Value Stream Analysis

What is it?

It is a simple assessment of where value is added and where non-value (waste) accumulates in a process. Value stream analysis involves drawing up a process flow chart for the business and then asking, at each stage (including the stages between activities) whether cost/waste or value is being added. This often highlights unnecessary space, distance travelled, processing inefficiency, etc. It can be applied equally well to service activities - for example, the process of carrying out paper processing in sales or in developing insurance quotations or processing claims.

Why is it used?

It is used to highlight improvement areas for process innovation. It is similar to value analysis which is used in product development and improvement.

When is it used?

As part of an initial diagnosis, it can highlight areas for improvement - for example, by elimination or re-design of process stages.

How does it work?

This technique is designed to identify internal strengths and weaknesses - what is it about the firm which helps achieve the strategic goal of competitive advantage - and what gets in the way? It can be applied inside the firm or along its wider supply and distribution chain, but the principle is the same. The overall goal is giving the customer what they want - providing customer value - and the challenge is to find any and every place where value is not being added. It could be because of a poor machine or a duplicated process or lengthy queues or… The point is that such an analysis quickly focuses on where change is needed and throws up opportunities for change.

It is based on the idea that the firm consists of a sequence of activities, each of which is designed to add some value to the product or service as it moves through. Eventually it finds its way to the customer.

For example: At each stage we hope that value is being added but of course there are also costs of running the relevant activities, etc. And there is also an overhead which adds to the cost and supports the overall running of the business. But there is also - unfortunately - a component of waste associated with each activity and with the flow through the organization, which also adds cost and unnecessary time, space, etc. to the process. For example, if partly finished pieces have to wait in a queue before they can be processed this wastes time. If there is too much of a gap

between machines or if the layout means parts have to travel a long way between activities, then there is wasted time and space. And so on.

This approach is described in several sources - for example, in the business process re-engineering literature, in the 'lean thinking' material and in other tools. The technique does not need to stop at the boundaries of the firm; it can easily extend beyond the firm back into the supply chain and down into the distribution chain. Its potential there is to highlight where unnecessary losses arise in weaknesses in relationships between firms - and where strategic targets for improvements lie.

This approach is behind the current fashion for 'business process re-engineering' and it forms the underlying philosophy for 'lean thinking'. The concept of a lean enterprise or supply chain is just that - one which has minimal unnecessary 'fat' built in - and value stream analysis techniques are the key tool in developing such enterprises.

Five Steps for Implementation of Lean Thinking

There are five steps for implementing *Lean Thinking* in an enterprise:

1. Define Value from the perspective of the Customer

Precisely define value in terms of specific products with specific capabilities offered, at specific prices through a dialogue with a specific customer/s, and at a specific time (Womack & Jones, p.16). In other words, lean enterprise understands and focuses precisely on what the customer's want to buy.

2. Identify the Value Streams

Womack and Jones define the value stream as "the set of all the specific actions required to bring a specific product through the three critical management tasks of any business: problem solving, information management, physical transformation" (Moore & Scheinkopf, p.17). Once the value stream has been identified, create a map of the Current State and the Future State of the value streams. The Value Stream Mapping (VSM) tool allows a visual representation of value streams to help identify and categorize the wastes in the Current State. This map is used to plan actions to eliminate the wastes and obtain the Future State.

3. Flow

This step identifies and eliminates any *muda-causing* structures or activities in the product flow that increase the manufacturing lead-time. It encourages companies to look at the physical distance that separates all pairs of functional departments that are utilized during the order realization process to fulfill customer demand. The most dramatic reductions in total lead time will be achieved by a product-focused organization (focused factory).

4. Pull

After the wastes in the system are reduced, a lean enterprise would use a strategy of *pulling* inventory through the system based on actual customer product demand, in contrast to the traditional approach of *pushing* inventory through the system. In a pull environment, the tendency of overproduction, which leads to increased inventory levels, can be controlled. In addition, letting the customers pull products as needed will eliminate the need for (unreliable) sales forecasts.

5. Perfection

This concept reminds the lean enterprise to continuously improve the production system, and move its performance towards perfection. The entire process of lean implementation must be a never-ending process since, in practice, the process of reducing effort, time, space, mistakes, and costs can never be perfect. For example, for further lean transformations in a company that wishes to offer a better product as per customer desires, it is necessary to go back to Step 1 in this 5-step process.

Value Stream Mapping (VSM)

Unlike traditional process mapping tools, VSM is a mapping tool that maps not only material flows but also information flows that signal and control the material flows. This visual representation facilitates the process of lean implementation by helping to identify the value-adding steps in a value stream and eliminating the non-value adding steps, or wastes.

Using a VSM process requires development of maps: a Current State Map and a Future State Map. In the Current State Map, one would normally start by mapping a large-quantity and high-revenue product family. The material flow will then be mapped using appropriate icons in the rich VSM icon template. The product will be tracked from the final operation in its routing to the raw material storage. Relevant data for each operation, such as the current schedule (push, pull, order dispatching rules in effect at any process ex. FIFO) and the amount of inventory in queue, will be recorded. The information flow is also incorporated to provide demand information, which is an essential parameter for determining the "pacemaker" process in the production system. After both material and information flows have been mapped, a time-line is displayed at the bottom of the map showing the processing time for each operation and the transfer delays between operations.

The time-line is used to identify the value-adding steps, as well as wastes, in the current system. The comparison between the processing times and the takt time (calculated as Available Capacity/Customer Demand) is a preliminary measure of the value and waste. This takt time is mostly used as an ideal time for each operation to achieve (ideally, the cycle time for each operation should be the takt time).

Based on the analysis of the Current State Map, one then develops a Future State Map by improving the value-adding steps and eliminating the non-value adding steps (waste). According to Rother & Shook, there are seven guidelines, adapted and modified based on the concepts of Lean Thinking, that can be followed when generating the Future State Map, or lean value stream

Produce to takt time

1. Develop continuous flow
2. Use supermarkets to control production where continuous flow does not extend upstream
3. Schedule based on the pacemaker operation
4. Produce different products at a uniform rate (Level the production mix)
5. Level the production load on the pacemaker process (Level the production volume)
6. Develop the capability to make "every part every (EPE) <time period>"