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A Review on Benefits of Implementing Lean Manufacturing

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ABSTRACT

In competitive environment, lean manufacturing is necessary in every industry. Due to rapidly changing business environment the organizations are face challenges. Any organization whether manufacturing or service oriented, to survive may depend on its ability and continuously improvement in process. Therefore value adding process is necessary to achieve this perfection; hence implementing a lean manufacturing system is becoming a part of any type of organizations to sustain. Moreover, Lean manufacturing are widely used for eliminating various types of waste and increase profit of organization by making process more efficient. This paper gives the literature survey on lean tools to apply the lean manufacturing and presents benefits of implementing lean manufacturing.

Keywords: Lean Manufacturing, Lean Tools, Lean Implementation.

I. INTRODUCTION

Lean concepts are evolved from Japanese industries especially from Toyota. Lean manufacturing is considered to be a waste reduction technique, but in practice lean manufacturing maximize the value of the product through minimization of waste. The waste-elimination concept of Lean manufacturing has a significant impact on various industries. The goals in implementing the lean manufacturing are lower production costs; increased output and shorter production lead times. The paper review focused on the implementing lean and their benefits, which is achieved through the tools of lean manufacturing.

II. LEAN IMPLEMENTATION METHOD

1) Value Stream Mapping (VSM)

Value Stream Mapping (VSM) is the process of mapping for the material and information flows required to know the activities performed by manufacturers, suppliers and distributors to deliver products to customers. Initially a current state map was drawn from which the source of waste identified and its finds the opportunity for implementing various lean techniques. VSM facilitates the identification of the value-adding activities in a Value Stream and elimination of the non-value adding activities. A second step in VSM is to draw a future state map based on improvement plan. The availability of the information in the VSM facilitates and validates the decision to implement lean tool and also motivate the organization during the actual implementation to obtain the desired results. VSM clearly indicate the inventory, process time, Lead time, waiting time etc and process flow from which we can sort out bottleneck cycle time against Takt time.

2) Group Technology

Group Technology is successful implementation of flexible manufacturing system which is need grouping of parts by using similarity among the design and manufacturing which make the production plan and manufacturing process flexible. Based on the grouping of parts through similar process, dissimilar machines are grouped together to form a cell concept as suggest by lean concept. Cell formation is purely based on the nature of the process which varies from organization to organization.

3) Inventory

Inventories are classified into raw material, work-in-process (WIP), finished goods. Survey from various articles indicates that 60% of wastes in manufacturing system are due to inventory. As per literature survey the excess raw material is due to poor projection of product

plan, availability of raw material, defective parts, waiting for processing leads to more work in process, and unnecessary transportation between working stations or plants increases work in process inventory, overproduction of parts beyond the plan leads to finished goods inventories which wait long time in the warehouse. Inventories are reduced by improving the quality levels, rejection rates, delivery rate, lead time and customer satisfaction. Raw material is controlled by ordering material against the demand. As a result manufacturing lead time increase which is increase the work in process. Kanban and Pull system are the lean tools which are control the work in process.

4) Kanban

Kanban is a lean tool of the Lean manufacturing system which was created to control inventory levels, the production and supply of components. During demand uncertainty, the buffer maintenance is necessary for smoothening production flow by Kanban System in order to lower the inventory. Thus Kanban system production for inventory level which are results in less lead time in product delivery and effective utilization of resources such as man, machine etc.

5) Takt time

Takt time defined as frequency of a part or component must be produced to meet customers demand. Takt time depends on monthly production demand, if the demand increases the Takt time decreases, if the demand decreases the Takt time increases which mean the output interval increases or decreases. Literature suggested that the importance of measuring Takt time due to the costs and inefficiency factors in producing ahead of demand, which includes Storage and finished goods.

6) Kaizen

Kaizen is a philosophy that defined as "Improvement initiatives that increase successes and reduce failures" Continuous Improvement is the management technique which effort the cultural change in the workplace. Once process stability is established, Continuous Improvement tools are required to determine the root cause of inefficiencies in production line. Kaizen tool help us for zero inventories exposes waste such as the idle time, waiting time, inventory and resource problem. In this competitive environment Continuous Improvement is necessary for sustaining in the market, but the success of the Continuous improvement depends on employee, adaptation, team work, leader engagement, motivation, initiative, and training.

III. LITERATURE REVIEW

Gisela lanzaa(2014) this paper indicate that Quality Value Stream Mapping is capable of systematically visualizing, analyzing and optimizing multistage manufacturing processes from a quality assurance viewpoint. The rate of defects and the quality-related costs were reduced.

Muhammad al-Ashraf(2012) conclude that the VSM applied to assess the expected impact of a change in the production process resulted in savings (lower rejection rates) and to a certain extent; a positive view was due to substantial gaps between standardized work and real work. The total reduction of man time was at 16.9% while the machine time was reduced at 14.17% compared to original processing method.

Darshak A. Desai(2015) conclude that six sigma tool use for quantitative continuous improvement which improves bottom line of the organizations by reduction of costs, waste and non-conformance. Also adding that, Quality and productivity can be improved by reduction in rejection, rework, cycle time, idle time and scrap by application of six sigma.

Hiren R. Kardani(2014) conclude that by using value stream mapping, we observed that non-value added time is reduced by 25.6%. Also, the WIP is reduced and thereby lead time is reduced by 66.7%.This proves the utility of value stream mapping technique.

Santosh kumar et, al(2014) conclude that use lean tool in time measurement for reduce the cycle time in assembly line with improve efficiency in that product line. Also, as per author, lean manufacturing is a business philosophy that continuously improves the process involve in manufacturing.

Mashitah Mohamed Esac(2013) this paper reveal information regarding Kanban system, which is save

costs by eliminating over production, developing flexible work stations, reducing waste and scrap and minimizing the waiting times; thus reducing the inventory stock levels and overhead costs of production (Surendra et al., 1999).

S. P. Kallurkar(2014) conclude that JIT techniques used for reduce non-value added activities, they have more time to focus on value added activities, which will improve service to their customers and provide better operating environment for the organization. Moreover, JIT also useful for optimizing manufacturing efficiency by reducing lead time through waste elimination and kanban system.

Nurul Hayati(2012) conclude that lean implementation shows that lead time in-process and finished goods inventory and also finished good area will certainly improve lead time reduced by 40%, in-process and finished goods inventory minimized by 23-29% finished good area optimized by 4%.

Seyed Mojib Zahraeea(2015) conclude that there are lots of reworks during the production process because of poor production control. Thus, identifying and eliminating waste by using product selection, conceptual design, and time frame formulation through talk time calculation, by using value stream mapping tool, production lead-time (PLT) has gone from 8.5 days to 6 days, and the value added time decrease from 68 minutes to 37 minutes.

Ratneshwar singh et,al.(2013) conclude that TPM implementation reduce break down time and improve performance efficiency. Adding that, TPM also depend on various pillars, like 5s, planned maintenance, quality maintenance, kaizen etc, which are improve the quality of product with over all equipment effectiveness.

Benefits of implementing of lean manufacturing:

- Reduction in lead time
- Improvement in productivity
- Quality improvement/ reduce defects
- Reduce cycle time
- Reduction of unnecessary activity
- Reduction in work in process [WIP] Inventory
- Waste reduction
- Reduction of cost

Summary of Literature Review and Discussion

Paper	**Title**	**Journal**	**Tool applied**	**Benefits derived**
1	Quality Value Stream Mapping	Elsevier	VSM	Reduce defect and product cost
2	Production Flow Analysis through Value Stream Mapping: A Lean Manufacturing Process Case Study	Elsevier	VSM	Reduce man and machine time
3	A Review of Six Sigma Implementation in Indian SMEs – Tools & Techniques Used and Benefits Drawn	IJAERD	Six sigma	Improve quality and productivity
4	Value Stream Mapping: A Case Study of Automotive Industry	Elsevier	VSM	Decrease lead time
5	Cycle time reduction of truck body assembly in automobile industry by lean principal.	Elsevier	VSM Tree diagram	Reduce cycle time
6	Lean Manufacturing Case Study with Kanban System Implementation	Elsevier	kanban	Reduce inventory and over production
7	A Case Study of Just-In-Time System in Service Industry	Elsevier	JIT	Reduce lead time
8	Development of Kanban	Elsevier	kanban	Reduce lead

	System at Local Manufacturing Company in Malaysia – Case Study			time and inventory
9	Production line analysis via value stream mapping: a lean manufacturing process of color industry	Elsevier	VSM 5s	Decrease lead time. Reduced value added.
10	TPM implementation in a machine shop. case study	Elsevier	5s Kaizen	Improve performance efficiency and reduce break down time

IV. CONCLUSION

Implementation of lean manufacturing is mainly useful for waste reduction, continuous improvement, process improvement and improving supplier customer relationship by reducing lead time. It is also offers various types of tools to improve manufacturing. Adding that, lean manufacturing also provides varieties of strategies for improving performance and to compete in this emerging market.

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