
TO STUDY THE IMPACT OF LEAN PRACTICES IN SMALL AND MEDIUM-SIZED ENTERPRISES (SMES) TO ENHANCE PRODUCTION PERFORMANCE

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ABSTRACT

In order to maintain competitiveness in the current global economy, large-scale enterprises have been implementing a range of management approaches. Lean manufacturing is a strategy that aims to enhance performance in terms of cost, delivery, quality, and flexibility. This is achieved by focusing on eliminating waste and operations that do not provide value. Historically, lean manufacturing has primarily been used by large corporations with ample resources. Despite the important role that small and medium enterprises (SMEs) play in the industrial supply network, there is limited knowledge about the prevalence of lean practices in these firms. This paper examines the topic by analyzing the deployment of lean manufacturing in small and medium-sized enterprises (SMEs) globally. The implementation of lean ideas and philosophies in Indian small and medium-sized enterprises (SMEs) is still a challenge for the Indian sector. This report aims to identify the potential for implementing lean practices in the Indian business. This article aims to analyze the progress and challenges faced by Indian small and medium enterprises (SMEs), with a specific focus on the state of Gujarat, in implementing and adopting lean principles.

Keywords: *Indian SMEs, Lean Manufacturing, Review, cost, delivery, quality*

1. INTRODUCTION

Markets are marked by strong competitive forces these days, honed over the years. Macro factors affecting both supply and demand have promoted the competitive existence of organizations. The increase in globalization and the deregulation of trade have affected supply, allowing businesses to trade with greater ease on a global scale. In addition, innovation and technology accessibility have encouraged better supply capabilities among businesses. The increase in choices available to consumers, who now take time to decide the best value or product available when deciding to buy an item, has influenced demand. Companies now need to understand that in order to trade

profitably in the markets today, they must improve their competitive capabilities. In order to provide consumers with what they want in order to produce income for the business, this consists of understanding what the consumer considers value in conjunction with the most productive operational and manufacturing methods. The "Lean" philosophy of business is a business strategy that encourages waste efficiency and reduction, while still concentrating on a high degree of understanding of what the consumer needs. Because of this philosophy, many businesses have followed the approach in order to focus their insights and actions to develop their operations best. This exemplifies how Lean is not limited to one form or size of industry, but rather to all forms, sizes and industries that are striving in regional and global markets to improve their competitive advantages, operations and income. This review discusses how to adapt Lean manufacturing strategies to accommodate each individual company, a belief advocated by Cooney who states the importance of universal business environments, the character of the relationship between buyer and supplier, and the creation of social and political institutions. In addition, the researcher will address the importance of market cycles that affect individual functions in businesses.

Zhou can be seen as the leading SME researcher implementing Lean methods. The research to date has focused primarily on the larger companies implementing it, especially in the automotive industry. It should, however, be recognized that SMEs can also take advantage of Lean methodologies as long as they are able to adapt them effectively to suit their individual circumstances. Over the years, any company, regardless of size, faces challenges and the Lean methods have proven beneficial, especially in the manufacturing industry. The number of businesses implementing the methods and the vast number of research carried out that have supported its success and achievement in their results. There are two sizes for companies: Large Enterprises (LEs); and Small-Medium Enterprises (LEs) (SMEs). It is evident that the degree of adoption of lean manufacturing in small and medium-sized companies is very low, and even awareness of it is also poor.

1.1 AN OVERVIEW OF LEAN

In his thesis Massachusetts Institute of Technology, the word "Lean" was first used by **Krafcik** to describe the Toyota Production System (TPS). It was then alluded to in two books, *The Machine that Changed the World* and *Lean Thinking* leading to its popular introduction. Lean technique became a popular concept designed to characterize the numerous activities undertaken by Japanese companies that at that time described their improved competitiveness advantages. At that time, it was known as "Japanese Way of Working". The Lean Idea's elements include: methods of operations (such as zero inventories; just-in-time (JIT) and lots of small volumes; reinforcement of quality processes shown by maximum efficient maintenance (TPM); and complete quality management (TPM) (TQM). Empowered employees and workers contributions were also included, challenging

the hierarchical top-down management structures and four function-oriented organizational structures that historically defined many western companies.

Lean implementation relates to the strategic philosophy of an organization and a long-term approach. In short, it can be summarized as 'doing more with less' and, while this might seem a simplification; the Lean term is summed up as a more effective use, when required, of the resources available. In order to preserve quality while reducing production costs, wastage of both time and materials, is detected and eliminated. The efficient execution of Lean does not rely solely on the implementation of particular instruments. Studies have been conducted that have established many variables that may prove to be obstacles to success. In both small and medium-sized companies and large companies, **Bhasin** has established many such obstacles, while **Hancock and Zayko** have also recognized the problems faced by manufacturing companies during the implementation of Lean. On the other hand, there are some considerations associated with efficient implementation. **Abernathy et al.** identified that, due to their tenacity in thoroughly planned management of staff, personnel and equipment, Japanese automotive firms, such as Toyota, have a high implementation success rate, an observation accepted by **Liker**. The researcher explains that long-term preparation and vigilance is more relevant than short-term satisfaction, and that this is understood and prepared accordingly by successful businesses. **Dombrowski et al.** have defined many areas of Lean's practices, including: continuous improvement; organization of the workplace; 5S; standardization of processes; visual management; complete quality management (TQM); total efficient maintenance (TPM); just-in-time (JIT); and leveling of output (**heijunka**).

1.2 SIGNIFICANCE OF THE STUDY

The goal is to conduct research through professional practice in the field of Lean Manufacturing, especially in the manufacturing sector, as India and Gujrat are growing in particular. The goal is to build a model for manufacturing industries on a small-to-medium scale that allows them to continuously improve productivity. At the outset, as presented in future chapters, the researcher will entitle the said objective to be achieved through survey-based study. Study can mainly be divided into literature review, the development of a survey method for SMEs, model development and the validation process. After the gap analysis, the choice of the topic chosen after the critical review of the literature and the problem is formulated, the choice of the topic chosen for critical review of the literature and the problem of gap analysis is formulated and personal interest is also the reason for the choice of theoretical study. The literature's critical analysis showed a disparity in the understanding of and the relationship between the critical success factors for lean production and operational performance indicators. In small and medium-sized Gujarat, the Lean Manufacturing efficiency model has not been developed in the industry. The

research study has been of interest to researchers working as lead auditors for more than two years from a personal point of view, and regularly takes part in various seminars and conferences on professional quality every year and the presentation of research in this field. Fierce market rivalry has forced enterprises to reconsider industrial laws in order to enforce them in manufacturing. In India, manufacturing organizations are very involved in the implementation of advanced manufacturing technologies and the management and efficiency associated with them.

2. OBJECTIVES OF THE STUDY

To build a Lean Practice model for the implementation of lean manufacturing for the Gujrat region's Small & Medium Scale Manufacturing Industries (SMEs).

3. REVIEW OF LITERATURE

Pursuant to **K. Venkataraman (2014)** says that in the last year, different companies have been introducing lean manufacturing to minimize and eliminate waste. Using the value stream mapping in this article to reduce the crank shafts cycle time. Different kinds of instruments are used and benefitted, create a current state map of the crank shaft assembly line and also create a future state map to enhance the crank shaft assembly process; here is a three assembly available for the development of a crank shaft. And enhance the process and decrease waste so that three kinds of kaizen are applied and the analytical hierarchical process (AHP) is also used to determine which system is applied and then the crank shaft assembly results in order to decrease the inventory and apply the single piece flow for crank shaft manufacturing and respond quickly to customer demand.

Ratneshwar singh et.al. also (2013). Implementation of TPM in the machine shop and reducing breakdown time and improving productivity in performance. TPM relies on different pillars, such as 5s, **jishu-hozen**, scheduled maintenance, quality maintenance, kaizen office, and protection, health & environment are implemented one by one, improving product quality with efficiency over all equipment.

P. Arunagiri et al. (2014) use a weighted average approach to classify high-impact lean tools in the auto mobile industry and research around 91 industries and use 30 or more lean tools used to achieve maximum useful tools in the automotive industry by weighted average method. First, 5s lean tools are preferred to waste disposal.

By system time calculation and line balance effectiveness, **Santosh kumar et al. (2014)** applies the lean tool and decreases the cycle time in a truck body assembly line and increases performance in that product line. It also notes that lean manufacturing is a business concept that constantly enhances the manufacturing process.

In this paper, a case study of the product line is creams and ointment, **Boppana V. Chaudhary et al. (2012)**, introducing lean manufacturing in a pharmaceutical business. Fixed operating costs and failure to supply goods were also an issue in the industry. With the aid of lean manufacturing, this paper strengthens the operation to define the issue where the waste occurs and VSM is using the lean tools. In order to detect value added and non-value added processes, VSM is a mapping tool. Prepare a current state map for the collection of information and use the 5-why process. And with the aid of the 5s instrument, after creating a potential state map for enhancement. Cellular processing is often used and after the outcome is decreased inventory and customer satisfaction, and overall cycle time reduced on time delivery, non-value added time has been reduced and the floor space area has been reduced.

Shah of Rachna et.al. 2007 Lean production is an integrated socio-technical framework, the main purpose of which is to reduce waste by reducing and decreasing suppliers, consumers and internal variability at the same time. And **Horacio Soriano-meier et.al.2001** says that lean manufacturing and lean production are associated with lean management. Lean output can be done over time. It cannot be used as a panacea to solve competitive short-term problems. And lean manufacturing is often used in every field. In this paper, applying lean hospital management and enhancing the quality of the care, and providing the patient with customer loyalty and service. In this report, the lean tool kaizen is used for improving the quality of service and 5s are also used for cleaning and systematic practices. All the changes are effective through lean tools.

4. RESEARCH METHODOGLOGY

The goal of this study is to support the population of small and medium-sized enterprises, primarily in Gujarat and adjacent cities. The eligibility guidelines must be complemented by manufacturing enterprises categorised as small and medium-sized enterprises as of 21.12.1999. (Annual Report 2011 and 2008-09) An industrial enterprise where spending in fixed assets in plants and machinery, whether to maintain or lease or rent land, does not exceed Rs.Ten crore (subject to the conditioning unit is not owned, managed or subsidiary by any other industrial enterprise) (Annual Report 2010-11). The owners and managers are presumed to be able to determine the elements of the business level for SMEs (strongly united). This hypothesis was proved by (**Gibson and Birkin Shaw, 2004**), which indicates that the data collected from the most senior/experienced level individuals were closely linked to the expertise of the workers in the levels of employment graded by the survey.

The primary objective of this thesis was to analyze the relationship between the latent constructs. Elaborate association, interference, and justice are the study hypothesis; relationships are revealed by modeling of the

systemic equation of AMOS 20.00. The linear regression model factorial analysis requires SEM. Proposals for the research study focus on the structure rather than predicting cluster associations or group variances. In addition, earnings are maintained here as a reliant house, so this study does not consider group analysis and improvement necessary. In addition, the degree of relation to a particular profile was not calculated properly now agreed due to a positivist approach instead of rules. The point of the investigation remained to produce linear combinations of independent factors detected and latent to explain linear combinations of response variable (**Tabachnick and Fidell 2007**). Therefore, SEM was recommended as the key methodology for the evaluation of multi - variate results.

5. RESULTS AND DATA INTERPRETATION

5.1 Respondent Position

It was noted that, as per Table 5.1, the respondents were questioned about their role in the organization. 33.4% of respondents came from the senior management level, 37.8% came from the middle management level, and the remaining 28.8% came from the junior management level.

Table 5.1 Respondent Position

<i>Position</i>	<i>Frequency</i>	<i>Percent</i>	<i>Cumulative Percent</i>
<i>Senior Management Level</i>	67	33.4	33.4
<i>Middle Management Level</i>	76	37.8	71.2
<i>Junior Management Level</i>	57	28.8	100
<i>Total</i>	200	100	

5.2 Educational Qualification

In Table 5.2, It was noted that respondents were questioned about their educational qualifications, 25.8 per cent had diploma. 25.1 percent of the respondents had a bachelor's degree, 28.8 percent had a master's degree, and 20.3 percent had a doctoral degree.

TABLE 5.2 RESPONDENT EDUCATIONAL QUALIFICATION

<i>Educational Qualification</i>	<i>Frequency</i>	<i>Percent</i>	<i>Cumulative Percent</i>
<i>Diploma</i>	52	25.8	25.8
<i>Bachelor,s</i>	50	25.1	50.9
<i>Master,s</i>	58	28.8	79.7
<i>Doctorate</i>	40	20.3	100
<i>Total</i>	200	100	

5.3 Year of Experience:

Table 5.3 indicates that 21.1 percent of respondents have less than five years of experience, 24.7 percent of respondents have 5-10 years of experience, 26.4 percent of respondents have 11-15 years of experience, and the remaining 27.8 percent of respondents have more than 15 years of experience.

Table 5.3 Respondent Years of Experience

<i>Years of Experience</i>	<i>Frequency</i>	<i>Percent</i>	<i>Cumulative Percent</i>
<i>Less Than 5 Year</i>	42	21.1	21.1
<i>5 to 10 years</i>	49	24.7	45.8
<i>11 to 15 years</i>	53	26.4	72.2
<i>More than 15 years</i>	56	27.8	100
<i>Total</i>	200	100	

5.4 Reasons of not Implementation of Lean Manufacturing Practices:

From Table 5.4, two key reasons followed by lack of time, employee resistance, middle management resistance, not easy to enforce and lack of capital funds were noted when asked about the reasons for not adopting lean manufacturing methods, lack of understanding and lack of implementation skills.

TABLE 5.4: REASONS FOR NOT IMPLEMENTATION OF LEAN MANUFACTURING

<i>Reasons for not adoption</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
<i>Lack of Capital Fund</i>	<i>1.00</i>	<i>5.00</i>	<i>2.81</i>	<i>1.33</i>
<i>Not Easy to Implement</i>	<i>1.00</i>	<i>5.00</i>	<i>2.91</i>	<i>1.40</i>
<i>Middle Management Resistance</i>	<i>1.00</i>	<i>5.00</i>	<i>2.91</i>	<i>1.362</i>
<i>Employee Resistance</i>	<i>1.00</i>	<i>5.00</i>	<i>2.93</i>	<i>1.38</i>
<i>Lack of Time</i>	<i>1.00</i>	<i>5.00</i>	<i>3.03</i>	<i>1.49</i>
<i>Lack of Implementation Knowledge</i>	<i>1.00</i>	<i>5.00</i>	<i>3.20</i>	<i>1.45</i>
<i>Lack of Awareness</i>	<i>1.00</i>	<i>5.00</i>	<i>3.38</i>	<i>1.33</i>

TABLE 5.5: SECTOR VS. AWARENESS ABOUT LEAN MANUFACTURING PRACTICES CROSS TABULATION

<i>Sectors Vs. Awareness</i>			<i>Awareness about Lean Manufacturing Practices</i>		<i>Total</i>
			<i>Yes</i>	<i>No</i>	
<i>Sector</i>	<i>Textile Sector</i>	<i>Count</i>	<i>42</i>	<i>32</i>	<i>71</i>
		<i>Expected Count</i>	<i>39.7%</i>	<i>32.3</i>	<i>72.0</i>
		<i>% Within Sector</i>	<i>56.9%</i>	<i>43.1%</i>	<i>100.0%</i>
	<i>Automobile Sector</i>	<i>Count</i>	<i>29</i>	<i>34</i>	<i>63</i>
		<i>Expected Count</i>	<i>34.7</i>	<i>28.2</i>	<i>63.0</i>
		<i>% Within Sector</i>	<i>46.0%</i>	<i>54.0%</i>	<i>100%</i>
	<i>Machinery</i>	<i>Count</i>	<i>38</i>	<i>42</i>	<i>80</i>
		<i>Expected Count</i>	<i>44.1</i>	<i>35.9</i>	<i>80.0</i>
		<i>% Within Sector</i>	<i>47.5%</i>	<i>52.5%</i>	<i>100%</i>
	<i>Other</i>	<i>Count</i>	<i>57</i>	<i>27</i>	<i>84</i>
		<i>Expected Count</i>	<i>46.4</i>	<i>37.6</i>	<i>84.0</i>
		<i>% Within Sector</i>	<i>67.9%</i>	<i>32.1%</i>	<i>100.0%</i>
		<i>Count</i>	<i>165</i>	<i>134</i>	<i>299</i>

Total	<i>Expected Count</i>	165.0	134.0	299.0
	<i>% Within Sector</i>	55.2%	44.8%	100.0%

6. CONCLUSION

The current study helps to define the crucial success factors that enable SMEs to effectively implement lean practice. The research also helps to define the relationships between each critical success variables and performance measures and to recognize their power of driving and dependency. By using structural equation modeling and the ANN approach to a case organization, the above mentioned goal is achieved. However, to finalize the list of CSFs and PMs and achieve the specified target, an expert panel of 10 members, including eight industry experts and three academic experts, will determine the comprehensive list of critical success factors through literature review. The eight industry experts include two top management executives, three experts in lean methodology and one case organization consultant. The list of CSFs and PMs is then submitted for finalization to the expert panel. The critical success factors shortlisted are then used as feedback for the SEM plan, which has helped to establish a hierarchical system of critical success factors and performance measures. The findings of the SEM method will later be used as part of the ANN approach. The ANN strategy helps to recognize the driving force and dependency of each crucial success factors and performance measures. The study looked at the critical success factors and performance measures for applying the Lean practice. To examine the relationship between Lean Production Practices and organizational performance, and identify how many of these relationships were statistically significant. The extensive investment in Lean does yield strong financial results. For this study derived performance system in line with Lean Practice Tools identified in the form of core elements or Critical Success Factors of Lean Practice initiatives. Indian SMEs, especially in Gujrat region, need to focus on better management of the critical success factors of Lean initiatives and provide a rational basis for resource allocation on the basis of significant elements, improvements will occur in quality, productivity, and ultimately result in improved financial performance and operating cost, employee involvement, Organization culture and will bring organizational growth for global competitiveness.

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