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VALUE'S BENEFITS OF STREAM MAPPING AS A LEAN TOOL IMPLEMENTATION MANUFACTURING INDUSTRIES

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Abstract — ***In this Paper an attempt is made to discuss on the Process Improvement Tools (Value Steam Mapping) which can improve the performance of mining operations.Mining sector is an important segment of the World Economy. Lean manufacturing has been proved to be an effective management philosophy for improving businesses in a competitive market by eliminating non-value added waste and improving in process operations. Value stream mapping (VSM) can be an extremely powerful tool, combining material processing steps with information flow as well as other important related data. The purpose of this paper is to highlight the effective utilization of the VSM tools for process and productivity improvements by different authors.This paper illustrates the review of VSM techniques and its benefits in machining industry.***

Keywords- Process Improvement, Lean Manufacturing, Value Stream Mapping, Review, Tools and Techniques .

I. INTRODUCTION

Lean manufacturing is a modern technique that many industries in India have been trying to adopt in order to remain competitive in an increasing global market [1]. We will depart from exploring general principles to focus on Value Stream Mapping (VSM), an extraordinary device in the kit of lean tools[2]. In the lean philosophy, "value" is determined by the end customer. It means identifying what the customer is willing to pay for, what creates "value" for him. The whole process of producing and delivering a product should be examined and optimized from the customer's point of view. So once "value" is defined, we can explore the value stream, being all activities – both value-added and non-value added – that are currently required to bring the product from raw material to end product to the customer [3].

II. VALUE STREAM MAPPING

Value stream mapping is a visual representation of all the specific activities, including the flow of material and information, which occurs along the value stream selected for a product or family (Tapping, 2002). The value stream mapping process will likely reveal that a significant amount of non-value-added activities are present in your current processes. These activities consume financial and human resources and make longer lead-time without adding value. However, some of these activities are really necessary in the process; therefore the idea is to minimize their impact. Figure 1 below shows the value stream symbols used to describe each process of manufacturing or assembly[10].

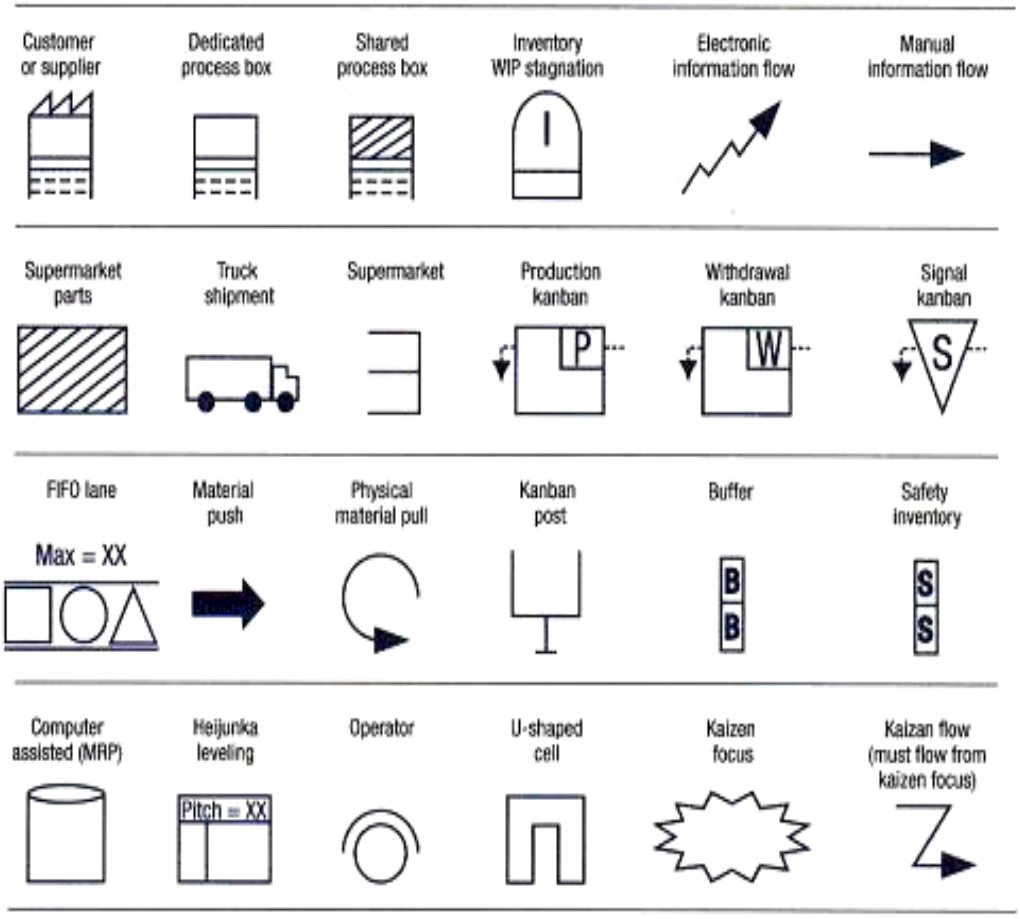

Fig (2) VSM typical symbols [10]

III. LITERATURE REVIEW

[A]. Rahani AR, Muhammad al-Ashraf, 2012. [4]

In this paper the author made an attempt to identify areas of wastes and these can be reduced or eliminated using lean techniques from the front disc assembly in Malaysia. They conclude their work in terms, there is a significant amount of the time products spent on the production system usually was waiting and non-value added. Quantitative evidence showed that many of the Lean tools have an expected impact related to the reduction of this waiting time. The evaluation of these improvements through the use of the CT evaluation highlights the economic impact of time improvements. The VSM applied to assess the expected impact of a change in the production process resulted in savings (lower rejection rates).The total reduction of man time was at 15.99s or 16.9% while the machine time was reduced to 299.832s or 14.17% compared to original processing method.

[B]. K. Venkataramana, B. Vijaya Ramnathb , V. Muthu Kumarc , C. Elanchezhiand, 2014. [5]

This paper represents the application of Value Stream Mapping as one of the Lean tools to eliminate waste, and improved operational procedures and productivity in case of crankshaft assembly supply chain in south India. They conclude their work in terms, Lean manufacturing system implemented in this paper is done in a crankshaft manufacturing cell to eliminate the 8 non-value adding wastes like over production, waiting, unnecessary transport movement, defects and unused employee creativity from the manufacturing system and also to create product mix flexibility in the manufacturing cell.

[C]. Adam Brown, Joseph Amundson, Fazleena Badurdeen, 2014. [6]

This paper represents the application of Value Stream Mapping as one of the Lean tools to eliminate waste, and improved operational procedures and productivity in case of satellite dish manufacturing in lexinton, USA. Basic aim of this paper was to use the Value Stream Mapping tool in identifying, quantifying and minimizing major wastes in a satellite dish manufacturing set-up. Completing a Sustainable-Value stream mapping can provide companies with a high-level assessment of energy consumption for the different processes and between them. The analysis shows that energy consumption, as well as the value type of manufacturing system configuration but rather would depend also on the nature of the product.

[D]. William M. Goriwondo, Samson Mhlanga, Alphonce Marecha, 2011, [7]

Basic aim of this paper was to use the Value Stream Mapping tool in identifying, quantifying and minimizing major wastes in a bread manufacturing set-up. This was a case study of the bread-making process analysis using the Value Stream Mapping tool. The study was; to use the Value Stream Mapping tool in troubleshooting waste generated in Bread Manufacturing and identify ways of reducing this waste while at the same time increasing the proportion of the processes that add value to the product. This was well achieved through the development of the Future State Map which has an increased throughput of 16%.

[E]. A. Deif, 2012. [8]

This paper represents the application of Value Stream Mapping as one of the Lean tools to eliminate waste, and improved operational procedures and productivity in case of titanium fastening bracket assembly supply chain in egypt. The study was; The new tool succeeded in capturing various variability sources in the production system and helped to reduce the variability level from 0.43 to 0.32 (26% reduction) on the VI scale. This was achieved through implementing various improvements techniques as outlined by the VSMII variability reduction plan. In addition to the normal gains of variability reduction to the system like less WIP level and better utilization, the VRP actions also lead to reducing non-value added time (by 65% in the considered case) and lead time (by 24% in the considered case).

[F]. Fawaz A. Abdulmalek, Jayant Rajgopal, 2006. [9]

In this paper the author made an attempt to identify areas of wastes and these can be reduced or eliminated using lean techniques from the several grades of steel in USA. Basic aim of this paper was to use the when upper management involved in lean manufacturing implementation author detailed simulation model can be used to evaluate basic performance measures and analyze system configurations.

IV. VALUE STREAM MAPPING 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. Collection of Data -

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?
- What sort of packing is required?
- Other information like number of delivery points, delivery windows etc.

2) Information Flow:

- What kind of forecast 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 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?
- Other information like more number of suppliers for a given part number?

B. Current State Mapping:

Before starting the current state map create a team and that team collects all the data required for the current state map. Following steps have to follow to draw a current state map.

1. Understand the customer demand.
2. Map the process flow
3. Map the information flow
4. Map the material flow
5. Map the information flow
6. Timeline

After Drawing of Current State Map find out the seven waste between all the process and draw a ranking chart and other way to find that which lean tool applied to improve the process like 5S,Kanban,Kaizen, Line balancing etc. to reduce the total lead time

C. Application of VSM Tools involves:

Tools	Parameters
Process activity mapping	Identify lead time & productivity opportunities
Demand amplification mapping	Volume with respect to Time
Quality filter mapping	Product defects, Scrap defects & Service defects
Production variety Funnel	No .of products variant- manufacturing process path
Value adding time profile	Value adding & Non-Value adding costs- Time

Table 2 Vsm Tools [12]

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.

CONCLUSION

Lean principles have the potential to be successfully applied in the mining industry; however there are challenges that need to be considered and overcome. Think of lean not just as a change of process but also a change in company culture. It is a slow process and one that will require total devotion. Applied correctly, lean principles could have some seriously positive impacts on business.

After referring number of paper it is not inconsistent to conclude that 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. VSM works in any of the sector such as hospitability, manufacturing, service industry, automobile, machining and casting industry, Transportation etc.

Lean principles are not purely about cost saving; instead, it focuses on working smarter to reduce or eliminate the nonvalue-adding work people do each day. Lean thinking is not complex but requires detailed understanding of the process, it can save time, money and effort – and empower the workforce to increaseproductivity, efficiency and morale

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