

# IMPROVE THE FLOW OF INVENTORY AND INFORMATION BY USING VALUE STREAM MAPPING TO ACHIEVE A COST SAVING IN AN INDUSTRY

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**Abstract**—Studies on applications of lean in a continuous process industry are limited. There is lot of opportunities for improvement in the process industries. If lean tools are utilized This paper addresses the application of Value Stream Mapping as one of the Lean tools to eliminate waste, and improved operational procedures and productivity. Current state map is prepared and analyzed and suggested to improve the operational process. Accordingly the future state map is drawn. The study reveals that there is an improvement in the tact time by implementing the proposed changes if incorporated in the future state map. A value stream map takes into account not only the activity of the product, but the management and information systems that support the basic process. This is especially helpful when working to reduce cycle time, because you gain insight into the decision making flow in addition to the process flow. It is actually a Lean tool. Studies on applications of lean in a continuous process industry are limited. There is lot of opportunities for improvement in the process industries.

**Keywords**—Value Stream Mapping; Lean Manufacturing; Current State Map; Future State Map

## 1. INTRODUCTION

A value stream mapping is a lean enterprise technique used to document, analyze and improve the flow of information or materials required to produce a product or service for a customer. A value stream is all the actions, both value added and non-value added, currently required to complete a product or service from beginning to end. Value stream mapping is a lean manufacturing or lean enterprise technique used to document, analyze and improve the flow of information or materials required to produce a product or service for a customer. Value stream mapping is a paper and pencil tool that helps you to see and understand the flow of material and information as a product or service makes its way through the value stream. Value stream mapping is typically used in Lean, A value stream map takes into account not only the activity of the product, but the management and information systems that support the basic process. This is especially helpful when working to reduce cycle time, because you gain insight into the decision making flow in addition to the process flow. It is actually a Lean tool.

VSM is the process of visually mapping the flow of information and material as they are preparing a future state map with better methods and performance. It helps to visualize the station cycle times, inventory at each stage, manpower and information flow across the supply chain. VSM enables a company to 'see' the entire process in both its current and desired future state, which develop the road map that prioritizes the projects or tasks to bridge the gap between the current state and the future state. The value stream mapping is used to analyze & map in order to reduce the waste in processes, enable flow, and to make the process for better efficiency. The purpose of value stream

mapping is to highlight sources of waste and eliminate them by implementing the future-state value stream that can become a reality. The goal is to build a chain of production where the individual processes are linked to their customer(s) either by continuous flow or pull, and each process gets as close as possible to producing only when the customers need it.

## 2. LITERATURE REVIEW

1. Balkema and Rotterdam (2004) have created current state map for a steel producer, a steel service center and first-tier component supplier. The current state map identifies huge piled of inventory and long lead-time. In the future state map target areas were subjected to different lean tools including kanban, supermarket, and continuous flow.

2. Ballard and Howell (1994) suggest that, the value Stream mapping can serve as a good starting point for any enterprise that wants to be lean. It provides a common language for talking about manufacturing process. It ties together lean concepts and techniques which help to avoid "cherry picking". It forms the basis for an implementation plan by helping to design the whole flow.

3. Halpan and Kueckmann (2001) explain value Stream mapping in aircraft manufacturing. They draw current and future state maps were developed with the objective of reducing lead time according to customer requirements. The implementation of the future state map attained lead-time reduction.

4. Summer, 1998 has described Activity Based Costing (ABC), identify various cost components and analyze the relative contribution to the total cost. The essence of ABC is that, product consumes activity, activity

consumes resource and resources generate cost. Thus it is necessary to develop the relationship between activity, cost drivers and activity measures. Target costing is to anticipate the acceptable market price through intensive customer focus. Design and manufacturing team's allies to bring the product within the target cost. Target cost is the cost that can be incurred while still earning the desired benefit. The objective of the present work is to demonstrate how a manufacturing system operates with timing of step-by-step activities.

5. New (1993), and Jones et.al (1997) and other Researchers developed individual tools to understand the value stream. VSM extends guidance for improvements in the process, identifies the need to improve workflow and finally shows avenues to reduce waste. Shingo (1989) has discussed the strategies for the effective implementation of Value Stream Mapping in a wood industry. He also opines that loops can be formed to identify the similar processes and these loops will be helpful in identifying the non-value activities in a systematic manner. He has suggested the ways to eliminate non value added activity and proposed measures to increase the Value added ratio.

**3. RESEARCH OBJECTIVE**

Today, automotive suppliers have a great concern over improving quality and delivery and decreasing cost, which leads to improved system productivity. In order to remain competitive, waste from the value stream must be identified and eliminated so to run system with maximum efficiencies.

A Production is to order and large numbers of different products are produced, each in relatively small volume. A Production shop consists of number of machine centres, each with a fundamentally different activity. The problems of machine shop are delayed deliveries, long queues, and high work in process inventories, improper utilization. These problems increase overall cost of production. The need for customized products/parts with reduced lead times together with the requirement of global competitiveness requires that products/parts be produced in small batch sizes as per customer's requirement. The processing in small batch sizes necessitates the adjustment in the flow of production through different processes as per their processing speeds. In addition it requires close monitoring of processes to reduce process variability (defect free production), efficient planned maintenance of all machines (for increased availability) and reduction in non-value added activities such as setup times, movement of material in between the work processes and additional processing of material. The efficient utilization of machines while producing in small batches reduced WIP inventories, reduced throughput times and reduction in lead times leads to competitive manufacturing. It is need for machine shop manufacturing system to adopt lean environment.

To improve productivity by identifying waste and then removing that by implementing lean principle in this industry we focus our attention on VSM tool. Value Stream Mapping enables a company to identify and eliminate

waste, thereby streamlining work processes, cutting lead times, reducing costs and increasing quality and hence productivity. The goal of VSM is to identify, demonstrate and decrease waste in the process, highlighting the opportunities for improvement that will most significantly impact the overall production system. In this study lean concepts are introduced using VSM in working environment.

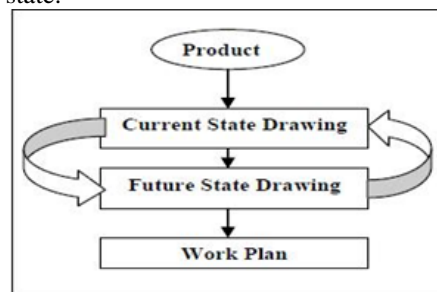
In brief the main objective of paper :

- Improve the flow of inventory and information by value-stream mapping
- Draw a current-state map
- Identify major lean concepts
- Draw a future-state map
- Develop a basic implementation plan

**4. VSM 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 Stream Mapping method (VSM) is a visualization tool oriented to the Toyota version of Lean Manufacturing (Toyota Production System). It helps to understand and streamline work processes using the tools and techniques of Lean Manufacturing. The 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 blue print for Lean Manufacturing. This section presents a methodology to develop a value stream mapping to identify material and information of current state. Generally VSM has four major steps as given by Rother and Shook (1996):

- Product
- Drawing current state
- Drawing future state
- Develop work plan for implementation of future state.



Within a warehouse, the first important step to carry out when developing a value stream map is to identify the product or product family (group of products that pass through similar processes and use common equipment and resources) you would like to improve. When creating a value stream map, it's crucial to focus on one product family at a time. The rule of thumb is to create maps for the products with highest volumes first. Value stream mapping for one product family usually takes about two days.

Identify the current flow

Once you've defined the scope, the next step is to create a "current state map," or a visual representation of how the process (or processes) in the warehouse are operating at the present moment. Current state mapping begins with understanding customer requirements. Key data points such as units per month, shipping frequency/schedules, hours of operations (available time), number of shifts worked, or any pertinent information around customer demand should be gathered before beginning the current state map.

Observe and confirm processes

The mapping then begins by going to the warehouse floor to observe processes firsthand. In fact, going to the place where the work happens is critical to having an accurate current state map. To do this, the value stream mapping team typically starts the value stream walk at the end of the process, with the last process closest to the customer. In a warehouse, this may be the shipping/outbound loading process. The team would then walk back up the value stream, observing the steps to each process, until reaching the process where the product comes into the warehouse (i.e. receiving).

Map the flow or stream

After discussing what has been observed, the team would then immediately begin to draw out the basic product flow. This is typically done on the wall using large sheets of paper or a drawing board, filling in data boxes below each process (cycle times, number of operators, defect and quality data, etc.), placing inventory numbers in between each process to understand the amount of work in process, and mapping the information flow (the systems and communications that authorize production at each process step). Identification of the process is important to fully understand where bottlenecks may occur or efficiencies can be implemented.

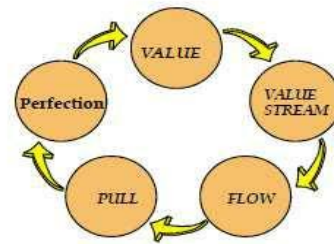
Creating the Implementation Plan

The most important and final step of the value stream mapping process is the creation of the implementation plan to achieve the future state. You create this plan by dividing your value stream map into manageable pieces that will allow the team to accomplish improvements in a short period of time. Typically, the implementation plan is split into three phases: 30-60 day improvements, 90-180 day improvements, and 360-day improvements. The team should prioritize the plan to get the majority of the improvements implemented within one year. After the one-year plan has been implemented, the future state becomes the current state for the following year and value stream mapping activities are conducted again to achieve continuous improvement to the value stream on an annual basis. It's important to remember that value stream mapping is only a tool. Unless you achieve the future state, the team's effort of creating the value stream map is worthless and creates no value for your organization or the customers' that receive your product or service.

## 5. VALUE STREAM MAPPING STEPS

- Specify value from the standpoint of end customer
- Identify the value stream for each product family
- Make the product flow

- So the customer can pull
- As you manage toward perfection



Step1. Select your sponsor and set expectations

Appoint someone who is responsible to make decisions, arbitrate solutions, and plan the project. The sponsor usually selects the processes that will be mapped and will usually have a firm grasp of what achievement is being targeted.

Step2. Select your team

You should ensure that each area or stakeholder of the process is represented e.g. Sales, Purchasing, Warehouse etc.

Step3. Select process to be mapped

Value Stream Mapping is suitable for most businesses and can be used in Manufacturing, Logistics, Supply Chain and some Service orientated Organizations.

Step4. Collect data and produce current state map

Process times, inventory or materials information, customer (or demand) requirements. The future state maps will be developed using information captured here so it's imperative you have a correct understanding of the business.

Step5. Critique Current state

Challenge the current thinking, encourage your team to make suggestions, look for areas of waste.

Step6. Map Future State

Compile a future state map based on the current state map and the critiques.

Step7. Create Action Plan and deploy

Taking the Future State map consider an action plan that could be implemented to change the current process to the future state.

Step8. Measure benefits

Check to ensure that the benefits expected have been obtained – review each change made and analyze benefits.

## 6. CONCLUSION:

Modern managers find it difficult to identify the key areas and practices, which can be used to eliminate waste in their processes. Based on the practical validation conducted, it can be seen that VSM can be effectively applied to apparel industry as the initial step of waste identification. Using this tool, it is possible to map the current status and subsequently analyze to achieve waste elimination.

This paper shown that the wastes such as transport, inventory and defects can be reduced which in turn improves the productivity of the organization. In order to accomplish this task, the managers of the case company have to implement approaches like 5S, one piece flow, Cellular manufacturing etc. Thus, VSM helps the managers to visualize the present level of wastes occurring in the

organization and the future possibilities of reducing or eliminating them. In order to continuously reduce or eliminate waste, management of companies need to apply different Lean tools and techniques accordingly while giving adequate training to their employees. Therefore organizations of similar type can use the research outcomes as a knowledge base to identify their wastes and come up with suitable remedies.

### 7. FUTURE-RESEARCH:

In future, researchers can deploy VSM for different styles, for several organizations across the apparel industry. It is also possible to examine the waste elimination level / improvement level over time during different periods since present study has taken into observations one single time slot. (E.g. observing waste elimination over several discrete time periods and variation)

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