Review of Increase in Productivity of an Industry by Applying Lean Manufacturing Process

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Abstract— Lean manufacturing is defined as a systematic approach to identifying and eliminating waste through continuous improvement, flow the product at the pull of the customer in pursuit of perfection. Implementation of lean manufacturing is very helpful to all manufacturing arrangements, it reduces all kinds of waste and non-value added activities. Lean is very wide concept. Here I motivated to apply lean concepts in manufacturing system i.e. automobile industry. Today industries are facing various problems related to quality and customer demand. The present study has been undertaken for analyzing different types of wastes in a Diesel Locomotive Plant's Light Machine Shop (crankshaft section) with an aim to design strategies for developing and implementing a Lean Manufacturing Program in such machine shops. The study has been carried out in a phased manner. For the purpose of modeling for developing a strategy for implementation, the controls identified have been grouped into broad, generalized category. Expert opinion has been utilized to identify factors and parameters affecting the development of a generalized approach for implementation. Generalized of various measures for developing an approach to be used by industry in the future has been suggested using expert belief. It has further been suggested that the implementation of the development approach be carried out in three phases. With the help of lean we increase production rate and improve quality.

Key words: Lean manufacturing, principle, Tool, wastes, crankshaft section, Automobile industry

I. INTRODUCTION

Now in these days Lean Manufacturing is very helpful to all manufacturing systems. Lean it means less everything which not good for the company. Lean reduces human effort, space requirement, investment, etc. Lean concept is developed by Toyota Company and it known as the Toyota production system. Lean means manufacturing without waste. Lean consist various tools and technique. Lean is an adjustable approach to customer demand. It covers quality circle, just-in-time, supply chain management, kaizen, kanban etc.

Lean reduces all kind of waste and reduces non-value added activities. The Aim of the every industry that reduces waste, improves quality, reduce cost and shorten lead time. Lean also minimize inventory levels; improve labour productivity, utilization of equipment. By using lean concept industry satisfy its customer requirement. Many Companies choose lean concept because today's competition is very tough and survive in this market lean concept is very helpful. Some companies implement lean practice by using its own way. Companies develop its own lean strategy which helpful to reduce wastes and improve quality of product. Hence company very flexible with its customer requirement.

Lean manufacturing has the capability to produce product using the least amount of non-value-adding activities that add time and subsequent cost to the manufacturing process. The lean methodologies include certain mathematical formulas that balance work being performed to optimize the manufacturing resources necessary to achieve customer demand while helping to model the ideal physical layout of the manufacturing shop floor. The methodology provides an objective set of tools for designing, manufacturing processes with minimum wait, move and queue time normally embedded in launching and routed shop-order-based systems, regardless of products manufactured or the processes used to produce them, [1].

II. LITERATURE REVIEW

The new uprising in the manufacturing goods and service sector has generated great challenges for industry. The customer driven and highly competitive market has rendered the old-fashioned managerial style an inadequate tool to cope with these challenges. These factors present a big challenge to companies to look for new tools to continue moving up the ladder in a global, competitive, growing market. While some companies continue to grow based on economic constancy, other companies struggle because of their lack of understanding of the change of customer mind-sets and cost practices. To get out of this situation and to become more profitable, many manufacturers have started to turn to lean manufacturing principles to increase the performance of their firms.

One such type of research shows the application of lean manufacturing concepts to the continuous production process sector with a focus on the steel industry with a goal of investigating the adaptation of lean manufacturing tools from the discrete to the continuous manufacturing environment and evaluating their advantages on a specific application instance. A product family was chosen and value stream mapping (VSM) was used as a basic tool, which not only helped to identify the sources of wastes but also helped in identifying the suitable lean tools to eliminate them. The research majorly contributed towards the development of a systematic methodology to implement lean manufacturing. While value stream mapping (VSM) depicted the source of waste, Kanban and was proposed tool to reduce it. The theoretical result depicted a reduction of inventory level by 65% and that of lead time by 89% was estimated to be achieved [2].

Value stream mapping was used to visualize the production path of a metal machinery factory of China. The lean tool helped in identifying the problems affecting the delivery time with its root causes. After integrating VSM

with other lean tools like Kanban, work standardization and total quality management, the conceptual future state map showed that production lead time reduced from 21 days to 9 days and cycle time reduced by 48% [3].

VSM is different than conventional recording techniques, as it captures the information at individual stations about station cycle time, up time or utilization of resources, set-up time or change over time, work in process inventory, man power requirement and the information flow from raw material to finish goods. It covers both values, adding as well as non-value adding activities. Various case studies of VSM implementation integrated with other lean tools in an Indian manufacturing sector depicted an average reduction of total inventory by 83%, cycle time by 4%, manpower by 17%, changeover time by 7%, and total lead time by 84% [4].

Implementation of value stream mapping in Geared Hydro Power Pvt. Ltd. helped to identify the cause and magnitude of several issues related to one of its product family. Kanban was then implemented by the supermarket facility to eliminate the waste. The implementation helped the industry to optimize its man and machine power. Lean practices implemented and resulted in 88% reduction in lead time, 23% reduction in processing time and 40% reduction in man power [5].

Another research has proved that Lean concepts – VSM, Kaizen and Heijunka, when successfully implemented in the manufacturing sector of horizontal slurry pumps showed a remarkable result by reducing the lead time from 90 days to 50 days and the non-value added time from 54% to 48%. Value stream mapping is proved to be a valuable tool for developing and implementing lean improvement projects [6].

Kumar R.D. and Thyla P.R. (2011) described how the Value stream mapping and other suit of lean tools can be used to map the current state of the production line & design a desired future. They addressed several strategies to eliminate wastes on shop floor & carried evidence of genuine advantage when applying lean at shop floor [7].

Value stream mapping is not just a communication tool, but also a strategic tool, and could be applied to new product development (NPD). An aerospace, industrial experience indicates that both a good set of value stream and a lean context correlate with process improvement success. The research concluded that lean tools when used individually showed no appreciable success but when combined with value stream mapping provided an effective improvement in the product development [8].

Kanban system is inventory stock control system that trigger signal for production of product based on actual customer requirement. The development of Kanban system at local manufacturing company in Malaysia was once studied by the researchers to find its impact on reducing lead time, minimizing inventory on floor and optimizing storage area. Kanban system that triggers upstream production based on downstream requirements had improved relevant areas by reducing the lead time by 40% and in-process inventory by 29%. The finished goods area was also optimized by 4% [9].

As a part of a research work, the application of lean manufacturing techniques in a Malaysian metal fabrication industry was studied. To The goal of this research was to investigate the application of lean manufacturing tools to reduce production lead time for a dedicated product family. Value Stream Mapping (VSM) was applied to identify wastes and lean tools to try to eliminate the wastes [10].

In order to retain and expand the customer base by reducing the lead time and to increase the productivity, value stream mapping was implemented in a rubber manufacturing company of Chile and South America. The reason for the research was the finding that the company had higher lead times than its past records and also had a chance of losing its market share. Value stream mapping proved to be an excellent tool to analyze the manufacturing process. The current state map helped identify areas of potential improvement while the future state map suggested ways to reduce lead-times and increase throughput. The conceptual future state map suggested a reduction of 66% reduction in the lead time and 20% increase for the throughput [11].

Although the research was theoretical, it depicted in the future map that the company would achieve a good success and failure could be caused only if the wrong combination of lean tools are considered with value stream mapping (VSM). The theoretical result shows that the productivity will increase by 50% and the cycle time reduces by 40 minutes [12].

Sameh Mohamed Fahmi et. al describes the application of lean principles in the production planning of a flat steel plant. Pull Production, Mixed Model Production, elimination of waste, and creating flow are among the lean manufacturing principles that were applied in this case. The results show more than 40% reduction in work in process and cycle time, reduction in cycle time variability, and less disorder. This case shows that it is possible to implement, at least, several lean principles in the steel industry and achieve positive results.

Several principles of lean production have been completely/partially implemented at a flat steel plant in Egypt. Those principles include: pull production, production leveling, Gemba (work place) visits, waste elimination, creating flow, and problems visibility. The production planning was the focus of those lean principles' implementation. The results show that the work in process and cycle time decreased by more than 40%. The variability in cycle time- measured by the monthly standard deviation- decreased by 55% the production leveling created free spaces in the coal yard which helped in standardization and minimization of the cooling time. The improvement of the coil assignment process decreased the effort and time. All these improvements decreased the disorder and improved the planning accuracy.

This case shows that many of lean principles can be applied in the steel industry, but they may have a special form in order to face challenges in the steel industry. The principles that were not applied in this case may be applicable in the steel industry and may be tried in the future [13].

Raven Rathilall at all. Lean manufacturing was derived from the Toyota Production System (TPS) in Japan, and can be traced back to the borrowed concepts and practices of Henry Ford and other predecessors. Similarly, Anderson et al. Provide strong empirical support of other quality management concepts such as Total Quality Management, Value Engineering and Six Sigma. These

concepts also had their origin in Japan and revolve around minimizing waste and resources while improving customer satisfaction and financial results. More specifically, Total Quality Management centers on customer satisfaction, Value Engineering concentrates on systematically improving the value of products and services and Six Sigma drive towards processes to reduce defects by minimizing variation. These authors further postulate that the lean manufacturing concept appears to be the more widespread and successful attempts when compared to other quality management concepts. Therefore it was selected for discussion in this study based on this model and from the review of the literature, it can be established that lean manufacturing principles in the production environment are: waste elimination, continuous improvement, multifunctional teams, zero defects, just-in-time (JIT), vertical information systems, decentralized responsibilities, integrated functions and pull systems. These are defined in the following sub-sections [14].

III. METHODOLOGIES USED

In past, various research and articles have been published on lean manufacturing & its implementation and they suggests various methods for implementation of lean. The first step of this study is to conduct comprehensive literature review in order to collect information on fundamental lean principles. After that the process analysis is carried out by collecting data from various enquiries with shop floor experts & directly participating in measuring the time involved in various machining processes.

After identifying the project, the various lean tools like standardized work, 5S, visual control, kaizen etc. are deployment which work around certain types of problems and highlighted the underlying cause of many problems. Then, a future state map is developed to implement lean through the elimination of the root causes of waste and process improvements, minimizing several non-value added activities such as bottlenecking time, setup change time, downtime etc[15].

This study is performed based on the principles and the framework of a systematic literature review as promoted for the management science field by Tranfield et al. [16]. In the past, a systematic review has been used extensively in the medical field in search of improved evidence for guiding the future policy and practice. It is utilized because of the rigorous and transparent form of literature review. Systematic reviews involve identifying, synthesizing and assessing all available evidence, quantitative and/or qualitative; in order to generate a robust, empirically derived answer to some focused research questions [17]. The review procedure undertaken is adopted from Albliwi et al. [18].

IV. CONCLUSION

By these review paper we conclude following points

- Lean Manufacturing concept is very helpful to all type of organization like large scale, medium scale and small scale.
- The Company follows some strategy which are very helpful to increase production rate and improve quality.
- The using lean concept reduces waste of all kinds and increase productivity.

V. REFERENCES

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