

Development of Lean Manufacturing Model for Increasing Productivity & Reduce Inventory in Brake Pad Manufacturing Industries Review

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ABSTRACT

It is the approach to minimize industrial wastes with the implementation of appropriate LS in available resources & also a method to identify the strong and weak factors in lean implementation for better improvements. The weak factors may be in form of infrastructure, worker knowledge, layout, management support, inventory control etc. Once the changes take place maximum profit could be achieved with contribution from the engineers, staff of an organization, suppliers and the management team. The study finds a most difficult favorable result for implementing lean methods for to calculate productivity, reduce waste at all stages, reduce manufacturing cost, improve product quality, standardize process, increases company profit, reduce inventory and indirectly improve customer satisfaction.

Keywords: LMS-Lean manufacturing system, TPM-Total productive maintenance, SME-Small – to – medium enterprise, CLM-Customer lifecycle management, GT-Group technology, QC-Quality control, WIP-Work in progress, JIT-Just in time.

INTRODUCTION

Lean manufacturing is an efficient system for waste minimization and improvement in performance of the manufacturing system. The lean methodology is working for two purposes, Mortimer Andrew Lee (2006) explained it.

- a. Customer satisfaction**
- b. Increase profitability.**

It is a systematic method for waste elimination within available resources with good customer satisfaction & highly productivity. There are so many lean strategies (LS) which remove non value added activities/wastes in the industry. LS are identified & selected by the Indian manufacturing industries. But, it is observed that every industry is not implementing all LS. e.g. 5'S, JIT, VSM are the most implemented strategies considering in every manufacturing industry due to the necessity of implementation. On other hands, Kan-Ban, Kaizen, Lean training, TQM are the strategies which need some extra attention but these are not so costly strategies, Cellular manufacturing, TPM, Six Sigma is the strategies which are some costly to implement. Similarly different types of wastes can be considered regularly like overproduction, waiting, flaws, inappropriate processing etc. and some are not considered regularly like worker fatigue, work in process, failure time, worker talent not used, setup time etc. LS and wastes are related to each other. A good and proper selection and implementation of LS are very important which result elimination of wastes and good utilization of money and time to improve industrial performance. In the past years, many researchers have published a number of research articles which focus on the comfortable implementation of lean manufacturing or contain case studies that focus on individual industry performance. This research will identify lean strategies and industrial wastes through literature review and then select high impact LS and industrial wastes. e.g., JIT is a continuous flow and quick switch strategy used in most of the industries, so most research articles focus on it. 5'S is used most frequently, while safety development methods are also used with it. The standards of quality & manufacturing implemented by TPS. The Japanese companies achieved high productivity, best quality by using limited resources. Denis To will ed2007) [15] define that LMS is the systematic method of identify & eliminate waste in the process. Lean manufacturing creates massive progress in quality, efficiency, process lead time, material costs, productivity, and scrap. In general, LS provides lower product costs & higher quality. Lean manufacturing develops a

substitute for mass production, which provides future solutions for the continuous growth of quality in the present competitive market scenario. According to principle of specialization goal of any organization earns maximum profit. By increasing revenue & implemented effective control cost management system helps to achieve maximum profit. The cost minimization in any organization is very important & challenging concept. It can be achieved by better planning, advance technology & tools, ideas, operations managements. Narkhede B.E said that quality of any product is the priority for organization growth. Edward Deming 1990 [13] the king of Quality Management. The prestigious award for Quality is known as Deming Award. In the early 1980s the world best manufacturers realized that the Japanese manufacturing companies did very different & get best results in manufacturing sector. It was very difficult for whole world to gave competition to Japanese companies. The balance supply & demand increase competition between existing competitors which affect on switching of the customers.

LITERATURE REVIEW

Lean manufacturing is also known as Toyota Production System (TPS) 1998 [12]. There are many benefits those are associated with lean manufacturing are Improved Productivity, Improved Quality, Reduced Wastes, Improved Lead Time. Improved Customer Service it works for increasing the quality of the product. Researchers around the world have conducted no of empirical studies utilising the survey methodology. Sachin Kamble (2020) [6] a research was done by Indian manufacturing companies in which they find that industry 4.0 directly effect on manufacturing & LMS practices Numerous surveys exist in the field of L M and address a wide variety of issues. The function of lean manufacturing within industry functions has diverse impacts, such as the development of working methods and the rearrangement of industrial practices (Papadopoulou & Ozbayrak 2005) [16]. Thus, for businesses to succeed and persist surviving in such insecure market conditions, industries have to develop means of eradicating non-value-added wastes that make the overall cost of their processes Mudhafar Alefari et al (2020) [8] the goal of this study to recognise the lean implementation barriers in UAE industries. The barriers in lean business, six implicated in sustainability manufacturing research was done by discussed with senior management persons & chief executives in Queensland, Australia. Eagle stone (1994) studied the share of industries located in Australia had implemented LP in their organization and undergone structural changes to be implemented. They found that almost 81% of the organizations had successfully implemented LP and the impacts in the field of supplier and customer relationship, employee satisfaction, productivity improvement etc.

Oliver et al. (1996) [11] identified 71 automotive manufacturers to study the impact of LP on the performance of the organization. They concluded that the top performing plants showed a significant improvement in process control than the other low performers. Shah & Ward (2003) [17] analysed the correlation between the size of plant, age of plant and unionisation on the favourable situation of implementing 22 LP related to manufacturing process. Most of the manufacturing companies implement TPS methods & tools. Nelder, (2006) [3] said LMS is working for two purposes which are waste elimination & delivery on time. The delivery of any product is depend on the supply chain of any organization. Muda & Hendry (2002) proposes a world-class manufacturing concept combined with lean principles for the customization department. Anvari, A, Zulkifli, N & Yusuff, RM 2011 the purpose of this research was to identify elements related to lean barriers in SMEs. The outcome of this study shows that lack of qualified workers, lack of information about current technology, opposition to change are the main lean implementation barriers in SMEs Singh and Sharma (2009) presented that VSM is a multifunctional tool for lean implementation with a case study of Indian manufacturing industry and saw 92.58 per cent, decrease in lead time, 2.17 per cent reduction in processing time, 97.1 per cent decrease percent in WIP and 26.08 percent. Reduction in staffing requirement. Many operations managers have implemented or continue to implement manufacturing because of the benefits reported by other companies or because their customers have demanded it.

Research Gap And Problem Identification

- 1) While implementing LEAN practices they identified several barriers which hindered progress.
- 2) The main hindrance being the lack of training and the reluctant of the employees to adhere to the changes in implementing Lean techniques.
- 3) Strategic groups are essential to implement lean successfully.
- 4) Stress level induced among the employees after implementing lean was studied and found less significant.
- 5) Each industry should formulate its own strategy to implement lean and no standard framework suits even similar industries.
- 6) After which process the part is to be inspected is the prime factor which limits the production of defective parts.
- 7) Position and number of inspection units has to be analysed carefully in order to reduce the cost of inspection and increases the effectiveness of the system.
- 8) To find the optimal number of inspection units and the suitable position, many optimization algorithms are used.

METHODOLOGY

LMS implementation is the fourth stage. At this stage, selected tools were implemented in the production line of case study Company to improve its productivity & reduce inventory. Under each lean tool, all the necessary activities were carried out to make changes in the production line. Lean implementation becomes a tedious process unless planned appropriately. It involves time, cost and strong labour force. So, it demand san appropriate work flow, which could reduce the time taken to complete the task. The methodical approach of lean implementation consists of team formation, work allocation, plan work cell, future state value stream mapping, implementation of selected lean tools and quantification of performance measures. The lean implementation methodology is presented.

- Industrial visits
- Literature review
- Problem identification
- Tool selection
- Methodology
- Implementation
- Result and discussion
- conclusion

CONCLUSION

A framework was developed to show the sub factors the barriers in moving towards the objective of lean readiness. From this work, 25 lean tools were identified from different literature works. From this study the top three lean tools were shortlisted. The shortlisted lean tools were ranked by using weighted sum model against five lean wastes such as transportation, motion, breakdown/waiting, defects and inventory as criteria. The final five lean tools were selected and applied for lean implementation. The applied lean tools were 5S, safety, TPM, standard operation, JIT. It covers how the productivity is increased & inventory reduction by LMS implementation. This way company reduce inventory. LMS implementation helps to control these problems. But it also demonstrates the way in which lean can be put into practices. More over the lean model explains how the reduction of lean wastes can improve the productivity. It reduces the gap between the factors affecting the material flow and lean tools with a help of a framework called lean model.

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