# SOME STUDIES ON LEAN MANUFACTURING IN INDIAN MANUFACTURING INDUSTRIES

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## ABSTRACT

*Lean Manufacturing is a systematic approach to identifying and eliminating waste through continuous improvement. The manufacturing industry in India must also look to leverage its advantages, its large domestic market, good conditions in terms of raw materials and skilled labour, and the quality focus. "Lean manufacturing" is a leading manufacturing paradigm being applied in many sectors of the economy, where improving product quality, reducing production costs by reducing cost of poor quality, reduce inventory level, decreased material usage and being "first to market" and quick to respond to customer needs are critical to competitiveness and success. Lean principles and methods focus on creating a continual improvement culture that engages employees in reducing the intensity of time, materials, and capital necessary for meeting a customer's needs. Implementation of Lean Manufacturing is very important in current scenario in Indian Manufacturing industries. Lot of wastages are happened in industries. Manufacturing industries gain Number of benefits by applying Lean Manufacturing.*

***Keywords: Lean Production, Product Quality, Cost of Poor Quality, Continual Improvement, Indian Manufacturing Industries and Waste Elimination.***

## I. INTRODUCTION

A new vocabulary has developed in the past decade that stems from the Toyota Production System. Lean manufacturing is a concept whereby all production employees work together to eliminate waste [1].

Lean manufacturing is defined as "A philosophy, based on Toyota Production System, and other Japanese management practices that strives to shorten the time line between the customer order and the shipment of the final product, by consistent elimination of waste". All types of companies, manufacturing, process, distribution, software development or financial services can benefit from adopting lean philosophy. As long as a company can identify a value stream, from when the customer's order product to when they receive it, lean principles can be applied and waste removed [2]

Lean manufacturing is now one of the most powerful manufacturing systems in the world. Numerous plants around the world have attempted to implement or adopt it to enhance their efficiency [3]

Lean manufacturing is a manufacturing philosophy which focuses on delivering high quality products at the lowest price and at the right time. Lean manufacturing focuses on eliminating waste or non-value added activities.

When companies implement several or all of these lean methods, several outcomes consistently result:

1. Reduced inventory levels (raw material, work-in-progress, finished product) along with associated carrying costs and loss due to damage, spoilage, off-specification, etc.;

2. Decreased material usage (product inputs, including energy, water, metals, chemicals, etc.) by reducing material requirements and creating less material waste during manufacturing;
3. Optimized equipment (capital equipment utilized for direct production and support purposes) using lower capital and resource-intensive machines to drive down costs;
4. Reduced need for factory facilities (physical infrastructure primarily in the form of buildings and associated material demands) by driving down the space required for product production;
5. Increased production velocity (the time required to process a product from initial raw material to delivery to a consumer) by eliminating process steps, movement, wait times, and downtime;
6. Enhanced production flexibility (the ability to alter or reconfigure products and processes rapidly to adjust to customer needs and changing market circumstances) enabling the implementation of a pull production, just-in-time oriented system which lowers inventory and capital requirements.
7. Reduced complexity (complicated products and processes that increase opportunities for variation and error) by reducing the number of parts and material types in products, and by eliminating unnecessary process steps and equipment with unneeded features.

## II. HISTORY OF LEAN

After World War II, Japanese manufacturers were faced with the dilemma of vast shortages of material, financial, and human resources. These conditions resulted in the birth of lean manufacturing concept. Toyota motor company, led by its president (Toyota), recognized that American automakers of the era were out-producing their Japanese counterparts; in the mid 1940's American companies were outperforming their Japanese counterparts by a factor of ten. In order to make a move toward improvement early, Japanese leaders, such as, Shigeo Shingo and Taiichi Ohno, devised a new, disciplined, process-oriented system, which is known today as "Toyota Production System" or "Lean Manufacturing" [4]

## III. LITERATURE REVIEW

Karlsson and Ahstrom(1995) [5] asses the changes towards the lean production. They observed a significant role of remuneration system on the lean production management. They realized a need for congruence between the principles of organization and remuneration. They also proposed a remuneration system for lean manufacturing implementation.

Warnecke and Huser(1995) [6] explained lean production or rather lean management is an intellectual approach consisting of a system of measures and methods which when taken all together have the potential to bring about a lean and therefore particularly a competitive state in a company. The main fields of activity concerned are product development, chain of supply, shop floor management, and to lesser extent after sales service.

Imtiaz and Ibrahim(2007) [7] demonstrated that the organizations have integrated some of the principles of lean production system (LPS) in construction, but with variations. Some of the LPS principles are incorporate more frequently than others. The organizations need to give importance to identify and eliminate waste from all facets of construction operations. This can be done through the use of planning production process and workflow. Organizations also need to apply LPS principles holistically in construction by focusing on improving whole processes. They have also found a correlation between LPS principles and operational performance.

Saleh (2011)[8] found that the five studied Iraqi manufacturing firms possibilities of establishing the lean foundations are different according to the availability of thinking capital and there is a positive relationship between the thinking capital and lean foundations for all of the studied firms.

McGrath (2007)[9] found that both Irish companies have made some great improvements in terms of the value streams of their respective plants and also in the reduction of waste and inventory. Another result has been reached that lean manufacturing is a considered as a strategic tool to improve the competitive position of the organization.

## IV. BENEFITS OF LEAN

Whether you are looking to cut costs, gain a competitive advantage, or remain viable in the face of competition that has gone lean, there are many reasons to adopt lean manufacturing techniques in your company. Lean benefits include reduced work-in-process, increased inventory turns, increased capacity, cycle-time reduction, and improved customer satisfaction.

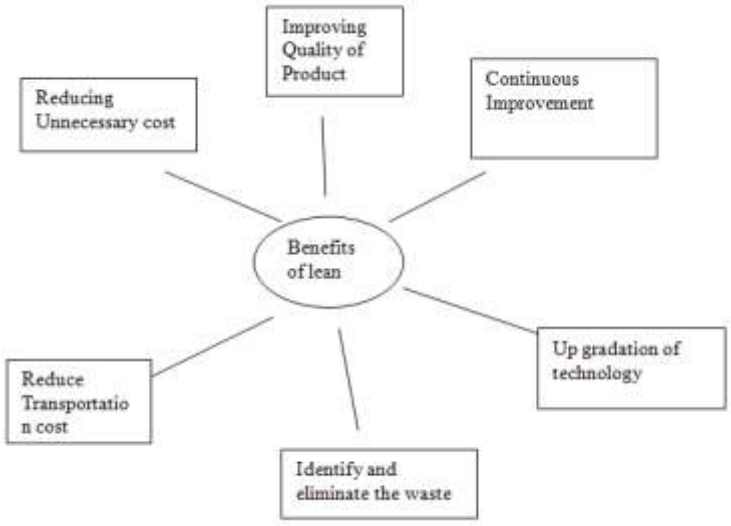


**Figure-1:- Benefits of Lean**

## V. MAIN KINDS OF WASTES

- Overproduction
- Defects
- Inventory
- Unnecessary Processing
- Transportation
- Waiting
- Over-processing

## VI. IMPLEMENTATION OF LEAN MANUFACTURING IN INDIAN INDUSTRIES:

Implementation of Lean Manufacturing is very important in current scenario in Indian Manufacturing industries. Lot of wastages are happened in industries such as over production, Defects on products, Inventory,

Unnecessary Processing, Transportation, Waiting as a result of these wastages increase in product cost. Manufacturing industries gain Number of benefits by applying Lean Manufacturing. With the help of lean we reduces the following wastages happen in industries

1. Raw materials consumed in making defective products. Defective components require recycling or disposal and more space required for rework and repair, increasing energy use for heating, cooling, and lighting. We reduce with the help of lean manufacturing
2. Potential material spoilage or component damage causing waste. Wasted energy from heating, cooling, and lighting during production downtime.
3. More raw materials consumed in making the unnecessary products. Extra products may spoil or become obsolete requiring Disposal.
4. More energy use for transport, Emissions from transport, More space required for WIP movement, increasing lighting, heating, and cooling demand and energy consumption, More packaging required to protect components during Movement
5. More packaging to store work-in-process ie Waste from deterioration or damage to stored WIP, More materials needed to replace damaged WIP, More energy used to heat, cool, and light inventory Space.
6. More parts and raw materials consumed per unit of production, Unnecessary processing increases wastes, energy use, and emissions

At the same time, lean implementation consistently fosters changes in organizational culture that exhibit the following characteristics:

• A continual improvement culture focused on identifying and eliminating waste throughout the production process;

• Employee involvement in continual improvement and problem-solving during production

• Operations-based focus of activity and involvement and a whole systems view and thinking for optimizing performance.

## VII. CONCLUSION

Lean manufacturing" is a leading manufacturing paradigm being applied in many sectors of the economy, reducing unnecessary cost during production, improving product quality, reducing production costs by reducing cost of poor quality, and being "first to market" and quick to respond to customer needs are critical to competitiveness and success. Lean Manufacturing is a collection of philosophies and techniques that reduce waste and add value.It is becoming more accepted and implemented in industry.

Implementation of Lean Manufacturing is very important in current scenario in Indian Manufacturing industries. Lot of wastages are happened in industries can be removed with the help of Lean Manufacturing. Manufacturing industries gain Number of benefits by applying Lean Manufacturing.

It become essential for a company to remain competitive in the long term, which has focused on continuous improvement, has to focusing on systems approach, implementation of new and emerging techniques, automation and up gradation of technology. It is a systematic approach to identifying and eliminating waste

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