

Review - Value Stream Mapping for Improvement in Productivity

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Abstract—Value stream mapping is one of the most important tools of lean manufacturing to disclose muda in manufacturing, production and business process by identifying and removing non value added activities. This map will show the current states of operations through which non value added activities can be identified to eliminate it with proper lean tools. The current process steps are analyzed for opportunity of reduction in the process steps to fewest necessary steps. By which the value added time in each process and output speed increases which results in considerable profit to the organization.

Keywords:-Value stream mapping (VSM), Productivity, and Value added Activity, Non-Value added activity

I. INTRODUCTION

Value stream mapping (VSM) is a lean manufacturing technique and it has emerged as the preferred way to support and implement the lean approaches to increase productivity and remove the muda from the processes.

By which the product can reach to customer in short period of time and by which the quality of product is also increase.

II. LITERATURE REVIEW

Through the advent of automation in manufacturing the competitors have almost entered into their manufacturing cycle time to beat the cut throat competition through reduced cycle time to accomplish fast delivery to their worthy customers. Thus manufacturing is becoming more and more competitive; companies globally strive to increase their efficiency. Benchmark practices in manufacturing have left little scope for getting cutting edge through machining, company all over the globe tries to have cutting edge through process improvement by removing unnecessary muda (waste) from the process. From the internal manufacturing context, operations are classified into three categories^[1]. These can be categorized into: (1) non-value adding (NVA); (2) necessary but non-value adding (NNVA); and (3) value-adding (VA).

The Value Stream Mapping method (VSM) is a visualization tool oriented to the Toyota version of Lean Manufacturing (Toyota Production System). It assists in to understand and streamline work processes using the tools and techniques of Lean Manufacturing. The main goal of VSM is to identify, demonstrate and decrease waste in the process. Waste being any activity that does not add value to the final product, often used to demonstrate and decrease the amount of waste in a manufacturing system. VSM can thus serve as a starting point to help management, engineers, production associates, schedulers, suppliers, and customers recognize waste and identify its causes. The beauty of value-stream mapping is found in its usefulness and simplicity. VSM is a map that outlines the current and future state of a production system, allowing users to understand where they are and what wasteful acts need to be eliminated. The user

then applies lean manufacturing principals to transition into the future state.^[2]

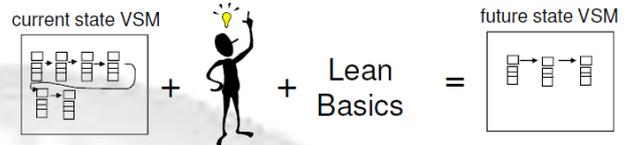


Fig.1: VSM in Brief

Bhim singh implemented Lean to production industry. The author highlighted the benefits from the all the areas of lead time, WIP, processing time, inventory and manpower^[3].

Whenever there is a product for a customer, there is a value stream. The challenge lies in seeing and working on it. VSM can be done in the same way for practically any business activity and expanded upstream or downstream. This powerful tool not only highlights process inefficiencies, transactional and communication mismatches but also guides about the improvement. Value stream mapping is an enterprise improvement tool to help in visualizing the entire production process, representing both material and information flow. Defined value stream as collection of all activities value added as well as non-value added that are required to bring a product or a group of products that use the same resources through the main flows, from raw material to the end customers. [4]

Seven new mapping tools (namely, process activity mapping, supply chain response matrix, production variety funnel, quality filter mapping, demand amplification mapping, decision point analysis and physical structure mapping) and their applications areas, which are also useful in value stream mapping.^[5]

Womack JP, Jones DT, Roos D (1990) showed the five tenets of lean manufacturing were enumerated and it was emphasized that VSM has to be carried out as the first step towards lean implementation.^[6]

VSM is a method to describe the flow of material and information through the production system. It also helps to find where value is added and where value is lost by graphically portraying the processes. The ratio of value added to total lead-time is determined by documenting the current lead-time, inventory levels and cycle times. The visual representation provides a view of where costs can be reduced and improvements can be made. Then the future states can be designed where waste steps are left out and continuous flow and pull production are introduced.^[7]

To implement VSM on the process sector as a main tool to identify the opportunities for various lean techniques and a *simulation model* to contrast the before and after scenarios in detail was developed in order to illustrate to managers potential benefits such as reduced production lead time and lower work in process inventory.^[8]

III. METHODOLOGY

To start improving productivity by identifying waste and then removing it by implementing lean principle in the industry there is no other tool better than VSM. The Value

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Waste being any activity that does not add value to the final product, often used to demonstrate and decrease the amount of 'waste' in a manufacturing system. VSM can thus serve as a blue print for Lean Manufacturing. This section presented a methodology to develop a value stream mapping to identify material and information of current state.

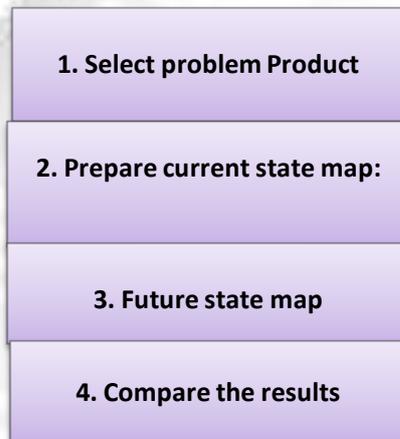


Fig.2: Methodology of VSM

IV. DISCUSSION AND CONCLUSION

Value Stream Mapping is an important lean manufacturing tool useful for elimination of mudas and optimising manufacturing efficiency. VSM can be applied successfully to reduce the process time by identifying the non-value added activity from the process.

REFERENCES

- [1] Monden, Y., Toyota Production System: An Integrated Approach to Just-in-Time, 2nd ed., Industrial Engineering and Management Press, Norcross, GA, 1993.
- [2] Sudhir Dalal, Dr. R. M. Belokar, "Importance Of Value Stream Mapping For Improvement In Inner Wheel Housing Manufacturing Line ", IJERT, ISSN: 2278-0181 Vol. 2 Issue 8, August – 2013
- [3] Bhim Singh & Suresh K. Garg & Surrender K. Sharma (2011) "Value stream mapping: literature review and implications for Indian industry" ; Int J Adv Manuf Technol (2011) 53:799–809
- [4] Rother M, Shook J (1999) "Learning to see": value stream mapping to add value and eliminate MUDA. The Lean Enterprise Institute, Brookline, MA

- [5] Hines P, Rich N (1997) "The seven value stream mapping tools". Int Jour. Of Opern & Prod Manage 17:46–64
- [6] Womack JP, Jones DT, Roos D (1990) "The machine that changed the world". Macmillan, New York
- [7] Dimple Khatri, Pardeep Dhull, Rajender Kumar, Vinod Dhull (2011) "Reduce the Work In Progress by using Value Stream Mapping" ISSN: 2249 – 6564 ; IJMEAR
- [8] Abdulmalek FA, Rajgopal J, "Analyzing the benefits of lean manufacturing and value stream mapping via simulation: a process sector case study." Int. J. Prod. Econ. 107(2007): 223–236. To start improving productivity by identifying waste and then removing it by implementing lean principle in the industry.