

IMPLEMENTATION OF LEAN MANUFACTURING USING VALUE STREAM MAPPING – A REVIEW

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ABSTRACT

The prime idea of lean manufacturing is quite simple i.e. continuously working for the elimination of wastes from the manufacturing processes. Here wastes are those activities which does not adds any value to the process from the perspective of the customer. There is a popular misconception that lean manufacturing can only be used in manufacturing sector which is not true, it can be applied in many sectors like Service sector, Transportation system etc. Value stream mapping is a tool of lean manufacturing which helps us in the establishment of current state map of a process while assisting to uncover the opportunities for the reduction of wastes while improving the process. In today's highly competitive world manufacturers have to face the reduction of costs and efficiency challenges. Many activities like steps flowcharting, flows of materials, activities, communications are included in Value stream Mapping. All the actions (both Value added as well as non-value added) which are required to bring the product in main flow that is from raw material to the customer's hand. The Method of Value stream mapping and its benefit in different industries is being discussed in this paper.

Keywords : Lean Manufacturing, Value Stream Mapping, Current State Map, Future State Map.

INTRODUCTION

During the rule of traditional business in the past manufacturing industries were controlled by a high volume of product at very low cost. It is called “Lean” because of this process more production in less time, inventory, capital and less resource is possible. The most important and strategic too nowadays is quality; many organizations have noticed that it’s the main key for developing products and services that support continuous success.

LEAN MANUFACTURING

Lean manufacturing is an operational approach whose main focus is toward attending the shortest possible cycle time by eliminating the wastes. It is acquired from the Toyota production system and its key push is to eliminate the wastes and increase the value added works. By the implementation of this technique there is a decrease in the time between a customer order and shipment. Many companies’ tries to apply the Toyota Production system but unfortunately failed in their attempts because the traditional processes don’t provide the adequate and timely information. For the guarantee on time delivery and meet customer’s satisfaction both the high quality control and Efficient production process has become essence of effectiveness of production. Companies have to keep their main focus on eliminating wastes by the continuous improvement in order to increase the effectiveness of the companies. There are five principles of lean that makes lean more efficient and functional.

- 1> Precisespecification of value by specific product
- 2> Recognize the value stream for every product.
- 3> Make value flow with value added and non-value added.
- 4> Let customer pull value from producer.
- 5> And continuous perfection.[7]

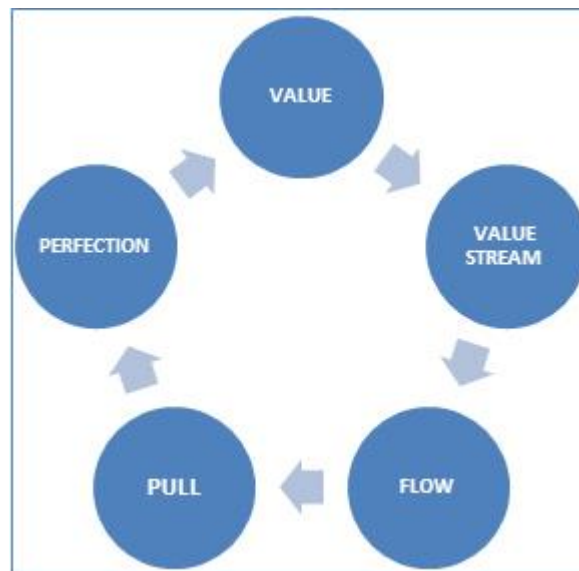


Fig. Five Principles of Lean Manufacturing.

Lean production widely accepted in many areas such as industries and service sectors. Implementation of lean in every industries impact on various strategic factors like changes in strategies of process and working style, effects on company culture, focus on production, commitment and consistency of senior management, space and time for improving of performance. So in order to survive in cut throat competition in global market and to be need to meet customer's demand.

Organization must not only design and provide services for better product but will have to change their manufacturing operations by using lean implementation it can be achieved.

VALUE STREAM MAPPING

The introduction of value stream mapping took place in Second third of twentieth century by Toyota motor company and after that it became one of the major technique of the lean manufacturing. Its fundamental stands on the visual or graphical representation of all the processes of value chain flow in other words from receiving customers order to the final delivery of the product. In value stream

mapping two state map are drawn which are Current State Map and Future State Map. In Current State Map all the processes are drawn which shows how the actual process operates with the actual material and information flow.

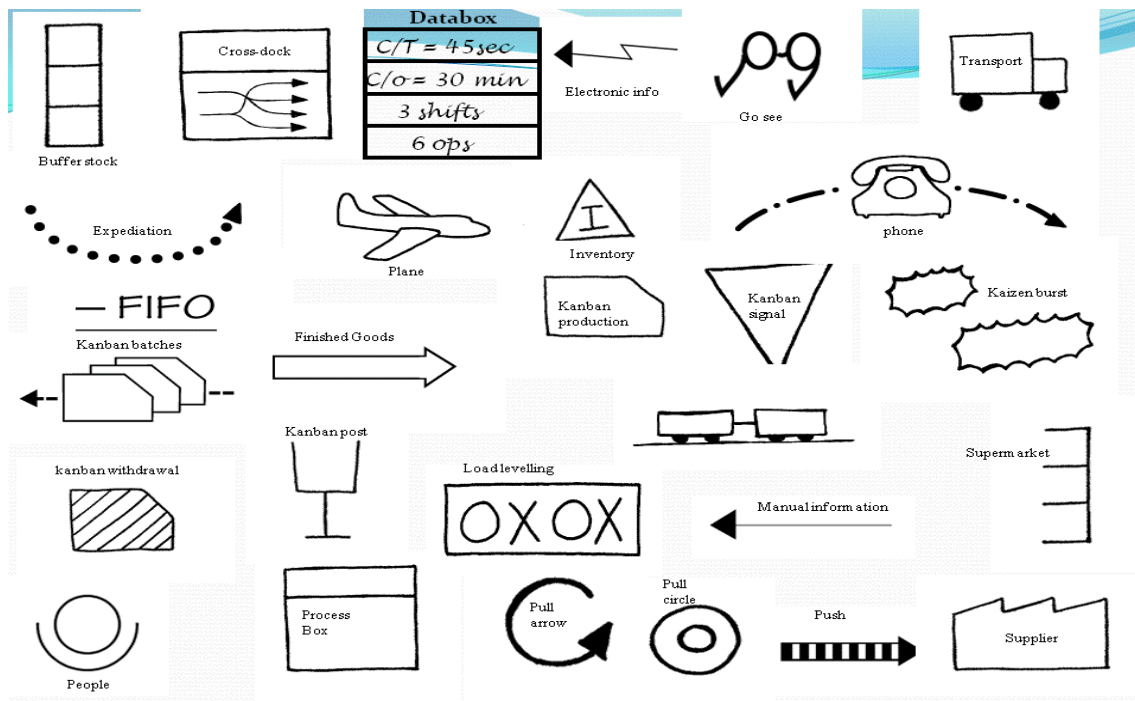


Fig. VSM Symbols.

Womack and Jones described the value as potential provided to the customer at right time and at a appropriate price, as described in every case by customer. They also said that the value of money as well as the value they receive for the money is being compared by the customers.

Literature Review

Benjamin Haefner, Alexandra Kraemer at all [1999]. In this journal it is reported that, the Companies of manufacturing industry today are faced with increasing challenges with respect to their effects of cost, cycle time and product's quality in the system. Dealing with these goals one of an important task was to find the desired solutions for the application of assessment processes within the chain,

which are necessary to make sure the required production quality. For this method, techniques which are in favour to the process and easily applied are required to examine and design the configuration of a their process chain. Value Stream Mapping (VSM) is tool which is very often used by the experienced professionals. It, however, is not such developed for high-lightning the issue of a suitable integration or application of testing processes in the process chain. Yet, this provides very important Potential to facilitate the reorganization of effective testing equipment, testing strategies and quality control trees. Therefore, this article introduces new approach called Quality Value Stream Mapping (QVSM). Based on elements of Value Stream Mapping, it provides a suitable tool for viewing, analyzing and design of quality assurance measures in process chains in manufacturing sector. The implementation of the approach is exemplarily shown for a complex value chain of a manufacturer in the electronic industry.

Anthony J.Donatelli, Gregory A.Harris[2001]

For simulation with value stream mapping following conclusions are made, VSM is the most useful tool in lean manufacturing and sustain improvement effort. Fourth dimension, time is added by simulation in VSM. Value stream mapping is no longer just a depiction after being simulated. It provides the internal sights that may have been missed if value stream mapping is used alone. To not get "paralysis by analysis" is one belief of lean manufacturing. Value stream mapping's simulation lets the lean team to do more rapidly and without causing disturbance in production process. Not only testing of ideas got easier, cheaper and quicker but also the instant evaluation proposed changes to the system, by the simulation of value stream mapping the model and the data making simulation has

got easier to do. Value stream mapping and simulation both enhances each other value since they are the natural combination in lean manufacturing effort.

David Werner and Christophe Cruz [2001]. All information is needed by the contractors, decision makers of the business and to drive their outputs. The distribution and production of a press review about French regional economic actors indicates a prospecting tool on partners and rivals for the businessman. The core aim of the research is to give output and information of the process, so that the burden of the unwanted information can be eliminated. Some systems exist which already wants the news system. During the process of recommendation in the information redemption the system's Knowledge base has already explained the use of their external knowledge which includes the domain knowledge. Our recommender system frame is standard, during the indexing task, the representation of each article with its contents and the interests of user profile created are based on their domain knowledge by our recommender. Articles and Profiles with the concept of money defined in the Knowledge base via concepts, instances and relations. In our favorable measure, a critical sub-task in recommendation systems and relationships between relevance and similarity concepts are the main issues in this paper and they deals with such issues.

Dimitris Folinas, Dimitrios Aidonis at all [2003]. In this research paper, a systematic approach for determining the waste in the agro-food supply chains is presented and observed. Lean thinking techniques are used to detect the sources of waste in the desired supply chain on which the suggested approach is based. Specifically, the waste is determined by the tool VSM, in terms of measuring the carbon dioxide emissions particularly across organizational boundaries. Authors

argue that lean thinking techniques can be considered as effective tools for identifying the factors that influence the total emissions in the targeted supply chain and also for decreasing waste as measured by carbon dioxide emissions.

K. Venkataraman, B.Vijaya Ramnath at all [2011]. Lean manufacturing system is being followed by various organizations in the recent years which mainly focus on improving the efficiency of operations by eliminating and reducing the wastes. This research paper is focused on to explain the implementation of lean manufacturing techniques in the crankshaft manufacturing system at an automotive manufacturing plant. A multi decision making model, analytical hierarchy process is applied to examine the decision making process in the manufacturing system. The target of this industry was to increase the sales from the exports. Lean manufacturing techniques were selected to meet the company's quality cost and its delivery targets. Crankshaft was made in a single flow system with the low cost machines developed indigenously and the outcomes are that the crankshafts have passed the tests, validation and acceptance by the customer to produce any variant in the company. After the implementation of lean manufacturing system, the lead time reduced by 40%, defects were eliminated, higher process capability achieved, quick response of the customer demand in small lots were achieved.

D.T. Matt, D. Krause at all [2014]. The automotive or aerospace industry the use of computerization technology and processes and the application of lean manufacturing methods are applicable nowadays, the construction industry lags behind these developments of lean. In this context, with the help of value stream design, largely known in mass production but recently also in variant intense

manufacturing, the process flows within a company but especially amongst the partners in such a mutual or two-way network such that can be designed in a highly customer-oriented and well-organized way. Therefore, this paper explains in detail a procedure to design an integrated and adapted value stream map for construction industries necessities.

Schönemann, M, Thiede, S. et al [2014]. The characteristics of products, such as, the quantity of material used have great effect on working times/cycle, m/c setup times, and its lead times, as well and overall cost of production. Unfortunately, detailed information about their interdependencies between the product and its production is not available often in the product development phase. Developers are not in full support in considering the impacts of different design options on manufacturing objectives. This paper addresses the connection of product and process design by proposing a value stream based modeling approach for manufacturing information.

Soudabeh Khodambashi [2014]. In clinical processes the application of IS needs to be evaluated to increase the alignment between the new applied information systems and the process. This study focuses on the evaluation of a health information system (HIS) adoption to intra-operating management of the anesthesia process in heart operation. Lean method is applied to the intra-operating management process in the case study. We use some common tools of lean such as the Value Stream Map and the A3 method to evaluate the anesthesia. Using the value stream mapping and A3 problem solving tool assist us to map the process and removes the wastes from the steps and actions in the process, enhance data integration and process integration. This paper and the related results can help the

clinicians and practitioners in the application of the Lean method to HIS so that the wastes can be reduced from the clinical workflows.

Florian G. H. Behncke, Sebastian Maisenbacher [2014]. Manufacturing firms have to design products for global competitive markets that provide a distinct cost-value-ratio. Research papers provides approaches like target costing and value engineering to counter this challenge from different angel. Combining benefits and summarize any immediate information during the application of both approaches within a comprehensive model.A model for the integration of value engineering is presented in this paper. Manufacturing processes as well as supply chain networks are used for the extension of this model as those factors emerge as drivers for costs and values in built-up firms, while the new model already considers requirements, functions and physical components of a product.

Egon Müller, Rainer Schillig at all [2015]. The main criteria of all lean production systems are to decrease the company's unuseful product. Process steps are therefore divided into two categories such as the processes that add value i.e. value-adding and the processes that do not add value i.e. Non value-adding ones. Value stream mapping (VSM) is the best practiced tool for the above process. It detects wastes in the detail list of the process and lead/cycle times. However, if we talk about the matter for betterment in value streams of energy efficiency, then the manufacturing process should itself has to be bi-sided, with regard to value-adding and non value-adding elements. This paper represents two methods of dualising the time and energy consumption in the plastic injection moulding process. Factors that improve the process, from the viewer's point of view the energy and time, are

highlighted. Based on the dual process analysis, the steps where chances of improvement are their, those concepts are high lightened. The VSM thus, while maintaining its inner logic, be improved or increased to an energy value stream mapping method (EVSM).

1. METHODOLOGY:-

There are following steps which convert simple manufacturing in to a Value stream mapping based lean manufacturing system.

Step 1:- Appoint someone responsible and set what is desired.

- To make decision and plan the project appoint a sponsor who is accountable.
- The appointed person maps the process for achieving the desired target.

Step 2:-Selection of team.

- Each area of the process should be represented.

Step 3:-Selection of processes which have to be mapped.

- Value stream map is not only limited to manufacturing industries but it is suitable for most of the business and it can be used in supply chain, logistics, and some services providing sectors

Step 4:-Collection of data and preparation of current state map.

- For gathering data time of processes, inventory and material information, and customer's demand are required.
- After making current state map viewer is able to understand what changes that should be implemented to make the process more effective and efficient.

Step5:-Review current state map.

- Examine the area of waste and encourage the team to make suggestions.

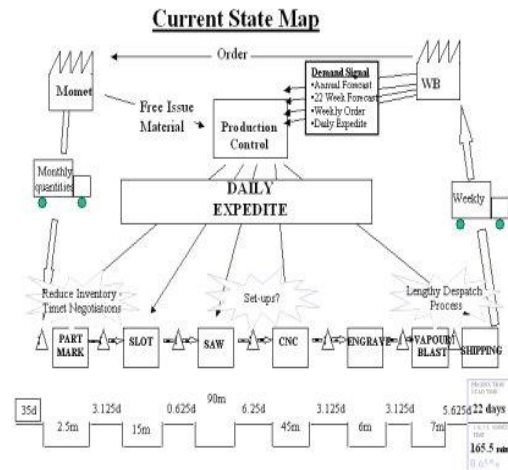


Fig. Current State Map

Step6:-Mapping of Future state map.

- ✓ Mapping of Future state map is done by using the data of current state map.
- ✓ The suggestion of the reviewers is also included in the Future state map.

Step7:-Create strategy and implement it.

- ✓ From the Future state map make the strategy that can be implemented to change the current process to the further state.

Step8:- Measure the advantages.

- Check the result to ensure that the target is being achieved. Review each change made and analyses the benefits.

Conclusion

After considering many papers we get to know that Value stream mapping is the vital tool of lean manufacturing which emphasis is of gathering the information and representing it graphically right from the request made till the moment that request is fulfilled. It allowed better observation and evaluation of the processes more efficiently. This Paper aims to highlight the objectively evaluating that what adds and what does not adds value to the process. Lots of time products in production system are wasted mainly on waiting, these wastage of time can be efficiently reduced by the use of quality VSM. For the creation of more value to the customers the companies should be more value oriented and implementation of these manufacturing strategies should be done. Value Stream Mapping does not only consider the activity of the product but it also analyze the flow of information. Thus we can conclude that using VSM tool empowers and add more value to the product in lean manufacturing.

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