



Supply Chain Insider

Volume 01, Issue 03, 201. 30-10-19

Article Received: 16-09-2019

Accepted: 05-10-2019

Available Online: 05-11-2019

ISSN: 2617-7420 (Print), 2617-7420 (Online)

supplychaininsider.org

Supply Chain Value Analysis

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ABSTRACT:

Value analysis is like little Tommy's definition of salt, he said, "Salt is what spoils the potatoes if you leave it out!" Value Analysis is what spoils the Value if you leave it out (Miles, 1954). The value of a product or service is recognized according to the appropriateness level of its performance and cost. It can almost truthfully be said that, by this definition, value can be increased by either increasing the performance/function or decreasing the cost. It is important to create a value culture in organizations, through methods such as Value Analysis (VA). In this paper we intend to provide a better knowledge of value analysis and suggest possible ways of its application.

KEYWORDS:

Value, Cost, Function, Value analysis, Job plan, Supply Chain Management, Value Chain Analysis, Primary Activities, Support Activities, Functional analysis, Lean waste, Value creation.

INTRODUCTION:

The techniques that support VA activities include 'common' techniques used for all value analysis exercises and some that are appropriate under certain conditions (appropriate for the product under consideration). The VA approach is almost universal and can be used to analyze existing products or services offered by manufacturing companies and service providers alike. For new products, the Value Engineering (VE) approach, which applies the same principles and many of the VA techniques to pre-manufacturing stages such as concept development, design and prototyping.

At the very heart of the VA process review is a concern to identify and eliminate product and service features that add no true value to the customer or the product but incur cost to the process of manufacturing or provision of the service. As such, the VA process is used to offer a higher performing product or service to the customer at a minimal cost as opposed to substituting an existing product with an inferior solution. It is the principle that guides all actions within the VA process and allows any improvement ideas to be translated into commercial gains for the company and its customers. For many of the world's leading companies, including names like Hewlett Packard, Sony, Panasonic, Toyota, Nissan, and Ford, the VA process of design review has provided major business returns. The key to realizing these returns is knowledge, of the customer requirements, the costs of the product, and an in-depth knowledge of manufacturing process and the costs associated with failures due to poor or inadequate product design. All these inputs to the VA process are vital if decisions regarding product and process re-design are to yield lower costs and enhanced customer value.

METHODOLOGY:

The VA appeared in 1947 in the United States, from work carried out by Lawrence Miles, executive of the purchasing department of the General Electric Company. Initially, VA was applied only in the reformulation of existing products (Miles, 1972). However, it soon became apparent that organizations could get higher benefits if VA is introduced into the product design phase, because redesign a product can involve large investments. Currently VA is considered a method and not a simple technique. This is because, not only is an organized approach to improve and create value, but also uses several different techniques to achieve this goal. The competition is forcing companies to re-examine its range of products in order to provide a higher level of satisfaction to their customers without increase the costs. In addition, some companies are also using the VA with its suppliers. VA is a well-known structured method to increase value and support the selection of the most valuable solution. Throughout recent decades, VA has proven able to reduce costs and ensure quality, while also contributing to the improvement of decision-making and other important organizational tasks. The VA can be defined as an organized and creative methodology that uses a functional approach and aims to increase the value of a product/service. The VA provides a means to link, align and maximize the efficiency of the value chain. Miles, the main pathfinder of Value Analysis, had in his day questioned the future application of the concept in business: "The basic question is: what do we really have in Value Analysis? What we have is a tremendous problem-solving system." (p.69). In Miles's opinion, value had to go on a new and different path in supporting business development, rather than keeping its action, as at the time, exclusively in the field of "cost reduction". He continued on his new vision for value analysis: "It becomes essential that we in Value Analysis work to help modify the management of areas into which the work will go. At the same time, we must further change our approaches in Value Analysis so that we are modifying the seed and the soil together without taking the strength out of the problem-solving approach" (p.70). This would mean, at that time, going one dimension further ahead in value analyses.

Defining Cost and Value:

Any attempt to improve the value of a product must consider two elements, the first concerns the use of the product (known as Use value) and the second source of value comes from ownership (Esteem value). This can be shown as the difference between a luxury car and a basic small car that each has the same engine. From a use point of view both cars conduct the same function – they both offer safe economical travel (Use value) – but the luxury car has a greater esteem value. It is important for all managers to understand the nature of costs in the factory and for any given product. A shocking figure, that is often used as a general measure, is that typically 80% of the manufacturing costs of a product will be determined once the design drawing has been released for manufacturing. The costs of production are therefore ‘frozen’ and determined at this point. These costs include the materials used, the technology employed, the time required to manufacture the product and such like. Therefore, the design process creates many constraints for the business and fixes a high degree of the total product cost. It is therefore a process that demands periodic review in order to recover any ‘avoidable’ costs that can be removed throughout the life of the product by correcting weakness or exploiting new processes, materials or methods and lowering the costs of production whilst maintaining its Use value to the customer. Basically, there are three key costs of a product:

- Cost of the parts purchased: These are costs associated with the supply of parts and materials.
- Cost of direct labour used to convert products.
- Cost of factory overheads that recover the expenses of production.

Although there are three elements of total cost accumulation it is traditionally the case that cost reduction activities have focused on the labour element of a product. Activities such as work-study, incentive payments and automation have compressed labour costs and as a result there is little to be gained, for most companies, in attempting to reduce this further.

Value, is the ratio of function to cost. Several strategies for improving the value:

1. Increase Function/Performance with decreasing Cost. ($V \uparrow = F \uparrow / C \downarrow$)
2. Increased Function/Performance for the same Cost ($V \uparrow = F \uparrow / C \rightarrow$)
3. Decreased Cost for the same Function/Performance ($V \uparrow = F \rightarrow / C \downarrow$)
4. Proportionate increase in the Function/Performance is more than the proportionate increase in the Cost. ($V \uparrow = F \uparrow / C \uparrow$)
5. Proportionate decrease in the Cost is more than the proportionate decrease in the Function/Performance. ($V \uparrow = F \downarrow / C \downarrow$)

Analysis is a process of systematic examination and evaluation of data or information of a complex topic or substance facts to uncover and understand cause effect relationships, thus providing basis for problem solving and decision making.

Value Analysis Job Plan

The VA methodology uses a structured and methodical job plan contemplating several steps/phases to assure the success in their application. The most known and distinctive phases are;

Orientation: One of the most important initial steps in developing the VA process is to create a formal team of individuals to conduct the exercise. These individuals must be drawn from different parts of the business that affect the costs associated with design, manufacturing, supply and other relevant functions. The project is selected and clearly defined. The team examines in detail the product and its components to understand thoroughly their nature.

Information: The purpose of the Information Phase is to gain an understanding of the problem and any solutions that have been proposed. Project related information and data is reviewed to help the team establish a thorough understanding of the objectives and the context. The complexity of the project, the amount of information and time available will influence the level of effort, and time devoted to the Information Phase.

Function Analysis: Function Analysis is a technique used to analyzing functions, worth, cost, performance and quality of the product or service. Functions come in two forms: Primary functions are those that represent the reason for the project's existence, for example, a building project might have adequate plumbing as a primary function. Secondary functions are those that the project serves without being core to the project. For example, a building project might have as a secondary function maintaining the view of the neighboring building.

Creative: The Creative Phase is an opportunity for the team to use their creativity and produce alternate means of performing the functions associated with the product, service or project. The goal is to generate as many ideas as possible in a short period of time. This can be accomplished through Function-based Brainstorming.

Evaluation: This is where the ideas generated from the Creative Phase are systematically evaluated, screened prioritized and short-listed for their potential to save cost and/or value.

Development: The Development Phase involves exploring in detail the ideas selected. In this phase, report is prepared. This report contains a summary of the study, conclusions and specific proposals. The decision makers choose the alternative.

Presentation: Presenting VA recommendations for review, approval, reporting and implementation.

Review: Implementing and evaluating of the outcomes of the approved recommendations. The progress of analysis changes in continuously monitored and followed up in order to provide assistance, to clarify any misconceptions and to ensure that the desired results are achieved.

Supply Chain Management:

Supply chain management (SCM) is the active integration and coordination of all supply chain activities to provide the customer, with the best value. Providing customer with the best value means providing with a quality product for a reasonable price.

Value Chain Analysis:

Originated in the 1980s by Michael Porter, he suggested that activities within an organization add value to the service and products that the organization produces, and all these activities should be run at optimum level if the organization is to gain any real competitive advantage. Value chain analysis (VCA) is a process where a firm identifies its primary and support activities that add value to its final product and then analyze these activities to reduce costs or increase differentiation.

Value is the total amount (i.e. total revenue) that buyers are willing to pay for a firm's product. The difference between the total value and the total cost performing all of the firm's activities provides the margin.

A value chain concentrates on the activities starting with raw materials till the conversion into final goods or services. So, profit margin depends on ability to manage all the activities in the value chain.

Classification of Value Chain Analysis:

Value Chain Analysis is grouped into primary and support activities discussed as under:

Primary Activities: The functions which are directly concerned with the conversion of input into output and distribution activities are called primary activities. It includes:

Inbound Logistics: It includes a range of activities like receiving, storing, distributing, etc. which make available goods and services for operational processes. Some of those activities are material handling, transportation, stock control, etc.

Operations: The activity of transforming input raw material to final product ready for sale, is termed as operation. Machining, assembling, packaging are the activities covered under operations.

Outbound Logistics: As the name suggests, the activities that help in collecting, storage and delivering the product to the customer is outbound logistics.

Marketing and Sales: All the activities like advertising, promotion, sales, marketing research, public relations, etc. performed to make the customer aware of the product or service and create demand for it, comes under marketing.

Service: Service means service provided to the customer so as to improve or maintain the value of the product. It includes financing service, after-sales service and so on.

Support Activities: Those activities which assist primary activities in accomplishment, are support activities. These are:

Procurement: This activity serves the organization, by supplying all the necessary inputs like material, machinery or other consumable items, that required by the organization for performing primary activities.

Technology Development: At present, technology development requires heavy investment, which takes years for research and development. However, its benefits can be enjoyed for several years and by a multitude of users in the organization.

Human Resource Management: It is the most common plus important activity which excel all primary activities of the organization. It encompasses overseeing the selection, retention, promotion, transfer, appraisal and dismissal of staff.

Infrastructure: This is the management system, which provides, its services to the whole organization and includes planning, finance, information management, quality control, legal, government affairs, etc.

Link between Primary and Support Activities:

As mentioned before, primary activities add value directly to the production process, but they are not necessarily more important than support activities. Nowadays, competitive advantage mainly derives from technological improvements or innovations in business models or processes. Therefore, such support activities as 'information systems', 'R&D' or 'general management' are usually the most important source of differentiation advantage. On the other hand, primary activities are usually the source of cost advantage, where costs can be easily identified for each activity and properly managed.

What is waste in Lean Manufacturing?

A core principle in lean methodology is the removal of waste within an operation. Lean waste can come in the form of time, material, and labor. But it may also be related to the utilization of skill-sets as well as poor planning. In lean manufacturing, waste is any expense or effort that is expended but which does not transform raw materials into an item the customer is willing to pay for. By optimizing process steps and eliminating waste, only true value is added at each phase of production.

8 Wastes Check Sheet

Process Area: Dining Room

Date: August 1st

	Waste	Definition	Examples	Type "High", "Medium", "Low"	Description of Issues
D	Defects	Information, products and services that are incomplete or inaccurate	- Inaccurate applications - Broken parts - Missed deadlines	Low	Occasionally - Coffee orders are made with real milk when soy milk was requested
O	Overproduction	Making more of something - making it earlier or faster- than it's needed	- Extra copies of reports - Redundant storage (hard & soft) - "Reply All" on emails	Medium	Making too much coffee in the morning and wasting stock of coffee beans
W	Waiting	Waiting for information, equipment, materials, parts or people	- Waiting for approvals - Waiting for equipment - Waiting for large batches	High	Customers waiting too long for lunch orders - complaints about returning late from lunch hours
N	Non-Utilized Talent	Not properly utilizing people's experience, skills, knowledge or creativity	- Employees unable to make decisions - Employees not fully trained - Skilled employees doing unskilled tasks	Medium	Too few people able to operate the register - occasional bottleneck
T	Transportation	Unnecessary movement of materials, information or equipment	- Hand-offs between functions - Multiple reviews - Sending, resending emails	High	Moving a lot of supplies between 2 different Bistro locations
I	Inventory	Accumulation of parts, information, applications, etc.	- Stockpiling supplies - Information piling up for data entry	Medium	Stockpiling a year's worth of coffee beans - wasting

		beyond what is required by the customer	- Keeping data longer than necessary		space and run the risk of stale coffee
M	Motion	Any movement by people that is not of value to the customer	- Repetitive key strokes - Walking between equipment - Switching applications	High	Employees frequently walking between dining room, kitchen and stock room
E	Extra-Processing	Any steps that do not add value in the eyes of the customer	- Extra formatting, extra fields - Extra features, excess detail - Extra report information	Low	Some staff writing both first and last names on coffee cups

Value Analysis example in Purchasing:

Today's purchasing people are buying on the best combination of price, quality, and service. The use of Value Analysis in no case lowers quality. It secures either the same or better quality at lower cost (Miles, 1954).

Example of EOQ: Economic order quantity (EOQ) is the order quantity that minimizes the total inventory holding costs and ordering costs.

Suppose annual requirement quantity (D) = 1,000 units

Cost per order (K) = \$20

Purchasing Cost per unit (P)= \$5

Carrying cost (h)= 20% of purchasing cost

Annual carrying cost per unit (h) = \$1

Economic Order Quantity

$$Q^* = \sqrt{\frac{2DK}{h}}$$

= **200 Quantity**

Value Creation Example in Manufacturing:

Approved Specification:

Product Name: Mr. Energy Standard

Gross Weight = 87gm Net Weight = 85gm

Observation:

Gross Weight = 90gm Net Weight = 88gm

Difference = $88 - 85 = 3$ gm per pack

Per Carton = $24 \text{ pack} \times 3 \text{ gm} = 72 \text{ gm}$



Date: 30/05/2014

Production of Mr. Energy Standard = 6,000 Carton

Extra Weight = $6,000 \times 72 = 432,000 \text{ gm} = 432 \text{ Kg}$

Extra Packet = $432,000/85 \cong 5,082 \text{ pcs}$

Extra Carton = $5,082/24 \cong$ around 212 cartons

Which is monthly average = $212 \times 27(\text{day}) = 5,724 \text{ carton}$

For 264 Tk IP value its stand = $5,724 \times 264 = 15,11,136 \text{ Tk}$

There are approximately 10 regular products like this,

So average more or less $5,724 \times 10 = 57,240$ cartons are produced as extra in one month. For average 250 Tk IP value its stand = $57,240 \times 250 = 14,310,000 \text{ Tk loss/month}$

Reasons: Dies shape problem, Irregular dies maintenance, Conveyor belt pressure, Inaccurate mixing, Irregular quality maintenance. By utilizing proper maintenance calendar for dies, conveyor belt and mixing quality maintenance it can be reduce the amount of extra weight loss.

Value Analysis example in Logistics & Distribution:

Truck space is expensive and inefficient usage of it leads to wasted fuel, maintenance and personnel expenses each year. This leads to more trucks plying on the road, below example shows that according to average 80% utilization of a truck space leads per 5 truck 1 truck all costs are wasted. So, efficiently arrange the delivery items for a shipment can improve this KPI.

Vehicle No.	U-11-3380	
Std. Space	5,670	Cubic Feet

Space Utilize	4,546.49	Cubic Feet	80%
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Party Name: Arjun Enterprise				
SL. No.	Product Name	Cubic Feet/Unit	Delivery Qty	Total Cubic Feet
1	A	0.20	1,500	299.69
2	B	0.26	500	131.39
3	C	0.28	900	255.00
4	D	0.32	400	129.96
5	E	0.41	800	331.50
6	F	0.20	300	60.67
7	G	0.35	700	243.70
				1,452

Party Name: Salam Enterprise				
SL. No.	Product Name	Cubic Feet/Unit	Delivery Qty	Total Cubic Feet
1	A	0.20	1,200	239.75
2	B	0.26	450	118.25
3	C	0.28	800	226.67
4	D	0.32	1,200	389.87
5	E	0.41	300	124.31
6	F	0.20	250	50.56
7	G	0.35	1,500	522.22
				1,672

Party Name: Karim Enterprise				
SL. No.	Product Name	Cubic Feet/Unit	Delivery Qty	Total Cubic Feet
1	A	0.20	1,100	219.78
2	B	0.26	600	157.67
3	C	0.28	250	70.83
4	D	0.32	1,400	454.84
5	E	0.41	200	82.88
6	F	0.20	1,300	262.89
7	G	0.35	500	174.07
				1,423

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