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Validating Lean Manufacturing (LM) Practice Model for Productivity Growth in an Indian Small & Medium Scale Enterprises (SMEs)

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Abstract:

Lean Manufacturing (LM) is a term used to describe manufacturing practices that eliminate the waste (MUDA) during any part of the manufacturing process. It emphasizes the use of processes that do not delay the delivery of product, employee involvement, or synchronized way of all production and managing shop floor operation. LM stresses on reducing waste, rationalizing materials, and standardize components, to help make products more efficient to build. This paper presents the details of a case study. It highlights the road map of the company for achieving performance improvement through LM implementation and its impact on organizational performance. It also points out strengths and weaknesses of LM implementation practices and overall performance using developed research instrument. The case study helps in evaluating the company's LM implementation and overall growth of SMEs. To do so, research instrument was administered amongst forty four employees in the three SMEs respectively and their responses were analyzed. Using the data obtained from a survey of industries in India, the identified factors were subjected to appropriate statistical tests to establish reliable and valid model. Statistical computing package SPSS 20.0 for Windows was used for reliability and validity analysis. The validated instrument of LM factors developed here may be used by manufacturing organizations to priorities their management efforts to assess and implement LM. The validated results are in Indian context; however, the instrument developed can be used in global context.

Keywords:

Lean Manufacturing, Critical Success Factors, Reliability Analysis, Factor Analysis

1. Introduction

Henry Ford first developed a concept of manufacturing assembly line in constant motion - the first method for mass production. The model Henry Ford performance for a worker in the most simple and repetitive tasks have been replaced by job rotation and teamwork, mainly to improve employee morale, but also provide significant benefits in terms of higher quality and suggestions of employees to improve the process. This model is changing the way managers see production, the emphasis is on the specialization of information work performed by unskilled labor. The spread of mass lower cost per unit, work standardization, volume products supported by the school and the founder of scientific management Frederick Taylor. Until Taiichi Ohno Toyota Group in Japan pointed out some flaws in the model, the effect of the model is not challenged by managers. Mass production requires large amount of capital and space, poor quality of products, high inventory levels of materials needed in product standardization and related organizations are resistant to change and very inflexible demand customers. Lean manufacturing practice or production system Toyota initiated by the Japanese automaker under the strong leadership of its quality engineer Taiichi Ohno, 1988, later it was popular as a parent to lean manufacturing, and the new framework is implemented in manufacturing at the time of the financing deficit and economic crisis after World War II in Japan. Lean is to identify the Manufacturing SMEs are active in Gujarat provide significant revenue to the government of Gujarat and the country. Lean manufacturing is a way to achieve excellence in manufacturing. Lean manufacturing is a

philosophy, a production strategy and a set of techniques to meet customer needs with the minimum of all resources. Lean manufacturing tools eliminate waste in the system, thereby reducing the manufacturing cost. Lean manufacturing results in reducing manufacturing time manufacturing, WIP reduction, better space utilization, improved quality, increased customer satisfaction and ultimately increase productivity. Driver cost of manufacturing down and allows an organization to be competitive in the market and become more profitable. Lean manufacturing practices have much attention as a practical world-class manufacturing due to the effective and continuous improvements in everyday work value (all you can produce money) and incorporate techniques to minimize waste and rework with effective machines, and active participation of employees in the commitment line. From the origins of the idea Lean Toyota Corporation, these principles have moved to other Japanese car manufacturing and then to the US auto companies such as benchmarking and improvement techniques.

1.1 Small and Medium Scale Enterprises in Gujarat

The state of Gujarat is one of the highly industrialized states in India with its reputation as a very investor-friendly state. The state has a proven track record of attracting large amounts of investment will be most favored investment destination in India (Socio-Economic Review, Gujarat, 2011-12) history. In the current scenario of privatization and globalization, small scale industries facing tough competition and thus the survival and growth of these industries will be a tough challenge. Some industries consistently get growth under competitive conditions, while others do not. As a result, new opportunities and threats appeared on all types of industries in India (MSME Annual Report 2010-11). SMEs play an important role in the national economy, especially in the economy such as ours, which is growing.

According to the Economic Survey 2012-2013, Gujarat ranks second after Bihar in the list of fastest-growing state during the past seven years. Between 2005-06 and 2011-12, Gujarat registered an increase in gross domestic product (GSDP) of 9.98%, while Bihar recorded the highest growth rate of 10.17%. The growth of industries in Gujarat is very impressive and growing every year, which is also shown in the chart below (Socio-Economic Review, Gujarat, 2011-12)

2. Review of Literature

Critical success factors (CSF's) are the vital input factors that will drive a good LM system. Different authors have attempted to investigate the CSFs in LM with differing purposes and objectives. Critical factors should be interpreted as those circumstances or practices which already exist, or those that need to be developed in ensuring the success of LM implementation. Performance measures are deliverables or output of a LM system. Improving organizational performance is a goal of every organization. Organizational performance is the final result of running a business. It can reveal the effects of doing business, show the competitive capability of the firm in the market place and its financial status. Organizational performance is a good indicator to test the effects of improvement practices and of companies' efforts in pursuing performance measures. An objective of this study is to evaluate the factors which have positive impact on the organizational performance indicators in Indian manufacturing companies. The requirements of LM critical success factors and performance measures proposed by various authors are briefly described below.

In research (Hines, 2004) Holwe & Rich raises awareness of the vision of managers. The main aim is to develop into lean philosophy and develop an understanding level of the hypothetical foundations of organizational culture. In "The machine that changed the world", Womack and Jones claim that the implementation of an approach "will change almost everything in all industries - options for consumers, the nature of work and the wealth industry by combining the benefits of art and mass production." Lean tactic contains of several methods, its purpose is to improve the quality, efficiency and responsiveness to customers. Lean as a concept has evolved over time. The researchers based their research effort on the structural framework proposed by McGill and Slocum (1993) for the association between values and achieve balance cost and cost value.

Todd (2000) defines Lean Production "initiative, which aims to reduce waste of human effort, inventory, time to market and production space to respond to customer demand and produce the

highest quality products in the world," the most well-organized and inexpensive way.

The curiosity in constant development led to the concept of a learning of the organization. Opens new opportunities for improvement and achieve long-term sustainability. In direction to demonstration the development of the idea of Lean from the original application of the first major use as a technique to target today's culture to improve organizational learning, the four steps in the development of the Strategy reading are discussed in detail:

McGrill and Slocum (1993) classified four types of organizational learning as mentioned in (Hines, Holwe & Rich 2004). The steps in the development of lean philosophy is related to the different stages in the growth of organizational closure. Fiol and Lyles, 1985, in accordance (Hines, Holwe & Rich 2004) defines organizational learning as "the process of improving actions through better knowledge and understanding."

Rockart (1979) has defined the CFS as a "limited number of areas that will result if successful, will ensure competitive success of the organization." Critical success factors are crucial for the success of the programs and objectives associated with these factors achieved extensive, application programs available. The term ERROR (Rockart, 1979). When asked to Boynton and Zmud (1984) CSF years, "so get things to go well to ensure success." CSF measured and processes that are controlled by management to achieve the objectives of the organization (Brotherton and Shaw, 1996) diet. All improvement initiatives involve higher costs, investments (Ranjan and Bhatnagar, 2008) and high risk (Umble et al., 2003) for an organization. Therefore it is important to identify factors that diets that determine the success and avoid the risk of failure. If not selected in these CSF, not only can be a significant difference in success, men Aventure losses in labor, time and money (Coronado and Antony, 2002). The critical success factors are important elements that must be resolved by cable or responsible for that "things should go quickly," of a project or activity to achieve the objectives for the management and growth of the project. I agree with. I implement Six Sigma projects, CSF represents the most important ingredients, but whose application has little chance of success.A number of researchers have examined the role of CSFs in lean application.

Achanga et al. (2006) identified four key factors that are crucial for the implementation of Lean Manufacturing in SMEs. The factors are: organizational culture, leadership and management, competence and financial capacity.

Sua'rez-Barraza and Ramis-Pujol (2010) identified several opportunities and inhibitors during the execution of lean kaizen in a Mexican public service organization. Activators and inhibitors are as follows.

Enablers:

- Clear Loop to Improve
- Commitment and desire for improvement
- Effective application of the best inhibitors of human resources management
- Establish a system to measure the performance of service processes
- Resistance to change by employees who enjoy their own share of power (influenced by the union) and their own way of doing things in HRO sections (a legacy of procedure in this type of area).
- An "organizational structure" bureaucratic classic mode, to create "small fiefs".
- The influence of unions with little interest in change and / or improvement.
- The lack of professional training in Lean Kaizen techniques and tools.
- Service is the result / client / stakeholder-oriented
- Focus on the simple and practical
- Active Leadership
- Description and transversal thinking
- Effective application of the best inhibitors of human resources management:
- The lack of credibility of some middle managers, these efforts are seen as enforced by a force management team or a fashion.
- Excessive regulation can block you thinking about the improvement and quality of service.
- The lack of a strong link between Lean Kaizen's efforts and the best HRM practices needed to consolidate them.
- Resistance to the measurement of generating an action as a result of the measurement of

"culture" inadequate or non-existent in the form of execution the service processes.

According Rathje-Scherrer et al. (2009), due to the implementation of lean success exclusively on: support for management's commitment and involvement in the work to learn; Give the employees to decide on changes in business processes; Information transparency in thin target; and evidence of improvements in the initial performance and weak sustainability. The six lessons for effective implementation are:

- Lean will not succeed without visible management commitment
- Develop formal mechanisms to encourage independence
- Disseminate medium-term lean objectives
- Make sure there are agreements for the long-term sustainability of lean
- Communicate few benefits from the outset
- Continuous assessment during lean effort is critical

Cheng et al. (2011) identified the types of resistance: resistance to power outage, new routines, change and the state of polarization.

An analysis of the research literature by Skrudupaite and Jucevicius (2011) revealed the following key success factors in the management of SPS (Synchronized Production System) Application process: business plan and vision; Management support (including funding); Project management (including project promoters and teamwork and composition); Change management, organizational culture; Effective communication, training, knowledge transfer, knowledge management (including skills); organizational structure; Monitoring and evaluation of results: performance measures.

Kumar et al. (2009) identified the importance of the following critical success factors in implementing Six Sigma or small: Participation and management commitments; communication; The quality of the relationship with the employee, cultural change; Training; The quality of the association client, project selection; Link quality of enterprises, the quality of the link with the supplier; project; Organizational infrastructure; Vision and plan, information technology and innovation.

Crute et al. (2003) considered five factors that are important for the lean implementation of the aviation industry: A specific and comprehensive strategy change; Effects of company culture; Product analysis; the commitment of senior management; Performance improvement time.

Kettinger and Grover (1995) quotes (Motwani, 2003) that a significant change in the process requires the following success factors: strategic investment managers acting as leaders in defining and communicating the change vision; The desire to learn; Preparation for culture; Retained relationships network; Knowledge exchange; Prescribed processes and change management methods lies mainly in implementing Lean with aging and then work duty and lack of leadership involved in this research on the site. Grove et al. (2010) identified the obstacles they face during a lean implementation in a healthcare environment. These were: Mefford (2009) identified the following four essential components for successful implementation of lean. Believe in the new program will serve; Commitment to the implementation of the managers; Participation of the entire organization - employees, resources; Patience and long-term vision for the results. According to Pedersen and Huniche (2011), the following factors are important for the implementation read: Goals and values; Complexity and importance; Balance of power; and the resources and capacity.

According to Sim and Rogers (2009), the problem maximum variation process; A lack of understanding of lean; Lack of communication and leadership; Focusing goals; Defines waste problems; And it is difficult to identify customers and value from the customer's perspective. The obstacles that supports the implementation can be overcome with advanced planning, transformational leadership, good communication, identification and sharing of best practices and, above all, a common vision.

Henderson and Evans (2000) listed seven components for the successful implementation of Six Sigma as senior management support, organizational infrastructure (OI), training, tools, associated personnel based measures, measuring systems and infrastructure.

Antonio and Fregusson (2004) identified ten key success factors for driver software company study, this commitment to leadership and uncompromising commitment of the senior

management, support OI, cultural exchange, training Six Sigma, commitment to customers, and understanding of the Six Sigma methodology, project management, prioritization and selection of projects. The results from this study also shows that the most critical factors for success is dedication and uncompromising commitment by management, cultural change, linking Six Sigma with the business strategy and customer participation.

Bhasin (2011) found the following barriers to application support: The need to convince shareholders / owners; Inadequate external financing; Insufficient internal funds; Lack of understanding of the potential benefits; The cost of the investment; cultural issues; Inadequate handling time; Insufficient knowledge of Lean implementation; Employee attitude / resistance to change; Adequate knowledge oversight to apply lean.

Bakas, Ottar et al. 2011, identified in his study of Norwegian and Belgian SMEs that was held in the European research project EIRP (European Regions for Innovative productivity). Six proposed critical success factors, which is consistent with previous research: 1) ensuring a strong management commitment. 2) Develop employee participation in depth. 3) Allocate enough time to prepare the organization. 4) Focus on creating motivation to complete the initiative. 5) Build knowledge internally within the organization. 6) Establish a performance evaluation system.

MM Ravikumar et al 2014 found seven critical factors for SMEs

- Employees are trained in the application read
- Fearless message about identifying waste management and leadership
- Strong a total commitment capacity.
- Financial willing to provide sufficient funds for the implementation
- Link Lean initiatives to improve business strategy and client
- Accept change in faith and organization culture.
    - Ability of providers to support the implementation reading.

3. LM Framework

Depending upon the critical success factors and performance measure a validated instrument of LM factors is developed .Based on the information provided by the respondent and the analysis of survey data about LM implementation for manufacturing companies in India, a LM frame work is developed. Statistical methods such as descriptive statistics, factor analysis, correlation analysis, regression analysis and hypotheses testing were used in the analysis. Table1 shows the strong and weak relationship between the various LM implementation factors and the Performance measures.

Table 1: Relationship Matrix for LM operational Model

Sr.No	**Organizational Performance Measures**	**Relationship with Lean Manufacturing Critical Success Factors-CSFs**	
		Strong	**Weak**
1	Quality	1. Customer Focus 2. Human resource management 3. Performance management 4. Strategy	6. Employee Management 7. Financial capabilities 8. Organization Culture 9. Process management 10. Skill Development 11. Supplier Network

		5. Top Management	
2	Cost	1. Customer Focus 2. Employee Management 3. Financial capabilities 4. Human resource management 5. Skill Development 6. Supplier Network	7. Process management 8. Performance management 9. Strategy 10. Top Management 11. Organization Culture
3	Delivery	1. Financial capabilities 2. Performance management 3. Skill Development 4. Supplier Network 5. Customer Focus 6. Process management	7. Top Management 8. Strategy 9. Human resource management 10. Employee Management 11. Organization Culture
4	Flexibility	1. Skill Development 2. Supplier Network 3. Customer Focus 4. Strategy 5. Human resource management 6. Process management	7. Top Management 8. Organization Culture 9. Financial capabilities 10. Performance management 11. Employee Management
5	Customer Satisfaction	1. Top Management 2. Organization Culture 3. Financial capabilities 4. Performance management 5. Employee Management 6. Process management	7. Supplier Network 8. Customer Focus 9. Strategy 10. Human resource management 11. Skill Development

6	Financial Performance	1. Top Management 2. Organization Culture 3. Strategy 4. Human resource management 5. Process management	6. Financial capabilities 7. Performance management 8. Employee Management 9. Skill Development 10. Supplier Network 11. Customer Focus
7	Productivity	1. Top Management 2. Organization Culture 3. Financial capabilities 4. Performance management 5. Human resource management 6. Process management	7. Employee Management 8. Skill Development 9. Supplier Network 10. Customer Focus 11. Strategy

4. Case study :

4.1. Objective of Case Study

To verify whether the relationship established is valid through the responses from the industries. The major aim of the case study is to provide a practical example of performance improvement of the Gujarat/Indian manufacturing company that has implemented LM initiative. One of the objectives of case study was to assess the LM implementation practices and performance improvement of the organization. The study was conducted in company that has already implemented this initiative. The case study helps in evaluating the company's LM implementation and overall business performance.

4.2. Brief about the Organization

Company ABC is a Manufacturing and Engineering service provider, utilizing Precision Machinery & Equipment for manufacturing and Inspection. It is located in the State of Gujarat, Chhatral GIDC. Possessing over 15 years of experience in Manufacturing, Production Processes, Design, Quality management. It is equipped with latest technological precision machining machinery and state of art inspection facilities. It offers complete single source reliability and convenience precision machining services in the field of HVAC, Aerospace, Automotive, Medical Devices, Fasteners, and Fittings. It has established System to meet requirements of ISO 9001and AS 9100 and has extensive experience in all aspects of Design, Development & Supply Chain Management. Their ability to operate with a low overhead cost coupled with Lean Manufacturing practices allows offering competitive pricing while maintaining a high level of quality.

4.3 Key processing facilities:

- CNC/VMC Machine
  - VMC (Hass Make) VF 2 FYT Model 914 X 457 mm Thru-Coolant
- Hot Forging Facility
  - 35 KVAMetal Gathering Mc, Upsetting Header, Forging Pressl50T
- SPM/Automates
  - Single Spindle Automatic Traub A 32 & A 25 MM, Capstone TraubA 32, Roll Thread Machine A 24, Threading SPM 1.00"
- Welding Equipment
  - MIG Welding 400 AMP

- Tool Room Machinery &Equipment
  - HACKSAW Machine 8", Lathe Machine, Drill Machines (up to 24 mm), Surface Grinding Machine

4.4 Processing Options:

- VMC & CNC Turning Precision Components
- Hot Forged Brass & MS Components
- Conventional Turning Components
- MIG Welded Fabrication Component
- Insert able Molded Components (Rubber & Plastic)
- Post Treatment: ZINC Plating, Hard Anodizing, Yellow Passivation, Blackodizing, Ni - Cr Plating

5. Performance Improvement Programs Pursued by the Company (LM in Company)

The Company has always striven to be responsible and sensitive to inventory wastage and product delivery matters. This is ensured by Planning, Implementing and monitoring all possible Lean drives and human resources, often far beyond what is mandated by government and other institutional policies. The Company is committed to complying in full measure with all regulations relating to waste elimination around its operations. By constantly upgrading technologies and by applying the best of Lean processes and practices, the Company endeavors to provide fast delivery to the customer as the priority they deserve.

Table 2: Data Collection for ABC organization before Lean Implementation

SR NO	Performance Measures	Company	Before Implementation					
			Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
1	In process stage Rejection	ABC	25.5%	25.0%	25.5%	26.0%	25.0%	25.5%
2	Final stage rejection	ABC	8.0%	8.0%	7.5%	8.0%	7.8%	8.0%
3	Return goods	ABC	10.0%	10.5%	10.0%	10.5%	10.0%	10.5%
4	Cost of Quality / sales	ABC	44.00%	44.00%	44.00%	45.00%	42.30%	44.50%

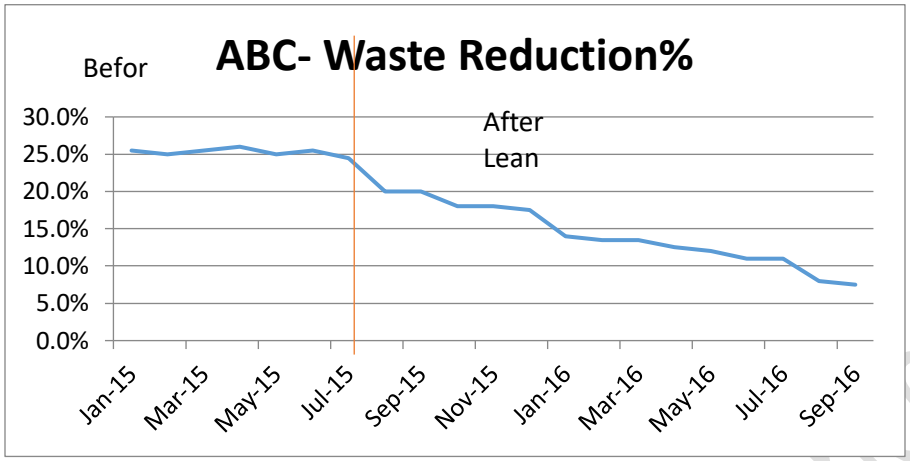

Figure 1 Waste Reduction

As shown in figure 1 the ABC organization has a significant rejection in process stage of manufacturing in the month of January to June, which was actually before lean tools implementation and from the month of July 2015 Company started the implementation and achieved the reduction in rejection/waste elimination by 71 % as shown in the figure.

6. Evaluation of LM Implementation and Organizational Performance

In order to evaluate the company's LM implementation practices and organizational performance, the developed research instrument was used. Based on the evaluation, the current situations of the company's LM implementation and overall performance were obtained. Subsequent sections present the evaluation results, which were translated into marks according to the scoring methods. It also highlights the extent of relationship (little, moderate, large) between various LM implementation practices and overall performance.

6.1. Validation of the Research Instrument

In order to validate the developed model the structured instrument were given to 44 members of the organization. They were requested to complete the instrument in the context of their organization. A workshop to explain the interpretation of the instrument items and the meaning of 'LM' Implementation (Performance) Model' was held. The developed research instrument can be used by companies practicing LM approach. It can be used to measure the degree of emphasis of LM implementation and its impact on organizational performance. The research instrument was found to be reliable. It was necessary to validate the research instrument through a case study. The instrument was distributed to forty one employees of the company practicing combined LM approach with prior permission. The responses were analyzed, mean of each item was estimated and items were grouped as respective factors. Further grand mean of all six factors was obtained. The mean of the responses were proportionally marked in consultation with the experts as shown in Table 3. The number "1" means that the company is having Not at all relationship between the implementation factor and the performance measure or it means that the company is extremely weak in this practice, while the "8"indicates that the relationship between the implementation factor and the performance measure is To a very large extent or extremely strong. Similarly for assessing impact of LM on organizational performance the number "1" means Not at all improvement, while the "8" indicates improvement to a very large extent in performance measures of the company. During the process of assessment, the strengths and weaknesses of items of the respective factors were pointed out. Marks above and below "4" indicate strong and weak items respectively. If the company is neither strong nor weak in particular item, it is indicated as "Average" or to a moderate extent. Strong and average terms are just a relative sense compared with the weak term. Based on total marks scored by implementation factors and performance parameters, the overall grading criterion was decided as shown in Table 3.

Table 3. Mean and proportionate marks

Mean (Response)	Weightage
1.00-1.50	1(To a moderate extent)
1.51-2.00	2
2.01-2.50	3
2.51-3.00	4 (To a moderate extent)
3.01-3.50	5
3.51-4.00	6
4.01-4.50	7
4.51-5.00	8(To a very large extent)

The respondents were asked to share their experience of Lean Practices Implementation. There are 15 Statements measured on a 5 point Likert-type scale where was indicating Strongly Disagree and 5 was indicating strongly agree. 3 point was considered as neutral. If a respondent has given below 3, it indicates negative experience of lean implementation and if a respondent has given above 3, it indicates positive experience of Lean Implementation. The one-sample t-test is applied to test the significant difference of mean obtained by lean practice implementation and neutral point (3). Table below shows the result of one sample statistics. All statements have mean higher than 4 indicating positive experience of lean implementation. These means were tested for the significance difference with a neutral point.

Table 4. Assessment result of Lean Experience

	N	Mean	Std. Deviation	Extent of Relationship
PI_1	44	4.2045	0.63170	Large
PI_2	44	4.4318	0.75937	Large
PI_3	44	4.2273	10.29154	Large
PI_4	44	4.4318	0.99762	Large
PI_5	44	4.1136	10.08297	Large
PI_6	44	4.1136	10.46614	Large
PI_7	44	4.2273	0.98509	Large
PI_8	44	4.0227	10.28477	Large
PI_9	44	4.5455	0.66313	Large
PI_10	44	4.3636	0.83780	Large
PI_11	44	4.3636	0.80956	Large
PI_13	44	4.8182	0.39015	Large
PI_14	44	4.5227	0.82091	Large
PI_15	44	4.6364	0.65026	Large
PI_16	44	4.7045	0.46152	Large

The model developed for Lean Manufacturing Practices implementation was shared with the industry executives. The Hypothesis developed, tested and found significant for the model were again reconfirmed for the agreement of industry executives. Each statement was developed from each relationship between the Critical Success Factors and Performance factors. These statements were measured by 5 points Likert-type scale where 1 indicates strongly disagree and 5 indicates strongly agree. The one-sample t-test is applied to test the significant difference of mean obtained by lean practice implementation and neutral point (3). Table below shows the result of one sample statistics. All statements (except statement no 15 = 3.97) have mean higher than 4 indicating positive experience of lean implementation. These means were tested for the significance difference with a neutral point.

Table 5: Assessment of Lean Implementation Derived Model

	N	Mean	Std. Deviation	Extent of Relationship
P2_1	44	4.6136	0.49254	Large
P2_2	44	4.5000	0.66473	Large
P2_3	44	4.4773	0.50526	Large
P2_4	44	4.1818	0.75553	Large
P2_5	44	4.6818	0.47116	Large
P2_6	44	4.7727	0.42392	Large
P2_7	44	4.5909	0.69276	Large
P2_8	44	4.8182	0.58161	Large
P2_9	44	4.3182	0.88325	Large
P2_10	44	4.3636	0.68509	Large
P2_11	44	4.1818	0.92190	Large
P2_12	44	4.2273	0.96119	Large
P2_13	44	4.5909	0.81606	Large
P2_14	44	4.4545	0.87483	Large
P2_15	*44*	*3.9773*	*10.02273*	*WEAK*
P2_16	44	4.2727	0.92419	Large
P2_17	44	4.5000	0.82123	Large
P2_18	44	4.6364	0.74991	Large
P2_19	44	4.5000	0.82123	Large
P2_20	44	4.6818	0.67420	Large
P2_21	44	4.6136	0.49254	Large
P2_22	44	4.6136	0.65471	Large
P2_23	44	4.4773	0.69846	Large
P2_24	44	4.7955	0.40803	Large
P2_25	44	4.5000	0.66473	Large
P2_26	44	4.5000	0.66473	Large
P2_27	44	4.4773	0.50526	Large
P2_28	44	4.8636	0.34714	Large
P2_29	44	4.7500	0.43802	Large
P2_30	44	4.2273	0.83146	Large

P2_31	44	5.0000	0.00000[a]	Large
P2_32	44	4.4773	0.50526	Large
P2_33	44	4.5000	0.87604	Large
P2_34	44	4.4773	0.50526	Large
P2_35	44	4.7500	0.43802	Large
P2_36	44	4.2273	0.83146	Large
P2_37	44	4.5000	0.87604	Large

7. Conclusion

The developed research instrument has been validated. It can be used by other manufacturing companies practicing LM initiatives. The case study highlights the weak areas which can be used as possibilities for the company to improve its LM implementation and overall business performance. However, it should be noted that even its strong areas are not at all perfect as indicated by marks scored by respective items; they still have room for improvement. Strong and average areas are just a relative sense compared with the company's weak areas, though weak areas should receive more attention. The weak areas of the company's LM implementation can be used by the company to formulate improvement plans. The various performance indicators show remarkable improvement over the years. The company has achieved both tangible and intangible benefits by practicing this approach. The case study shows that LM approach can be used to Benchmark Company's continuous improvement, self-assess their quality improvement efforts and measure their progress over time. Through this, company can quickly identify which areas urgently need improvement. Thus, resources can be allocated more wisely. The results obtained from the implementation of LM initiative were encouraging for the organizations, and also substantiated the model. The organizations also benefited through the improvement in various areas and because of LM implementation the organizations have continuously improved their performances. In the process the organizations received appreciations from their customers and also gained significant benefits through LM implementation. The concerns also certified that 'The LM Implementation (Performance) Model' developed by the researcher through his research study served as a useful guidance in successfully implementing LM practices in their organizations and in achieving better organizational performance.

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