		
1.	Extent to which the organizational top management has clear goal, direction and objectives for lean implementation	Cua et al. (2001) Kaynak (2003)
2.	Extent to which the organizational top management communicate goal and objectives of lean implementation within organization	Habidin et al. (2013)
3.	Degree to which the organizational top management considers lean implementation as a way to increase profits	Malmbrandt and Ahlstrom (2013)
4.	Degree of participation by major department heads in lean implementation process.	Hadid and Mansouri (2014)
5.	Top management expresses supports for lean implementation and approves time and resources for implementation team	Sarah et al. (1989)

Organizational Culture

- | | | |
|-----|---|--------------------|
| 6. | There can be little improvement action taken care until a supervisor approves a decision | Wu (2015) |
| 7. | Any decisions concerning process improvement I make has to have my boss's approval | Naor et al. (2008) |
| 8. | Company emphasizes efficiency and control to reach predictable improvement performance results | Kaynak (2003) |
| 9. | Employees are encouraged to work as a team, exchange opinions, experiences and ideas | Gambi et al.(2015) |
| 10. | Employee are encouraged to openly discuss their opinions and improvement ideas with someone higher up | |
| 11. | Our reward system encourages reaching organization's goals of lean implementation | |
| 12. | The incentive system at this plant is fair at rewarding people who accomplish plant objectives | |
| 13. | We emphasize prospecting for opportunities and creating new challenges | |
| 14. | We make an effort to anticipate the potential of new service practices and technologies | |
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Employee Relations

- | | | |
|-----|--|--------------------------------|
| 15. | Our organization forms cross functional teams to implement lean throughout the organization | Cua et al.(2001) |
| 16. | Employees are encouraged to try solving problems as much as possible | Sarah et al. (1989) |
| 17. | Extent to which quality circles or employee involvement-type programs are implemented in the organization | Malmbrandt and Ahlstrom (2013) |
| 18. | Extent to which quality awareness building among employees is ongoing | Kaynak (2003) |
| 19. | Degree of participation in quality decisions by hourly/ non-supervisory employees | |
| 20. | You attended training in improvement techniques and the underlying ideas of lea | |
| 21. | You are continuously train in different aspects of work improvement and are considered highly competent in improving work | |
| 22. | Actively participates in improvement work, come up with improvement suggestions, see problems through long-term solutions and is a driving force for lean implementation | |
| 23. | Sees improvement work as an important part of everyday job. Equal focus on new solutions and sustaining previous ones. | |
-

Customer Focus

- | | | |
|-----|--|-----------------------|
| 24. | Extent to which feedback is given from customer on quality performance | Habidin et al. (2013) |
| 25. | Extent to which customers are actively involved in future service design concerning customer requirement adn expectation | Shah and Ward (2007) |
| 26. | We strive to be highly responsive to our customers' needs and requirements | |
| 27. | Extent to which the importance of relationship with customers is periodically evaluated | |
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3. Organizational performance

No.	Items	References
1.	The cycle time of each service transaction is reduced	Kaynak (2003)
2.	We can deliver service on time as promised	Cua et al.(2001)
3.	Less customer waiting time (queue time) after lean implementation	Malmbrandt and
4.	The operating cost of each service transaction is reducing	Ahlstrom (2013)
5.	The quality of service is improving continuously	Gambi et al. (2015)
6.	Customers satisfaction are increasing after lean implementation	Hadid and
7.	You are satisfied with your improved working process and environment after lean implementation	Mansouri (2014)
8.	Our productivity and efficiency are rising steadily	Naor et al. (2008)
9.	Number of reworks and errors are reduced after lean implementation	Shah and
10.	Number of customer complaints are reduced after lean implementation	Ward(2003)
		Kafetzopoulos <i>et al</i> (2015)