

Furniture Product optimization by using creative phase of Value Engineering (VE)

Raj Gandhi¹, Ashwin Chougule², Aniket Jadhav³, Prof. Shital Patel⁴

^{1,2,3}Student, Dept. of Mechanical Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai

⁴Professor, Dept. of Mechanical Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai

Abstract:

To make a product successful there should be a perfect balance between three important parameters that is Price, Quality and Functionality. For achieving this value engineering is one of the tool available to the industries which can give fruitful results. The ultimate goal of value engineering is to provide optimum results to the manufacturer as well as to the customer. It applies various methods to the manufacturing process through which the quality can be improved, its functionality can be increased and the price can be decreased. In this paper we specifically used the creative phase of value engineering concept to analyse variety of furniture products like bed(divan), computer desk, chair, so that a manufacturer can apply these ideas to decrease the overall production cost and increase the productivity and quality hence making the stakeholders as well as the customers happy and satisfied.

Key Words: Value Engineering, creative phase

1. INTRODUCTION

The current market scenario is very demanding. There is continuous demand to reduce the product price. This forces the businesses to lower the production costs of product to provide competitive product. Thus product engineers face challenge to reduce the production cost and material cost. This can be achieved by performing Value Engineering (VE). "Value Engineering is an organized, creative, cost search technique for analyzing the function of a product with the purpose of value enhancement without compromising with its quality, performance and efficiency"[3]. It cannot be carried out in haphazard manner; it is essentially a team effort involving carefully selected representatives from the main departments of an organization who have been thoroughly trained in the basic value engineering techniques. In Value Engineering

practice, areas of poor value are identified by analysis and studied at very early stage in design process, and at various stages right through manufacture to distribution and operation. This results in a reduced cost, an improvement in the effectiveness of functions, or both. Value Engineering can be applied in all sectors. Initially, this was introduced in manufacturing industries later it expands to all business and economic sectors including agriculture, healthcare, construction, service organizations and education.

2. LITERATURE REVIEW

Value Engineering technique was introduced during world war 2 at General Electric Co. During war there was shortage of raw materials, components and skilled labours. They found that many of substitutes have better or equal performance at less cost. Lawrence D. Miles take efforts to make concept systematic. As a result of their success GE forms a special group headed by Miles. They called their technique Value Analysis.

A second scenario of application of value analysis was in U.S. defense department. By 1954, Value Analysis was standard procedure in manufacturing of defense products. The evidence suggest that the term Value Engineering was introduced by US Defense Department as a means of classifying officers specialized in value analysis technique.

In 1950, US Navy Bureau of ships used value engineering for submarine design and engineered the desired outcomes. Value Engineering became the common term, subsuming, in most cases the term Value Analysis. This term was supported by the Society of American Value Engineering (SAVE). Following the successful application of Value Engineering in the US Defense Department, the

technique was introduced to the US construction industry in the early 1960's.[4]

In 1963, a major innovation in Value Engineering was the development of the Function Analysis System Technique (FAST) by Charles Bytheway of the Sperry Rand Company. This technique allows a set of functions performed by a product to be expressed in terms of a diagram similar to CPM. The technique is based on linking functions on the basis of "how-why" logic. Bytheway's FAST diagrams became an important part of Value Engineering and continue to do so to this day. The creation of the F.A.S.T. diagram was the single major development in Value Engineering since its inception in the 1940s.

Value Analysis was introduced into Australia in the mid-1960s. Its introduction was via the United States and (separately) via the UK. The earliest account available is that of Mr Eric Adam who, in 1966 was the Chief Executive of the Engineering Division of ACI Ltd. They were required to find different ways to reduce cost and improve performance, Adam contacted a visiting Value Analysis Practitioner from the US. Adam describes how he selected for the exercise a product packaging process. He thought there would be no possibility of reducing its cost. To his surprise, the Value Engineering approach led significant changes which reduced cost and improved performance. Adam then applied Value Analysis to the Engineering Division at ACI until he left the company one year later. Then he established himself as a full time consultant in Value Analysis. He is the first Australian known to have done this. Adam worked with many companies in his consulting role, leading to substantial cost savings and product improvement[4].

Advantages of VE

- i. VE provides systematic approach to tackle problems.
- ii. Value Engineering improves product design and quality.
- iii. It emphasizes on seeking the substitutes for achieving the function and on applying the best substitute among the various courses of actions available.
- iv. Suggests to remove the unnecessary functions in the organization that increases cost.
- v. Improves the customer's satisfaction and sales by determining the exact need and expectations of customers.

- vi. Environment of creativity in the organization encourages individuals to put forward suggestions which leads to ultimate cost reduction and better functioning.
- vii. Improves understanding of project and cost estimations.
- viii. Objective selection among competitive priorities or solutions.
- ix. Cost saving provide a measure for judging managerial effectiveness.
- x. The areas which requires attention and improvement gets focused.
- xi. Understanding and measurements of the values associated to product, service or project.
- xii. VE provides greater return of investment results.

There are generally five phases of Value Engineering which are listed below:-

1. **Information Phase** - During this phase, the VE team gathers as much information as possible about the program requirements, project design, background, constraints, and estimated/projected costs. The team performs functional analysis of systems and subsystems to identify high cost areas. The project designer provides additional design data and participates in the initial VE team conference.
2. **Creative Phase** - The team uses a group interaction process to identify alternative ideas for accomplishing the function of a system or subsystem.
3. **Evaluation/Analytical Phase** - The ideas generated during the speculative/creative phase are screened and evaluated by the team. The ideas showing the greatest potential for cost savings and project improvement are selected for further study.
4. **Development/Recommendation Phase** - The team researches the selected ideas and prepares descriptions, sketches, and life cycle cost estimates to support the VE proposal (VEP) recommendations.
5. **Report Phase** - The team presents the VEP's to the Government during an oral presentation at the conclusion of the workshop. Shortly after the completion of the VE workshop, a preliminary VE report encompassing the entire VE effort is prepared by the VE team leader and submitted to the Industry Management.

Out of these Five phases we are going to use the Creative phase of VE to Optimize the products.

3. APPLICATION OF CREATIVE PHASE TO VARIOUS FURNITURE PRODUCTS:

3.1 Bed (Divan)



Fig. 1- Image of Bed

This is the most common thing found in every house and it is made by most of the furniture manufacturers so it becomes important to apply concepts of value engineering to reduce the overall cost without compromising the quality of the product. By performing brainstorming sessions following techniques/conclusions were obtained to achieve it.

- i. At the initial phase try to make the design as simple as possible to improve the manufacturability hence increasing the productivity.
- ii. By Reducing the gauge/diameter of the pipe frame used which in turn will require less material, decrease its weight and also its cost.
- iii. Reduce the thickness as well as size of the board.
- iv. Instead of using steel M.S. can be used which is cheap and has good machinability this will increase the productivity and decrease the cost.
- v. Reuse the waste material where ever possible to reduce the overall cost.
- vi. To make the legs of the bed foldable so that it can be convenient for transportation for manufacturers as well as customers.

3.2 Computer desk



Fig. 2- Image of Computer desk

Computers is the need of the hour , so its industry is rapidly increasing and to keep/store the computer safely and conveniently therefore the demand of computer desk is also high. So following are the ideas which can be applied to decrease the cost and improve the productivity of the product.

- i. Instead of making complicated design a simpler design can be proposed at the initial phase of manufacturing.
- ii. Cheaper frame material can be used.
- iii. Instead of using square pipes, triangular pipes can be used as they cover less area as compared to square or circular pipes without compromising the load carrying capacity.
- iv. Wheels can be attached at the bottom of the supports to improve the maneuverability.
- v. Reduce the thickness of the board and the gauge of the pipe.
- vi. Reduce the number of compartments or combine any two compartments to decrease the complexity of design/manufacturing and increase the productivity.
- vii. Avoid using fancy paints or decorative items to improve the aesthetics of the product, this simply adds to the cost of the product without giving any physical output.

3.3 Chair

In furniture industries, manufacturing of chair is very common because every office, school, house needs it. Therefore it becomes necessary to think of ideas which can reduce its cost and increase its quality, productivity by conducting brainstorming sessions. Following ideas can be implemented to achieve it.

- i. Making a design of a chair by considering minimum ergonomic conditions, this can reduce the complicated processes required while manufacturing.
- ii. The number of supports/legs can be decreased from four to three which will decrease the material required hence reducing the cost of the chair. It can be implemented as shown in following figure.



Fig. 3- Before and After Images of a chair

- iii. Waste material should be reused as far as possible to decrease the overall new material required.
- iv. It should be made in powder coating.
- v. It should be made foldable that is it should be hinged at back of the seat location which will make it easily foldable and transportation will become convenient.

4.CONCLUSION:

In this paper we have successfully applied one particular aspect of value engineering that is creative phase to various furniture products to decrease the cost, increase productivity and quality. We had conducted several brainstorming sessions to discuss the ideas proposed in this paper and we believe that even if some of the ideas are implemented by the furniture industries then the customers as well as the manufacturers can get optimum product without compromising on other qualities.

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