



Performance Analysis of Lean Manufacturing in Small Scale Industries for Maximizing Productivity

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Abstract

The economy of India is a developing mixed economy with contribution from manufacturing and service segment. It is the world's sixth-largest economy by nominal GDP and the third-largest by purchasing power parity. Manufacturing Enterprises are the enterprises engaged in the manufacture or production of goods pertaining to any industry or employing plant and machinery in the process of value addition to the final product having a distinct name or character or use. In today's manufacturing environment, assembly work is routinely characterized by short production cycles and constantly reducing batch sizes, while the variety of product types and models continues to increase. The Micro, Small and Medium Enterprises sector has emerged as a highly dynamic sector of the Indian economy over the last five decades. This sector contributes significantly in the economic and social development of the country by fostering entrepreneurship and generating largest employment opportunities at comparatively lower capital cost. The MSMEs are widening their domain across sectors of the economy, producing diverse range of products and services to meet demands of domestic as well as global markets. The share of MSME in Indian GDP is 28.77%.

circumstances. Despite the fruitful outcomes of lean manufacturing tools in large sector organizations; this idea has not been adopted by meaningful number of SMEs operating. SMEs by virtue of their size are constrained by lack of adequate funding and leadership deficiencies for executing lean concepts. They lack in management involvement and commitment that are perhaps the most essential prerequisites in aiding any of the desired productivity improvement initiatives. Small scale industries don't clearly define vision and strategy in forecasting a projects likely costs and duration this result in unexpected results of lean implementation. A study shows that 90% of such implementations are late or over budgeted.

In today's manufacturing environment, assembly work is routinely characterized by short production cycles and constantly diminishing batch sizes, while the variety of product types and models continues to increase. Constant pressure to shorten lead times adds to these demands and makes the mix truly challenging, even for the most innovative manufacturers. The difficulties that companies face in today's marketplace are shifting customer demand, increased variation in products and demands for perfect quality. The way to escape this pitfall requires redefinition of inventory level and new production philosophy. As global competition is becoming more intense, competition has increased among lean producers. This has been quite evident as more and more mergers have been taking place among major companies. Competition among the lean manufacturers is based upon the assumption that; sustainable product related competitive advantages are unlikely to be developed [5]. Lean manufacturing, an approach that depends greatly on flexibility and workplace organization, is an

1.Introduction

Most of the SMEs are the suppliers to the large scale industries. The competition in today's market has forced companies to rethink industrial practices for their implementation in improved manufacturing. Manufacturing organizations in India are showing great interest in the introduction of advanced manufacturing technologies, associated management, and quality improvement concepts like Lean and six sigma, TQM etc. Large sector companies now make it compulsory to use quality tools for quality improvement and techniques of Lean Manufacturing - Lean tools through various ways to manage their suppliers and these tools are very successful in large companies and Indian automotive internationally. [3]

SMEs operate in a very precarious position as they must operate in a reactive manner to eve changing industrial

excellent starting point for companies wanting to maintain aim of the high quality, low cost, and just in time take a fresh look at their current manufacturing time delivery by shortening the production flow by methods. Lean techniques are also worthy of eliminating waste. Lean manufacturing is a team investigation because they eliminate large capital base structure. It breaks down organizational barrier Outlays for dedicated machinery until automation and develops highly trained and motivated employees who investigate problems and find solutions as a part of their job. Lean manufacturing is a philosophy to shorten lead time, reduce waste, and to reduce costs, and lean manufacturing is an integrated socio technical system whose main enterprises are those which practice the lean manufacturing philosophy. The techniques used to reducing and minimizing supplier, customer, and implement lean manufacturing are varied and internal variability. [7]

are the results, but the customer is pleased with In today's competition everyone is behind reduced lead times and lower prices. Very less to increase the business. Customers are awareness is found in SMEs and people, middle expecting more for the quality in product so that, management is main barrier in the lean standing with other competitors; it is needed to implementation Thus it is required to create and implement the lean manufacturing technique. Lean framework to analyse manufacturing systems and implementation gives the better quality of product access the impact of various practices on system and customer satisfaction without any investment. performance.

Lean methodology is not a short term non-value added activity with the help various process although some significant cost reduction can tools. Lean manufacturing also reduce the may be obtain quickly; it is continues improvement even type waste occurring in industry. Like (1) process that requires employee training, employee transport (2) Inventory (3) Motion (4) waiting involvement and employee empowerment. Lean (5) over processing (6) Over production (7) Defect.

manufacturing frequently utilises techniques such as Just-in-time production, total quality management, total cost management, group technology, concurrent engineering, team based work arrangements, supplies-producer- customer relationship (supply chain management) and integrated product development. The reduction in waste is not only reducing scrap production, but also increased process yield, reduced process queues and inventories, development of new product from product waste and elimination of waste streams which are often very costly.

3 Lean manufacturing tools:
There are various types of lean manufacturing tools available used in enterprises to improve production processes. The following are major lean tools discussed briefly.

A) Cellular manufacturing:
Cellular manufacturing reduce the transportation waste and reduce the inventory. Cellular manufacturing also called as "one piece flow" process. It is difficult to full fill the customer requirement with traditional product line, so using the U- shape product line replace traditional product line.

B) Just in time (JIT):
Just in time is a heart of the lean manufacturing. Just in time production gives right part at the right place at right time. Kanban system, Production smoothing, and setup time reduction are component of any JIT system. "Kanban" is a

Japanese word which means card or signal. Which process is running and give the basic information about manufacturing.

- Single Card Kanban System and
- Double Card Kanban System

Single Card Kanban System: In a single card kanban system parts are produced and brought according to a daily schedule and deliveries to the user are controlled by c-kanban.

C) Production Smoothing: Production smoothing is the process of the balance the work load over different time period. It provide flexibility to respond rush order. It is help to eliminate over production.

D) Total productive maintenance (TPM): Total productive maintenance is the techniques for reducing the machine down time and eliminates the defect and scrap. TPM is a fundamental pillar of lean. It is introducing awareness of self-maintenance and also introducing the preventive maintenance of machine.

E) Continuous Improvement: Continuous improvement such as improve the quality of product and customer satisfaction. Kaizen and 5s are the component of continuous improvement.

F) Kaizen: Kaizen is a Japanese word kai means continuous and zen means improvement, so its English translation is continuous improvement. Its main focus on completely improve the product and satisfy the customer.

G) 5s: It has a five stage of the improvement of the process. It has five "S" all "S" gives the different meaning and activity. Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. Is a Japanese word and

translate into English These 5S is: Sort, Set (in place), Shine, Standardize, and Sustain
H) Value stream mapping: Value stream mapping (VSM) is a paper pencil tool it is identify the value added and non-added. It is visual representation of the material flow and information flow. Value stream

mapping creates a two maps starting with current state map it gives the snapshot of assembly which process running. And after second one is create a future state map for the improvement of the process.

I) Poka Yoke (Error Proofing): Poke Yoke is a mechanism that helps to avoid the mistakes. It ensures that the defect is never a structured approach to ensure quality and error free manufacturing environment. Error proofing assures that defects will never be passed to next operation.

J) PDCA: It's a Plan-Do-Check-Act four step method used in any business which supports the continues improvement process.

K) Overall Equipment Effectiveness: Measures the availability, performance efficiency, and quality rate of equipment - it is especially important to calculate OEE for the constrained operations.

L) Quick Changeover: Quick changeover is a technique to analyze and reduce resources needed for equipment setup, including exchange of tools and dies. Single Minute Exchange of Dies (SMED) is an approach to reduce output and quality losses due to changeovers.

M) Standard Rate or Work : The length of time that should be required to set up a given machine or operation and run one part, assembly, batch, or end product through that operation. This time is used in determining machine requirements and labour requirements.

N) Takt Time : The time required between completions of successive units of end product. Tact time is used to pace lines in the production environments.

O) Theory of Constraints: A management philosophy that can be viewed as three separate but interrelated areas - logistics, performance measurement, and logical thinking. TOC focuses on the organizations scarce resources on improving the performance of the true constraint, and

therefore the bottom line of the organization.

P) Total Productive Maintenance: Total Productive Maintenance (TPM) is a maintenance program concept, which brings maintenance into focus in order to minimize downtimes and maximize equipment usage. The goal of PM is to avoid emergency repairs and keep unscheduled maintenance to a minimum.

Conclusion

In the current era of globalization, industries are adopting new tools and techniques to produce goods to compete and survive in the market. The most daunting issue faced by manufacturers today is how to deliver their products or materials quickly at low cost and good quality. One promising method for addressing this issue is the application of lean management principles and techniques. Lean management simply known as lean is production practice, which regards the use of resources for any work other than the creation of value for the end customer, is waste, and thus a target for elimination. Though there had been numerous claims on the real origin of Lean Manufacturing principles, it was generally accepted that the concept with this back ground, business needs to compete with efficiency and quickly respond to market needs [6].

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