VIVA-TECH INTERNATIONAL JOURNAL FOR RESEARCH AND INNOVATION

ANNUAL RESEARCH JOURNAL

ISSN(ONLINE): 2581-7280

Productivity improvement by using value stream mapping in stainless steel utensils manufacturing industry

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Abstract: *Value stream mapping is that lean manufacturing tool which helps to improve the productivity for the area through its detailed mapping. It is the visualize tool which describes the current state map followed by lean techniques resulting into the final state map that aiming at reduction of the non-value added activities throughout its phase. One of the most appropriate ways to emerge the productivity for the particular area is through Lean Manufacturing. This paper illustrates the VSM techniques and its benefits in stainless steel utensils manufacturing industry The purpose of this paper is to highlight the effective utilization of the VSM tools for process and productivity improvements*
.Keywords - Value stream mapping, Lean manufacturing, productivity

I. INTRODUCTION

Lean manufacturing focuses at striving only for customer value added activities by preventing the non-value added activities comes into the plays at each of the particular phase in terms of customer perspective [1]. Working from the customer's perspective, who consumes the end products or services, value can be defined as any action or process that a customer would be willing to pay for. Lean manufacturing is a management philosophy derived mostly from the Toyota Production System (TPS). TPS is renowned for its focus on reduction of the original Toyota seven wastes to improve overall customer value, but there are varying perspectives on how this is achieved to its best [2]. These seven wastes includes Overproduction, Defects, Inventory and Inappropriate Processing, Excessive transportation, Waiting and Unnecessary motion. A value stream map is said to be an end-to-end collection of processes or activities involves, that creates value from the customer's perspective. A value stream usually quotes list of things such as people, tools and technologies, physical facilities, communication channels and policies and procedures. A value stream is all the actions i.e. both value added and non-value added, currently required to bring a product family through the main flows essential to every product: (a) the production flow transforming from raw material into the hands of the customer, and (b) the design flow from concept to launch. Standard terminology, symbols, and improvement methods allows VSM to be used as a communication tool for both internal communication and sharing techniques and results with the larger lean community[3]. Value stream mapping differs from conventional recording techniques, as it quotes the information at each and every stations about station cycle time, uptime or utilization of resources, setup time, WIP inventory, manpower requirement and the information flow from raw materials to finished goods. Value is from the customer's perspective and the customer is being the person who utilizes the output in terms of end product or services. Non-value- adding is everything done in the process which contributes no value for the customer but which they are forced to pay for when they buy the product or service. In case of internal manufacturing point of view, there are three types of operation that are to be serviced [4]. These can be distinguished are as follows: – Non-Value Adding – Necessary but Non-Value Adding – Value-Adding Non-Value adding operation is of total wasteful activity which never be come to utilized in customer perspective and hence such operations are called as pure waste. It is necessary to eliminate these non-value adding activities completely. These include activities such as Scrapping, Sorting, Storing, Counting, Moving, Documentation etc. Necessary but Non-Value Adding operations may conclude to be wasteful but these are necessary under the present work of activities. These may include walking larger distance in order to receive parts or components, unpacking deliveries and transfer tooling form one position to another position. A value adding operation involves those activities which makes the final product or service by the processing of raw materials and with the help of manual labour; but in terms of customer perspective. These include valuable activities such as Machining, Processing, Painting, Assembling etc.

VIVA-Tech International Journal for Research and Innovation   *Volume 1, Issue 4 (2021)*
ISSN(Online): 2581-7280
VIVA Institute of Technology
9th National Conference on Role of Engineers in Nation Building – 2021 (NCRENB-2021)

II.   METHODOLOGY

The process analysis is carried out by acquiring the list of information from various enquiries with experts in shop floor level, labourers and by directly participating in measuring time for various processes. The various steps in the

VSM methodology are as follows.
− Data Collection
− Current State Mapping
− Application of VSM Tools
− Creating Future State Map

A. Data Collection
1) Customer Demand:
   − What is the product family?
   − How many products are required and when?
   − How many variety parts are made?
   − How many products are dispatched at a time?
   − How often are dispatches required?
   − What sort of packing is required?
   − How much amount of stock does the customer hold?
   − Other information like number of delivery points, delivery windows etc.
2) Information Flow:
   − What kind of forecast information is given by the customer?
   − What kind of call-off information is given by the customer?
   − Which department does this information go to in the firm?
   − How long does it stay there before being processed?
   − How do they pass it to as it moves towards suppliers?
   − What sort of forecast information given by suppliers?
   − What sort of call-off information given by suppliers?
   − What order quantities do supplier specify?
3) Physical Flow:
   − How many products are wanted and when?
   − How many different parts are required?
   − How many products are to be dispatched at a time?
   − How often do dispatches occur?
   − What sort packing is make?
   − How long does it take to dispatch?

B. Current State Mapping:
   − What kind of scheduling information is used?
   − What kinds of work instructions are produced?
   − Where is the information and instruction sent from and to?
   − What happens when there are problems in the physical flow?
C. Application of VSM Tools involves:

Table .1

Tools Parameters	Tools Parameters
Process activity	Process activity
mapping	mapping
Identify lead time & productivity	Identify lead time & productivity
opportunities	opportunities
Demand amplification	Demand amplification
mapping Volume with respect to Time	mapping Volume with respect to Time

D. Creating Future State Map:
   The improvement in the existing flow using various lean tools which will ultimately help in reducing inventory, lead time, changeover time and improving productivity comes to this phase of work.

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III.   FIGURES AND TABLES

Each of VSM tools is not equally applicable to any of the wastes. These are based on the kind of wastes and in which point of area we are applying at. The defining approximation weights are as shown in table 2

Table 2

Waste	Process Activity Mapping	Supply Chain Response Matrix	Production Variety Funnel	Quality Filter Mapping	Demand Amplification Mapping	Decision Point Analysis	Physical Structure (Volume & Value)
Over Production	Low	Low			Low		
Waiting	High		High			Moderate	
Transportation	High			Low			
Over Processing	Low	Low		High			High
Inventory	Low						
Motion	Moderate				Low		High
Defects	Low		Low				

IV.   CONCLUSION

Value Stream Mapping works to be an effective tool in order to improve and gather the information at each and every stations about station cycle time, uptime or utilization of resources, setup time, WIP inventory, manpower requirement and the information flow from raw materials to finished goods.

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