A REVIEW ARTICLE ON VALUE ENGINEERING

[1]Deepak Dhounchak, [2]Lalit Kumar Biban
[1]M. Tech, Mechanical Engineering Department, UIET, MDU Rohtak
[2]M. Tech, Mechanical Engineering Department, UIET, MDU Rohtak

Abstract: ***Value engineering is a basic concept which is generally used in automobile sector to increase the overall production of company and eliminate all unnecessary process so that the profit of a plat can be maximized. In 21th century competition in automobile sector is going to increase day by day. Production and demand of the product is limited for all groups because there is lot of choices available in market for a customer that is way not only the production is increases today but the demand of goods is also increases. So the idea of reducing the total manufacturing cost of running part and also reducing the amount of their wastage such as parts scrap, issue of quality of parts and other reason of rejection of parts i.e. value analysis of parts is to be done so that a group produces the same parts is of cheaper cost from their competitors in market. Over the last decade the interest in standardization of products has been increased. This interest stems from the high technology projects and the overseas business market requirement in the mid-century (1950). The International market leads to competition and its requirement for continuous improvement became an issue of major importance in 1980s and even more important in 1990s. This competitive market required organizations that provide the superior values to the customer. Standardization is important for exchange of goods and services at international level in the world. It is also co-operation in the scientific, technology and economic activities.***

Keywords: Value Engineering, Value Engineering Method, Quality Control, QC, VE, SPC, Quality Management, Value analysis, VA.

INTRODUCTION

Value engineering is a method used to increasing the quality and profit of any manufacturing industry by applying quality tools like quality management, SPC, MSA etc. in that manufacturing industry (Deepak Dhounchak, 2017). The total wastage in manufacturing of product can be eliminated by implementing the value engineering (Deepak Dhounchak and Sandeep Kumar, 2017). To increase the worth of an item VE is can be used as a logical and creative method. The item can be a process, a service, a product, tool or a method of working. Value analysis invented by L.D. Miles is also named as Functional Analysis. The value of an item is depending upon the function performed by the item divided by the cost of the item. In value analysis value is not just another word for cost. Value engineering is also named as "value management" or "value methodology" (VM), and "value analysis".

$$\text{Value Engineering} = \frac{\text{Performance of its function}}{\text{Cost}}$$

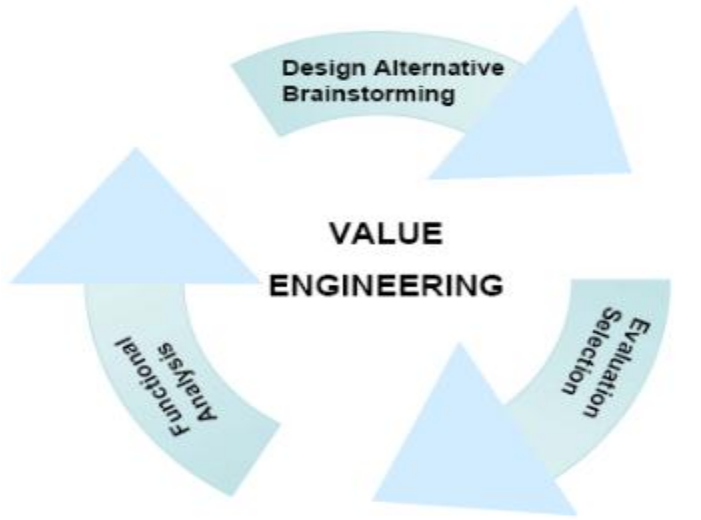

Figure 1: Value Engineering

Value engineering is a process analysis method which identifies and eliminates those features of product and service that has no real value to the customer needs or the product but increase manufacturing process cost of product or service (Deepak Dhounchak & Lalit Kumar Biban, 2017). The value engineering method is implemented to provide a high performance product or service to the customer at minimum cost. The basic principle of value engineering is providing value at the lowest optimal cost of production but never compromised with its features and quality. Basically in short we can say that Value Engineering/Analysis is about to increase the net profit of an organization without sacrifice the product quality (Sharma, C., & Kadyan, S. 2016b).

HISTORY OF VALUE ENGINEERING

Basically value engineering was invented at General Electric Co. during World War II. There were lack of skilled labor, raw materials and component parts due to war. Lawrence Miles, Jerry Leftow, and Harry Erlicher at G.E. looked for suitable alternatives. They noticed that these alternatives regularly reduced costs or improved the product or both. They named their technique "value analysis". In 1972 Robert Sproule worked at GE Hydro and was a member of the McGill University Faculty of Engineering's Advisory Board. The Faculty was interested in having more interaction between students and company engineers. Bob suggested the creation of a course to teach value engineering and to have students work on industry projects with company engineers. Professor David Pfeiffer and the Chair of the Department of Mechanical Engineering, Jules Stachiewicz, went to GE to participate in value engineering projects in order to understand the concept firsthand. In September, 1973 David Pfeiffer organized the first value engineering workshop held at McGill assisted by Bob Sproule and Henry Wales, a certified value specialist from the USA.

In 1995 Professor Vince Thomson and Lucie Parrot, CVS, took over the teaching of the Value Engineering Workshop at McGill when David Pfeiffer and Hank Wales retired. SAVE (Society of American Value Engineers) gave the 2007-2008 Presidential Citation Award to Mechanical Engineering at McGill University for their pioneering and sustaining work in teaching value engineering.

PHASES OF VALUE ENGINEERING

The concept of value Analysis is applicable by getting it in eight basic steps. These are also known as the phases of value analysis. In this first six are the basic steps of value analysis which are widely used forming its historical development (Deepak Dhounchak, 2017).

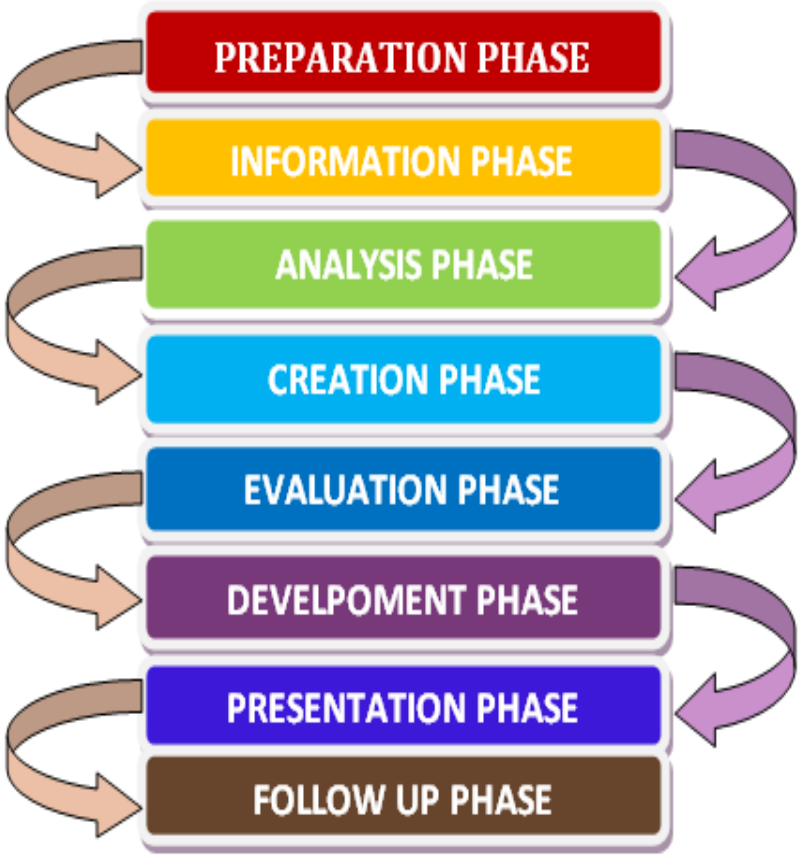

Figure 2: Phases of Value Engineering

Eight steps of Value Analysis are followed by Preparation phase and finally all work is expressed by using presentation and follow up phase. In this the first three are the basis steps of a value engineering process and last two steps are used to maintain (Sharma, C. 2013b) the existing system for all times like if we control any machine or process by documentation then supportive document are used to maintain that system and concerned person fill the related data by time to time as per decide frequency. In other ways these two steps are used to maintain a quality management system in an organization (Sharma, C. 2013b).

1. Preparation Phase

Preparation phase of value analysis is initial phase in this the area is used to identify where we have to apply the value methodology. In a running plant all process is analysis like press shop, paint shop & welding shop etc. then it is to be analysis where is the need of this concept in which area we face loss of production and where quality of product (Deepak Dhounchak & Naveen Khatak, 2017) goes on lower lever. Known problems are those that have generated complaints or costly warranty returns. These products have attracted criticism and frustration from the customer to the point that the customer has formally complained. As such these problems need to be corrected as they compromise the perceived value of the customer. Products with known problems within the factory are also important, as these products require high levels of internal rectification before they reach a standard suitable for dispatch to the customer (Deepak Dhounchak, 2017). For many businesses, the latter is a key motivation as high levels of internal corrective actions that consume costs but generate no true value for the customer or the business

subsidize good customer performance. To illustrate this point, it is common to find many businesses that invest heavily in rework and final inspection routines to ensure high levels of customer quality. These activities are unnecessary costs that are often traced to poor design control and review rather than poor equipment reliability.

2. Information Phase

Informational phase is the second phase of value analysis methodology. In this phase we have to study the subject complete detail which we select in the initial step or preparation step. In this phase complete information of part is calculated on a single table it includes-

- Raw material complete detail (Material Grade, Tensile, Hardness, length, width & thickness etc.
- Raw material supplier status. (Supplier process is as per requirement or not)
- Design 2D & 3D data.
- Process operation (like-Trimming, punching, bending etc.)

3. Analysis Phase

This phase is the most important phase of value analysis concept. In this process after getting complete operation information of product brainstorming process is start to improve the product process planning & continues improvement in the product cycle and quality level (Kaushik, P., & Mittal, K. 2015). In this phase the functions of the product are analyzed by Functional Analysis, which is aimed at identifying functions given by a product or part of it.

4. Creation Phase

For this phase it is necessary to use creative techniques that generate alternatives. Starting from the analysis of functions and costs, the options are searched that allow elimination, change or improvement of components and functions (Deepak Dhounchak, 2017). This requires the product or process to be 'mentally destroyed' and then rebuild a new one.

5. Evaluation Phase

This shows a confrontation of ideas, a collection of information about the feasibility and cost of those ideas, and measures the value of the best alternatives. This analysis or evaluation uses the same techniques of value measurement that have been used in previous steps. At this point an examination is done about the grade of functional accomplishment and the economic analysis of those alternatives that offer the higher value. Some of the techniques are well-known such as Cash-flow analysis and break-even point (Shakti & Deepak Dhounchak, 2017). The team involved in Value Analysis needs an objective analysis of the ideas generated through the innovation phase.

The evaluation phase is carried out in two main steps:

- A qualitative analysis of value in design, cost, implementation facilities etc.
- A quantitative analysis using numerical techniques of value measurement that leads to a few alternatives of high value that will be analyzed in depth.

6. Development Phase

In this phase all parameters which we selected up to evaluation phase are implemented in plant to improve the productivity and improve quality level (Mittal, K., Kaushik, P., & Khanduja, D. 2012). A finalized report to be made and all area are identified on which we have to done work and what time and proper documentation to be done to review and maintain the system as well. These includes-

- Check sheet
- Process sheet
- Control Plan
- Work instruction
- Bar Graph
- Skill matrix of worker and best selected for critical work
- Process flow diagram
- Kaizen sheet

All related data to this phase will display and work is done as per identified.

7. Presentation Phase

This phase includes expressing and presenting the total work to all management and related customer. Most important aspect in this phase complete information regarding to your project will be shown to your customer like-if change in drawing required then we ask for ECN. The final stage of the VA team is to report the findings to the senior management team and to gain permission to implement the findings of the report. This is the most rewarding stage as the many hours of brainstorming; classification and calculation begin to become 'the new product' and 'the new way of manufacturing'. At this point, each product or service that is conducted is done so with the knowledge that it generates profit for the business and generates value for the customer in the most effective and efficient way (Deepak Dhounchak & Lalit Kumar Biban, 2017). It should be noted that changes need to be scheduled in order to prevent 'change overload' within the factory whereby many elements of a product are replaced or modified and also to allow specialist departments such as the purchasing department to make the necessary changes to material and part specifications.

8. Follow Up Phase

This is also the important phase of value analysis which is recently added in this concept. This phase is not used in this concept at the time of its development (Mittal, K., Kaushik, P., & Khanduja, D. 2012). In this phase all work which we done to improve the product cycle is to be maintain for long time so various document are implemented (Kaushik, P., & Mittal, K. 2015) in the shop which we initially discussed in

presentation phase are time to time finalized by CFT team.

Main methods used in this phase are -

- Internal Audit
- Management Review Meeting
- Yearly TS-ISO Audit

CONCLUSION

The value engineering is good activity and gives better results after implementation in any industry. This gives tangible changes along with improved product or service quality and increased productivity. This eliminates the extra costs added in manufacturing cost of product in the industries. This also increases the performance and profit of the industry.

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